



ENVIS Newsletter Forest Genetic Resources & Tree Improvement

VAN VIGYAN

INSTITUTE OF FOREST GENETICS AND TREE BREEDING
(Indian Council of Forestry Research and Education)

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From the Director's Desk

The ENVIS Resource Partner on FGR-TIP brings to the readers latest information on various aspects of forest genetic resources and tree improvement in the form of articles, reports and documents to strengthen the field of forestry science. A large sector of the rural population are dependent on forest genetic resources for livelihood security and poverty alleviation. This newsletter highlights one such species, *Calophyllum inophyllum*, a potential tree borne oilseed which is gaining popularity. The newsletter also provides details of the latest publications brought out in the areas of forest genetics and tree improvement worldwide. The ENVIS team sincerely looks forward to your suggestions and feedback and seeks your support and co-operation.

Director, IFGTB

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Know Your Trees - *Calophyllum inophyllum* Linn.

Introduction

Calophyllum inophyllum Linn. is a large evergreen tree species which is commonly called as Alexandrian laurel, Beach *Calophyllum*, beauty leaf, Indian doomba oil tree, Indian-laurel, red poon and in Tamil its called as Punnai. It is a low-branching and slow-growing tree with a broad and uneven crown structure. It usually grows 8 to 20 m in height (Mabberley, 1997).

Taxonomic classification

Kingdom	–	Plantae
Division	–	Magnoliophyta
Class	–	Magnoliopsida
Order	–	Theales
Family	–	Clusiaceae
Genus	–	<i>Calophyllum</i> L.
Species	–	<i>inophyllum</i> L.

Distribution and Habitat

C. inophyllum is an evergreen tree species that gives us oil seed. It is a large tree of shorelines and coastal forest areas. Normally it grows in open areas and it can become wider crowns. *C. inophyllum* L. (2n=32) known as Punnai in Tamil, is a member of the Clusiaceae or Mangosteen family. It is a native to tropical Asia, east Africa and extends to Australia. It is widespread in India, Malaysia, Indonesia, Srilanka, Philippines, Myanmar, Taiwan, Thailand, Hawaii and other Paific Islands. It grows well in sandy and well drained soils distributed upto an elevation of 800 m and withstands a temperature range of 18 to 33°C and rainfall of 1000 to 5000 mm. *C. inophyllum* leaves are in opposite, dark green, shiny, hairless, broadly elliptical, 10–20 cm long, 6–9 cm wide, perpendicular to the midrib. It bears a cluster 4–15 fragrant white flowers that measures 2.5 cm across 0.8–1.4 cm long,



sturdy stalks in leaf axils. Petals (or inner tepals) 4–8, oblong, Stamens about 210 – 360 per flower. Flowering can occur perennially, but usually two distinct flowering periods are observed, in late spring and in late autumn. The *C. inophyllum* tree blooms twice annually with fragrant, white flowers, which later yield clusters of yellow-skinned spherical fruit nut. Fruits-drupe, globed, green and ripening yellow, cluster 2–5 cm, seed rounded.

Reproductive biology and breeding system

The flowering period is reported to vary depending on the area. In Tamil Nadu, the tree flowers during December-January and in Kerala, March-April. In some areas two flowering seasons have been observed as in the cases of Orissa (May –





June and October – November). In Andaman profuse flowering occurs during the rainy season and to a smaller extent at other times of the year. Fruiting season also vary. Tamil Nadu: March; Kerala: May-June, Orissa: July- August and December-January and Andaman: June-August. *C. inophyllum* is a predominant outcrossing plant. This is evident from the pollination experiments as 64.50% of geitonogamy flowers yielded viable fruits and seeds. Pollen viability test, percentage of pollen germination gave clear cut evidence that *C. inophyllum* does not have any constraint for pollination under natural conditions. Pollen production in plant depends upon several factors including season, anther length, pollen grain size and more anther dehiscence (Stanley and Linskens, 1974). In *C. inophyllum* fruit set self-pollination was very low (12.50%) when compared to the manual cross pollination (64.50%), which indicates a weak

phenomenon of self-incompatibility. Interestingly, fruit set even under manipulated conditions was only 28.50%, compared with that of un-manipulated flowers, since there was no spontaneous autogamy as indicated by lack of fruit set in un-manipulated and manipulated flowers in *C. inophyllum*. The pollination system exhibited by of *C. inophyllum* is entomophily.

In pollination experiments, hand pollination resulted in more fruit set than natural pollination and this confirms pollination deficit in this species and is mainly attributed to the lack of pollinators or lower effectiveness of the pollinators. In this species the main pollinators are honey bees and are known for effective pollination as compared to other bee species. It was observed that honey bees were responsible for pollination by bringing the stigmas near to the anther for transferring pollen grains.

Fruit collection and processing

Mature fruits of *C. inophyllum* with yellowish green coat or testa are collected during the peak fruiting season. The peak season varied from location to location and it ranged from July to December. Fruits can be collected from trees by climbing and picking individual fruits or lopping off branches using pruning poles. Ground collection of fruits is also advisable. Processing was carried out manually by peeling off the leathery testa using knife. Seed storage behaviour is recalcitrant the seeds are very oily, quickly loss its their germinative power.





It is found to be desiccation and low temperature sensitive with high seed moisture during maturity. Seeds can be stored in sealed polythene bags within a temperature range of 10 to 20°C. The tree can usually be grown from seed without difficulty, provided the seed is sown soon after ripening. Complete removal of the seed shell is very effective in improving the germination to more than 90%.

Germination

To raise seedlings, fresh nuts were sown in mother bed filled with river sand as medium. The beds were maintained under green shade net to minimize insolation. In order to hasten germination in stored nuts, the shell needs to be removed carefully and the exposed kernel alone can be sown. In such cases it took only about 25 days for first emergence. The depth of sowing is 0.5 feet from the



Seeds Germination on Mother bed



Seeds Germination Stages

surface of the medium. The beds need to be watered regularly to maintain sufficient moisture. After 40 days, the germinated seedlings were transplanted to polybags (size 13 x 25 cm) filled with sand, red earth and farm yard manure in the ratio 1:2:1 after 45 days of germination. The seedlings in the polybags were hardened for minimum period of 6 months before field planting.

Vegetative propagation

Vegetative propagation has become an inevitable tool for tree domestication and increasing the productivity through breeding. The experiment on apical and non-apical cuttings on rooting shown that apical cuttings were superior to non-apical cuttings. Varied combination and concentration of different hormones were stimulating the rhizogenesis of elite genotype of *C. inophyllum* cuttings with the two components and three component mixtures the percentage increase in rooted cuttings was in range of 64.38% to 30.75%. A higher yield of rooted cuttings was achieved in two combinations (IAA+IBA 500 ppm). IBA and IAA exerted a synergistic action on the effectiveness on rooting which become evident not only in a higher yield of rooted cuttings but also in an improved root system of stimulated cuttings. Auxins in combination also had stimulation effect on shoot particularly in the number if cuttings showing sprouting, although the shoot length was significantly different from



Hormonal Variations



Root Penetration

control as far as two components combination was concerned. Interestingly flowering was also observed at the end of 3 month of transplanting. Flowering capacity of cuttings by the end of 3 months period indicated the maintenance of mature state and lack of rejuvenation of cuttings.

Planting techniques and post planting operations

Usually spacing of 2 X 3 m or 4 X 4 m adopted for plating size of pits should be 45 x 45 x 45 cm. It is regarded as a slow growing species fertilizer can



Non-Apical Cuttings



Apical Cuttings

boost its initial growth. Watering should be done twice weekly in the initial years. Weeding has to be carried out once a month during summer and at fortnightly intervals during rainy season.

Pest management

The tree does not have many pest problems. Thrips may attack new leaves, but the trees usually outgrowth the infestation and no more treatment is needed. Fungus rot may affect adult trees. A fungal pathogen namely, *Leptographium calophylli* (*Verticillium calophylli*) causing vascular wilt disease

was detected on *C. inophyllum* in the Seychelles (Hill *et al.*, 2003). The scale insects, such as, mealybug and aphids could be kept under control by foliar spraying of botanicals or eco-friendly insecticide viz. *Jatropha* oil at the concentration of 3ml/ 100 ml water.

Agroforestry practices

It is grown as part of the mixed garden agroforestry systems mainly in Pacific islands. In the



Solomons, *C. inophyllum* has been traditionally retained or planted along with other trees such as breadfruit, sago palm, *Terminalia*, *Burckella*, *Pometia* and *Canarium* in fallow yam and sweet potato fields (Yen, 1976)

Tree Improvement

Extensive field surveys were carried out in various states of South India and Andaman Islands to identify potential populations of *C. inophyllum*. After the survey, a total of 144 individuals representing 18 populations were selected for investigation that includes 72 from Tamilnadu, 40 from Kerala, 8 from Pondicherry and 24 from Andaman Islands. From the selected individuals representing various populations, a half-sib progeny trial was established at Panampally (Kerala). Growth data were recorded in the half-sib progeny trial at regular intervals of 6, 12, 18 and 24 Months After

Planting (MAP). Significant differences were observed in growth attributes of 36 half-sib progenies in field condition. In the field condition, CA 22 (Nagercoil) for height, CA 49 (Chennai) for collar diameter, CA 75 (Kollam) and CA 47 (Chidambaram) for average crown spread and CA 75 (Kollam), CA 49 (Chennai) and CA 79 (Kollam) for number of branches were found to be superior half-sib progenies compared to the rest of the half-sib progenies. The studies on the clonal testing of 30 clones of *C. inophyllum* CA 2 (Aliyar) for height, CA 34 (Kanyakumari) for number of branches and CA 76 (Kollam) for collar diameter and average crown spread when compared to rest of the clones. Among the different traits studies, the clones showed moderate repeatability and genetic advance as percentage of mean observed for the collar diameter. The study reveal that significant variability exists between the clones and half-sib progeny which could be exploited in future tree improvement programs. As the species has great scope for improvement programme can be taken up for release of better clonal varieties for higher biodiesel production.

Currently, IFGTB is working towards popularization of *C. inophyllum* among farmers, industries, forest corporation and forest department as an alternative species for bio-fuel. The individual Candidate Plus Trees (CPTs) were analysed for kernel oil content arrived at a threshold oil percentage of 55% and above to identify high oil yielding CPTs. Out of these, 40 high oil yielding CPTs were shortlisted and deployed for raising multilocation trials at Salem, Gudalur (Chennai) and Neyveli. The list of CPTs with high oil content is given below (anandalakshmi, *et al.*, 2012).

***C. inophyllum* CPTs with high oil content**

S.No	Location	Clone No.	No. Fruits / FL	Kg Nuts / Tree	Oil %
1	Alapuzha	CA18CT7	21	7.14	61.17
2	Alapuzha	CA18CT2	15	8.4	60.37
3	Alapuzha	CA18CT12	16	7.5	58.50
4	Aliyar	CA1CT1	18	10.2	59.55
5	Aliyar	CA1CT5	15	9.4	56.84
6	Aliyar	CA1CT4	17	8.13	62.88
7	Coimbatore	CA2CT8	18	7.5	63.45
8	Coimbatore	CA2CT91	19	2.5	60.05
9	Anaikatti	CA2CT4	16	8.2	56.70
10	Chidambaram	CA8CT15	18	8.7	68.9
11	Chidambaram	CA8CT13	14	9	58.44
12	Chidambaram	CA8CT5	19	7.92	57.78
13	Coutrallam	CA6CT4	19	9.64	61.52
14	Coutrallam	CA6CT5	18	10.68	58.78
15	Coutrallam	CA6CT3	18	10.31	58.04
16	Kanyakumari	CA7CT7	15	6.82	68.55
17	Kanyakumari	CA7CT3	17	9.57	63.67
18	Kanyakumari	CA7CT1	17	9.26	65.74
19	Kasargod	CA5CT9	15	6.66	58.04
20	Kasargod	CA5CT8	19	9.66	67.24
21	Kasargod	CA5CT7	19	6.35	68.55
22	Kollam	CA4CT6	20	9.63	55.57
23	Kollam	CA4CT3	18	8.60	56.82
24	Kollam	CA4CT5	16	8.80	57.45
25	Nagapattinam	CA14CT7	17	9.5	72.05
26	Nagapattinam	CA14CT8	17	9.25	70.24
27	Nagapattinam	CA14CT1	16	9.8	66.16
28	Nagerkoil	CA3CT3	20	9.65	70.85
29	Nagerkoil	CA3CT1	22	4.8	63.75
30	Nagerkoil	CA3CT9	16	8.88	61.6
31	Shengottai	CA9CT31	18	1.48	65.74
32	Shengottai	CA9CT6	16	10.32	65.59
33	Shengottai	CA9CT1	18	10.66	63.15
34	Trivandrum	CA10CT1	19	8.65	61.9
35	Trivandrum	CA10CT2	18	9.1	59.52
36	Trivandrum	CA10CT6	18	9.45	58.65
37	Noyyal	CA15CT2	16	8.50	59.21
38	South Andaman	CA19CT2	16	11.18	55.52
39	Karaikkal	CA13T1	16	7.5	60.87
40	Pondicherry	CA11T5	16	7.94	58.39

Uses

It is a potential species valued for its seed oil. Research on biofuel efficiency of the oil has recommended the species as a promising petrocrop. *C. inophyllum* is one of the bioshield species amenable for planting along shoreline as it can withstand salt spray. It is reported that the typical yield of an adult tree is around 5kg of cold pressed oil is produced for every 100kg of fruit (Friday and Okano, 2006). Its benefits and versatility are now increasingly known and accepted in the modern world. *C. inophyllum* is renowned for its remarkable healing properties and its oil has been used to treat diabetic sores, psoriasis, herpes and hemorrhoids (Dweck and Meadows, 2002). Seeds of *C. inophyllum* are found to contain several known coumarins, including the potent HIV reverse transcriptase inhibitors. Seed oil studies of *C. inophyllum* indicate that the oil may have economic possibilities in the food industry. The timber of this species referred to a 'Bintagor' is of superior quality and is popularly traded in South-East Asian countries. However, in South India the oil from this species has been recognized since ages for its lighting utility and medicinal value. Presently the *Calophyllum* oil, even without transesterification, has been proved very useful in running small motor engines, pumpsets etc. by farmers in Tamil Nadu.

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- R. Anandalakshmi, T. Vamadevan,
V. Sivakumar and S. Sureshkumar.**
Institute of Forest Genetics and Tree Breeding,
Coimbatore

Choice of species for Windbreaks – A review

Windbreaks has multiple benefits such as i) Micro-climate moderation, ii) potential for reducing the soil erosion, iii) increasing crop productivity, iv) water productivity and v) potential for simultaneous production of food and wood. To harness these benefits, windbreaks are being established countries like USA, Australia, China, particularly in Canada where nearly 50% of farm fields are reported to have windbreaks. However, in India, research and development on windbreaks is dismal. Institute of Forest Genetics and Tree Breeding (IFGTB), Coimbatore took initiatives in promoting windbreaks with specific objective of addressing the recurrent problem of crop damages due to windstorms. As an outcome of a research initiative, IFGTB released five superior clones of Casuarina suitable for windbreaks namely IFGTB-WBC-1, IFGTB-WBC-2, IFGTB-WBC-3, IFGTB-WBC-4 and IFGTB-WBC-5 (Buvanewaran *et al.*, 2018). These windbreak clones have ideal branching traits that suit as windbreak such as i) production of more number of branches, ii) persistence of branches, iii) thicker and horizontally spreading branches. Besides better branching traits, these windbreak clones also have fast growth rate (height growth of 2.5 to 3 m per year and diametrical growth of 1.5 to 2.0 cm per year) in turn leading to higher productivity i.e. 40% increase in yield when compared to other commercial clone in the market. In continuation to this efforts in promotion of windbreak, the future research focuses will be on i) Developing superior phenotypes of species other than Casuarina and also indigenous species for Windbreaks through ideotype breeding programme, ii) Researches on clone specific Tree-crop interactions under Windbreak Agroforestry systems, iii) Assessing the potential of Windbreaks for increasing water productivity with particular reference to dry land agroforestry and iv) Scope of Deploying Windbreaks

for increasing fruit-set in fruit orchards and tree seed orchards.

Review on choice of species suitable for windbreaks other than Casuarina reveals that there are tree species very commonly known to our country that have been used as windbreaks viz., i) *Azadirachta indica*, ii) *Thespesia populnea*, iii) *Calophyllum inophyllum* iv) *Erythrina variegata*, v) *Bambusa sp.* vi) *Gliricidia sepium* vii) *Araucaria heterophylla* viii) *Bauhinia racemosa*

1. Neem (*Azadirachta indica*): One of the most notable neem planting programmes is that in the Majjia Valley of the south-central Niger. In this area, strong winds removed topsoil which, when deposited on newly planted crops, covered and destroyed them. In 1974, CARE International began a programme to help the people of the Majjia Valley and planted windbreaks. Neem was the principal species used and local residents were encouraged to establish neem nurseries for the programme. Today, there are more than 500 km of double-row windbreaks in the Majjia Valley which protect the millet and sorghum crop. Crop yields in protected areas have increased by 13 to 23 percent since the planting programme began. In addition to protecting crops, the wind-breaks provide fuelwood and shady lanes connecting villages to farmers' fields (Ciesla, 1993). Brenner *et al.* (1991) also reports that they conducted their experiments in



the windbreaks which were made up of a double row of six-year-old neem (*Azadirachta indica* A. Juss.) planted 4 m apart in 2-m wide rows on a triangular planting pattern in Sahel.

2. Milo (*Thespesia populnea*): Milo is an excellent windbreak in coastal areas due to its dense crown and tolerance of wind and salt spray. Further, Milo does not self-prune and low branches persist in the main stem. When planted as windbreak, Milo should be combined with taller and thinner canopy trees like Casuarina (Friday and Dana Okano, 2006). Milo is an early Hawaiian introduction with beautiful wood used for making bowls and other products. It is very wind tolerant and grows to a height of about 30 feet (Joy, 2006). Because of the tolerance of saline conditions, Milo is suitable for coastal erosion control, and is planted for this purpose, often as a living fence, in Karnataka, India (Orwa *et al.* 2009).



3. Indian Laurel tree (*Calophyllum inophyllum*) It is a hardy tree, native to tropical coastal areas and can survive against wind, salt spray and drought. Due to the tolerance to harsh environmental condition, this species has been planted in southern part of Java Island (Indonesia) to conserve coastal areas and provide windbreak (Leksono *et al.* 2018). *Calophyllum inophyllum* L. is a useful tree for coastal shelterbelts, windbreaks, and strand reforestation

because it grows well despite the wind, salt spray, drought, and occasional flooding common to beach environments. It even withstands typhoons. When *Calophyllum inophyllum* is planted as shelterbelts or windbreaks or as border planting in farms, the tree form is often irregular and branchy – which is more effective for windbreaks (Friday and Dana Okano, 2006).



4. Tropic Coral (*Erythrina variegata*): Joy (2006) reports that in recent years, 'Tropic Coral' has been the most popular windbreak tree in Hawaii. The columnar form of Tropic Coral tree with erect branches is often used for hedges, windbreaks and living fence posts. Further, 'Tropic Coral' trees have strong and vertical root systems that does not seem to compete too severely with adjoining crops, This cultivar "Tropic Coral" should be propagated through cuttings only (large cuttings) for use in windbreaks, not through seeds, to ensure the column-shaped form (Whistler and Elevitch, 2006).

5. Bamboos (*Bambusa sp.*): Clumping bamboo makes an excellent windbreak and isn't difficult to keep from spreading. For example, Oldham bamboo (*Bambusa oldhamii*) is popular in New Zealand for windbreaks and produces edible shoots (Joy, 2006). In experiment in Hawaii, several different bamboo species were identified as excellent multi-purpose

plants that are non-invasive, wind-resistant and rapid-growing, with results indicating *Bambusa heterostachya*, *Bambusa oliveriana* and *Bambusa lako* among the best species for rapidly establishing windbreaks on Oahu (Santo *et al.* 2008). Tewari *et al.*, (2015) reports that bamboos can be planted as windbreaks on the boundaries of agriculture field and orchards for protecting them from high speed wind. He also reports that the boundaries of Mango orchards in tarai areas of Nepal are planted with one or two rows of *Dalbergia sissoo* and *Dendrocalamus strictus*. Banik *et al.*, (2008) also recorded that in many parts of West Bengal in India, the clumps of *Bambusa balcooa*, *B. bambos* and *B. nutans* have been cultivated in close spacing in one to two rows along the north western sides of rice fields as windbreaks against the dry and cold wind blowing from Nepal and Bihar.

6. Other species : Other species like *Gliricidia sepium*, *Araucaria heterophylla*, *Bauhinia racemosa* have also been reported as suitable species for windbreaks (Joy, 2006)

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C. Buveneswaran

Institute of Forest Genetics and Tree Breeding,
Coimbatore

ENVIS ACTIVITIES

OBSERVANCE OF 'INTERNATIONAL DAY FOR BIOLOGICAL DIVERSITY - 2019' BY IFGTB ENVIS, COIMBATORE

ENVIS Resource Partner on Forest Genetic Resources and Tree Improvement at IFGTB, Coimbatore observed the 'International Day for Biological Diversity - 2019' on 22nd May 2019. In order to create awareness about the importance of biodiversity a poster on the theme '**Our Biodiversity, Our Food Our Health**' was released by Dr Mohit Gera, IFS., Director, IFGTB. Dr B. Nagarajan, Scientist – G & Head of Forest Ecology & Climate Change and Dr Kannan C.S. Warriar, Scientist-F & Coordinator ENVIS spoke on the theme during the occasion. All Scientists, ENVIS staff, Research scholars, field staff and interns actively participated in planting of tree saplings. A pledge to preserve the biodiversity was taken by all on this occasion. IFGTB ENVIS also distributed awareness handouts on the importance of biodiversity conservation to the research scholars, IFGTB Staff and interns.



ENVIS Resource Partner on Forest Genetic Resources and Tree Improvement
 Institute of Forest Genetics and Tree Breeding
 Ministry of Environment, Forest and Climate Change
 (Indian Council of Forestry Research & Education)
 PB No. 1061, Forest Campus, R. S. Puram PO, Coimbatore - 641002

INTERNATIONAL DAY FOR BIOLOGICAL DIVERSITY

22 MAY-2019

'OUR BIODIVERSITY, OUR FOOD, OUR HEALTH'

Why Biodiversity is Important

- 70% of India's population depends on various ecosystems for food, medicine, livelihood, fuel, shelter, etc.
- More than 90% of crop varieties have disappeared in the last 100 years.
- Half of the domestic animal breeds have been lost.
- All 17 main fishing grounds in the world are now being fished at or above their sustainable limits.
- More than 27,000 species (flora & fauna) in the world are threatened with extinction.

IMPACTS OF LOSS OF BIODIVERSITY

HABITAT CONVERSION

- Decline in natural habitats
- Homogenization of species composition
- Natural resource degradation
- Urbanization

INVASIVE ALIEN SPECIES

- Genetic contamination
- Competition with native species
- Transformation of ecosystem
- Habitat degradation

OVER EXPLOITATION

- Extinction
- Change in land use pattern
- Depletion of natural resources
- Uneven sustainability

VULNERABILITY

- Coastal communities have suffered from unpredicted floods due to loss of mangroves & coral reefs

HEALTH

- Loss of biodiversity may result in non-availability of balanced diet which in turn affect the well being of the people

AMPHIBIANS 40%	MAMMALS 25%	CONIFERS 34%
BIRDS 14%	SHARKS & RAYS 31%	REEF CORALS 33%
SELECTED CRUSTACEANS 27%		

RED LIST CATEGORY (flora & fauna)

- Extinct - 872
- Extinct in The Wild - 69
- Critically Endangered - 5914
- Endangered - 9175
- Vulnerable - 12,070
- Near Threatened - 6187
- Data Deficient - 15,215
(Source: IUCN, 2019)

BIODIVERSITY TO BE CONSERVED FOR HUMAN WELL-BEING

- For improved food security and better nutrition, mainstream the biodiversity in agriculture, fisheries and forestry
- Help native pollinators
- Restore natural habitats
- Reduce usage of hazardous pesticides and fertilizers
- 5Rs-Refuse, Reduce, Reuse, Repurpose, Recycle
- Integrate climate change measures in strategic planning

Poster No.04/IFGTB-ENVIS May 2019

**RELEASE OF THE "TAMIL
VERSION" OF THE MOBILE
APP "FOREST TREE DISEASES"
BY IFGTB ENVIS,
COIMBATORE**

The Tamil Version of the Mobile App "Forest Tree Diseases" (Diseases Management in Forest Plantations and Nurseries) developed by ENVIS Resource Partner on Forest Genetic Resources and Tree Improvement at IFGTB, Coimbatore was released by Hon'ble Dr Suresh Gairola, IFS., Director General, Indian Council of Forestry Research & Education, Deharadun on 24.05.2019 at IFGTB, Coimbatore in the august presence of Dr Mohit Gera, IFS., Director, Dr S. Murugesan, Scientist-G & GCR, Officers and Scientists of the IFGTB. Dr Kannan C.S. Warriar, Scientist-F & coordinator ENVIS briefed about the salient features in the Tamil Version of the Mobile App.





ENVIS Resource Partner on Forest Genetic Resources and Tree Improvement
வன மரபுவளம் மற்றும் மரமேம்பாட்டுக்கான சுற்றுச்சூழல் தகவல் பங்களிப்பாளர்

RELEASE OF MOBILE App
அலைப்பேசி செயலி வெளியீடு

ON

DISEASE MANAGEMENT IN FOREST NURSERIES & PLANTATIONS
வன நாற்றங்கால்கள் மற்றும் தோப்புகளில் நோய் நிர்வாகம்

TAMIL VERSION



By
Dr Suresh Gairola, IFS
Director General, ICFRE

in the presence of
Dr Mohit Gera, IFS
Director, IFGTB

Institute of Forest Genetics and Tree Breeding
(Indian Council of Forestry Research & Education)
P.B. No. 1061, Forest Campus, R.S. Puram (PO), Coimbatore - 641 002

வன மரபியல் மற்றும் மரப்பெருக்கு நிறுவனம்
(இந்திய வன ஆராய்ச்சி மற்றும் கல்விக்கழகம்)
த.பெ.எண். 1061, வன வளாகம், ஆர்.எஸ்.புரம் (அஞ்சல்), கோவை - 641 002

OBSERVANCE OF WORLD ENVIRONMENT DAY 2019

IFGTB ENVIS Resource Partner on Forest Genetic Resources and Tree Improvement at Institute of Forest Genetics and Tree Breeding (IFGTB), Coimbatore observed the 'World Environment Day 2019' on 05th June -2019 by releasing 02 awareness posters on the theme **“Beat Air Pollution”**. Handouts of the awareness posters were distributed to the students of various schools in and around Coimbatore.



ENVIS Resource Partner on Forest Genetic Resources and Tree Improvement
 Institute of Forest Genetics and Tree Breeding (Indian Council of Forestry Research & Education)
 Ministry of Environment, Forest and Climate Change
 PB.No. 1061, Forest Campus, R.S.Puram PO, Coimbatore - 641002

WORLD ENVIRONMENT DAY
 05 JUNE 2019
BEAT AIR POLLUTION

We can't stop breathing, but we can do something about the quality of air that we breathe

Approximately 7 million people worldwide die prematurely each year from air pollution, with about 4 million of these deaths occurring in Asia-Pacific.

World Environment Day 2019 will urge governments, industries, communities, and individuals to come together to explore renewable energy and green technologies, and improve air quality in cities and regions across the world.

92% of people worldwide do not breathe clean air	\$5 trillion of global economy every year spent towards welfare of air pollution	26% Ground-level ozone pollution is expected to reduce staple crop yields by 2030	9/10 worldwide are exposed to levels of air pollutants that exceed safe levels set by the WHO.	3.8 million premature deaths are caused by indoor air pollution every year
400,000 premature deaths caused by transport emissions	24% of all greenhouse gases emitted from agriculture, forestry and other land-use worldwide.	40% waste is openly burned	Energy production is a leading source of air pollution in many countries,	Other sources Volcanic eruptions, dust storms and other natural processes

Dust Storms **House Hold** **Industrial Pollution** **Transport Pollution** **Openly Burned** **Volcanic Eruption**

Beat Air Pollution | WORLD ENVIRONMENT DAY | CHINA 2019 | UN environment

Poster No.05/IFGTB-ENVIS - June 2019

IFGTB PRODUCTS



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 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 , ACTO, 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		
	Tissue Culture Teak Plants	Rs. 25.00 per plant		
2.	Windbreak Clones (WBC-1, WBC-2, WBC-3 & WBC-4)	Rs. 4 per plant		Dr. C. Buvanewaran , Scientist- F, Silviculture & Forest Management Division, Phone : 0422 2484198, 94422 45047 E-mail : buvanesc@icfre.org
3.	ArborEasy® DNA Isolation Kit	Price Rs.	Packaging & Transportation Rs.	Dr. Modhumita Dasgupta , Scientist-F, Division of Plant Biotechnology, Phone : 0422 2484123 E-mail : ghoshm@icfre.org gmodhumita@gmail.com
	Pack Size			
	10 Reactions	950.00	150.00	
	20 Reactions	1900.00	200.00	
	50 Reactions	4750.00	300.00	
4.	Soil Testing (pH, EC, OC, Micro and Macro Nutrients)	Rs. 2850.00		Dr. A.C. Surya Prabha , Scientist-C, Silviculture & Forest Management Division, Phone : 0422 2484150 E-mail : acsuryaprabha@icfre.org
5.	Phytosanitary Certificate	Rs.100.00 + Tax per application		Dr. John Prasanth Jacob , Scientist- G, Forest Protection Division, Phone : 0422 2484159 E-mail : jacob@icfre.org
Products of IFGTB: For Sale & Booking				
6.	Hy-ACT (Natural and Seed Oil Based Biopesticide)	Rs. 80.00 per bottle		Dr. N. Senthilkumar , Scientist-E & Head, Division of Chemistry & Bioprospecting, Phone : 0422 2484193 Mobile : 9629160703 E-mail : senthilnk@icfre.org
	Tree PALH (Natural and Seed Oil Based Biopesticide)	Rs. 80.00 per bottle		
	Crawl clean (Plant Based Green Insecticide)	Rs. 25.00 per packet		
				(or)
	Tree Rich Biobooster (Instant Organic potting mixture for home garden, terrace and kitchen garden)	Rs. 50.00 per packet		Smt. R. Sumathi , ACTO Division of Chemistry & Bioprospecting, Phone : 0422 2484144 Mobile : 9942245542 E-mail : sumathir@icfre.org
	Tara Red Jam (with natural fruit colorant)	Rs. 60.00 per bottle		

ABOUT IFGTB

Institute of Forest Genetics and Tree Breeding (IFGTB), Coimbatore is a National Research Institute under the Indian Council of Forestry Research and Education. 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 ENVIS

ENVIS established by the Government of India, in 1982 has been on 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 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 ENVIS Newsletter issues! The ENVIS Resource Partner at 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 ENVIS Newsletter, Van Vigyan, a quarterly publication, publishes original research articles, reviews, reports, research highlights, news-scan etc., related to the thematic area of the ENVIS 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.

ENVIS Team

Director

Dr Kannan C.S. Warriar
Scientist F and Coordinator, ENVIS

Dr Rekha R. Warriar
Scientist F and Editor

S. Vigneswaran
Programme Officer

Dr T. Vamadevan
Information Officer

V. Thangavel
IT Officer

G.V. Subha Shree
DEO

INSTITUTE OF FOREST GENETICS AND TREE BREEDING

Forest Campus, P.B. No. 1061, RS Puram HPO, Coimbatore - 641 002

Phone : 91 422 2484100; Fax : 91 422 2430549

Email: ifgtb@envis.nic.in, kannan@icfre.org; Web : www.ifgtbenvis.in, ifgtb.icfre.gov.in

Views expressed in this newsletter are not necessarily those of the Editors or of the Institute of Forest Genetics and Tree Breeding