



ISSN: 2394-7543

ENVIS Newsletter Forest Genetic Resources & Tree Improvement

- Volume 2 Number 3
- A Quarterly Issue
- October - December 2015

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(Indian Council of Forestry Research and Education)

From the Director's Desk

IFGTB's FGR-TIP-ENVIS quarterly newsletter covers issues related to genetic resources, their management and utilisation. The IFGTB, which has a mandate to enhance productivity of tree crops by evolving varieties of species used in afforestation and social forestry, has been undertaking long-term research work to increase wood production in plantations to meet the different end uses like timber, poles, pulpwood, fuelwood and other non-timber products. Seed and clone varieties of *Acacia*, *Casuarina* and *Eucalyptus* capable of increased pulpwood production in a short rotation of 3 to 5 years are being supplied to tree growers like farmers, industries and forest departments. Clones have also been made available to different industries and research institutions under Material Transfer Agreement for including in their farm forestry programmes. Capacity building programmes have also been developed in areas of soil health management, forest health management bio-manure application and other frontier technologies. The present issue covers aspects of health status and soil testing, which are integral components of tree improvement activities.

R.S. Prashanth
Director

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Know Your Trees - *Cedrus deodara* Loud.

Cedrus deodara Loud.

Synonyms: *C. libani* Barr. var. *deodara*, Hook. f.; *Pinus deodara* Roxb. Vern.

Common names

Devadāru in Sanskrit; *Devadāror dāru* in Hindi, Himalayan cedar, deodar, Didr, Dedwar, kelu, kilar, Badra daru, Toona, Toon, Suradaru, Devataram, Snehavidha, Devdari, Pahari-keli

Distribution and Habitat

This species is native to the western Himalayas in eastern Afghanistan, northern Pakistan (especially in Khyber Pakhtunkhwa and the regions of Azad Kashmir), Jammu and Kashmir, Himachal Pradesh and Uttarakhand states, southwestern-most Tibet and western Nepal, growing at elevations of 5,000 - 10,500 feet (1,500 - 3,200 m) above sea level. Its eastern natural limit is in the valley of the Dahliya river, a branch of the Aleksandra river in Garhwal, below the Nitti pass. The altitudinal range of what may be termed the deodar belt varies in different localities, while it is usually higher on southern than on northern aspects; this belt is a well-marked one, and the species often forms pure crops.



Botanical Description

A very large evergreen tree with dark green, or in some cases silvery, foliage; the form with silvery-blue foliage is conspicuous and handsome. Branches horizontal or slightly ascending or descending, not whorled but arising irregularly from the stem. Extremities of leading

shoot and branches drooping in normal young to middle-aged trees, stiffer on stunted slow-growing specimens. Up to middle age the tree has a conical crown with a definite leading shoot, but in later life the crown becomes rounded or broad and flat with spreading horizontal branches, the flat-topped formation being sometimes hastened by injury to the leading shoot or by the action of the wind in exposed situations. Leaves acicular, stiff, 2.5-38 cm long, on the normal long shoots spirally arranged, on the side shoots in pseudo-whorls. On the branchlets the successive years of growth are marked by rings of reserved bud scales marking the points of junction between the successive years shoots; on the arrested shoots also a fresh ring of small brown recurved scales marks each year's growth. Bark grayish brown, with vertical and diagonal cracks dividing it into irregular oblong scales.

Leaf-Shedding

The new shoots appear in March or early April, small pale green opening buds, marking their first appearance. The old leaves are shed for the most part in the hot season, chiefly in May, but leaf-shedding may also take place to some extent in the autumn, about the time the cones ripen. The persistence of the leaves varies. On vigorous saplings they do not persist so long as on older trees with slow growing branchlets. In the former case they may fall the year following their first appearance, while in the latter case they may persist, in part at least, as long as six years, this applies both to the whorls of leaves on the arrested branchlets and to the solitary leaves which are spirally arranged on the normal shoots.



Various stages of cone development

Flowering and Fruiting

Male flowers

The male flowers, sometimes termed catkins, first appear in June, by the end of which month they become clearly visible at moderate elevations. They ripen and shed their pollen from the middle of September to the middle of October, according to locality and season. The male flowers are solitary and erect at the ends of the arrested branchlets, and are found along the upper sides of the branches. When young they are pale green. Before ripening they are yellowish green with a purplish tinge, oblong ovoid, 2.5-4.6 cm long by 1.0-1.5 cm diameter. On opening they elongate rapidly to 5-7.6 cm in length, and become yellow with pollen. Trees covered with ripe male flower show a blaze of yellow on the upper sides of their spreading branches, and the pollen is blown far and wide by the wind, particularly on sunny days, when it may be observed in dense yellow clouds. The majority of the male flowers do not remain long on the tree after ripening, particularly if showers of rain occur to dislodge them when they fall to the ground; some may remain for a few months.

Female flowers

The female flowers or young cones appear in August, and pollination takes place from the middle of September to the middle of October; they are solitary and erect at the ends of the arrested branchlets on the upper sides of the branches, and usually farther towards their ends than the cones of the previous year. At the time of pollination they are inconspicuous, partly hidden by the rosettes of leaves,

and somewhat difficult to find, oblong ovoid, 1.3-2.0 cm long by 0.6 cm in diameter, pale glucose green. The scales, in spirals of 8X5, at the time of pollination stand perpendicular to the axis, exposing the ovules, but after pollination they close.

Seed Collection and Processing

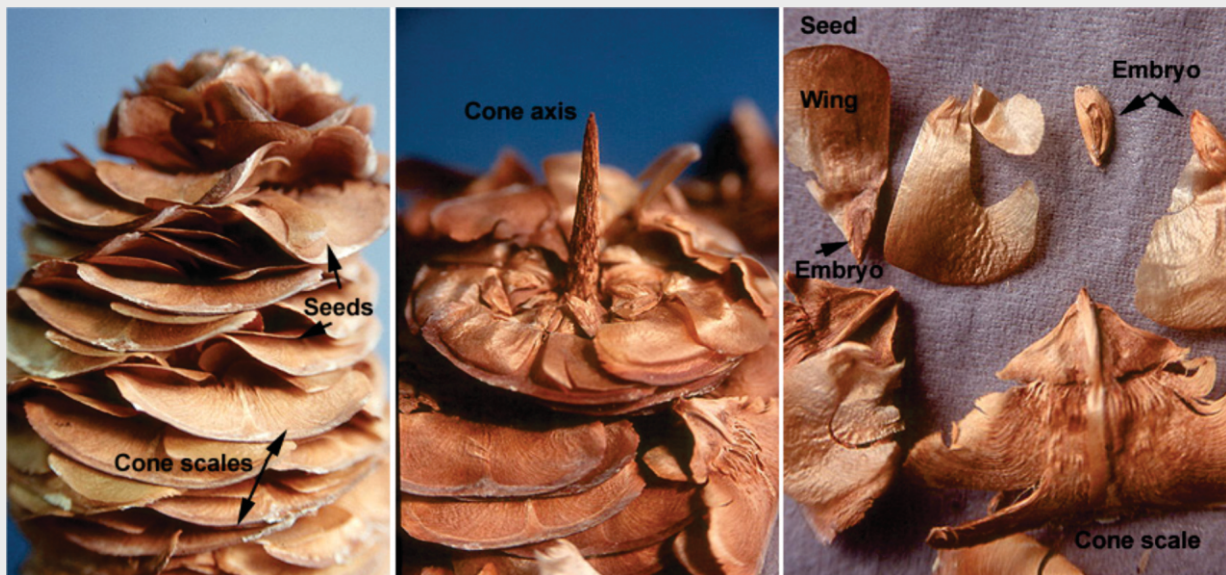
Development and ripening of cones

There is no growth in the young cones until the following spring, when by the early part of May they have increased sufficiently in size to be clearly visible. By the end of June or during July they become full sized, and are pale bluish



Photo Courtesy: www.botany.hawaii.edu/faculty/carr/pin.htm

green. They turn chocolate-brown in colour during August, and ripen from the end of September to the middle or end of November, though at high elevations or in late seasons the seed may not all fall until the early part of December. Thus



Courtesy: oregonstate.edu

the time occupied from the first appearance of the female flower to the ripening of the cone is about 12 - 14 months. The ripe cones are erect, brown, ovoid or ellipsoidal, 7.6 - 12 cm in long by 5 - 7.6 cm in diameter where broadcast, with numerous fan-shaped scales arranged in spirals of 8X5 on a persistent woody central axis. On each scale rests a pair of winged seeds. On ripening the cone breaks up on the tree, the scales and seeds falling to the ground and the persistent axis remaining; these old cone-axes remain for years on the branches. The opening of the cones is favored by dry, sunny weather.

The seed with wing is 2.5-3.8 cm long, triangular; wing with rounded corners, 1.7 - 2.5 cm broad; seed without wing 3.4 - 4.06 cm long, irregularly triangular. About 200 to 260 good seeds, or 230 on an average, weigh 30 gm. The seeds are oily and soon lose their vitality, but good fresh seed usually shows a high percentage of fertility.

Germination

Germination is epigeal. The seeds should first be soaked in water at room temperature for 24 hours. The water should be then drained off and the seeds mixed with a little clean, damp sand or damp vermiculite and placed in a clear plastic bag at temperatures between 3-5° C. Some reports indicate that temperatures of around 9° C also give optimum results. It is essential that the seeds are not waterlogged in the plastic bag or they may rot. This pre-treatment should last between 2-4 weeks to ensure a well synchronized germination of the highest percentage. After 2 weeks, check the seed every few days for signs of germination. Gently remove germinated seeds from the bag and plant them in a small pot containing a good quality potting compost. Keep them at room temperature around 20-24° C. Once the seedlings start emerging, they can be

placed in well light conditions but not in the sun.

Cedar species in general are prone to fungal diseases (damping off) just after germination hence care should be taken to prevent any such infections. Low frequency watering combined with good air circulation and low humidity will also help ward off fungal attacks. Initial growth is quite slow with seedling reaching 3-5 cm in their first year. Rate of growth accelerates in the second and subsequent years. After 3 or 4 years they are ready for planting.

Chandra and Ram (1980) referred to dormancy in stored seeds of *C. deodara*, which was broken after stratification for 30 days at +4.4°C. The resulting germination percentage was 45%. Struck and Whitcomb (1977) proposed the soaking of *Cedrus* seeds for 2 or 3 hours as an alternative method for breaking of dormancy.

Therefore, although *Cedrus* seeds do not possess primary dormancy, it is later induced, especially the long-term storage (3 to 6 years) (Young and Young, 1992). Even short-term storage, from the time of the collection till the sowing, can affect germination negatively. Krüssmann (1981) suggested that *Cedrus* seeds should remain in the cones during winter, because their germination percentage was better.

Vegetative Propagation

Cedrus deodara can be propagated by cuttings (67% rooted) collected in late fall to early winter, when given a quick dip in 5 g/L (5,000 ppm) indole-3-butyric acid (IBA) solution and placed in a sand: perlite medium with bottom heat maintained at 24°C (75°F) (Nicholson 1984). Shamet and Bhardwaj (1995) reported 69% rooting of *C. deodara* cuttings treated with 5 g/L indole-3-acetic acid-talc or 10 g/L (1 0,000 ppm) naphthaleneacetic acid-activated charcoal, both supplemented with 10 g/L captan and 10 g/L sucrose. Cultivars of *Cedrus* species are more routinely propagated by grafting (Richards 1972; Lyon 1984; Blomme and Vanwezer 1986; Macdonald 1986; Dirr and Heuser 1987; Hartmann *et al.* 1990; Siniscalco 1995). Two reports have been published on the *in vitro* culture of *C. deodara* (Bhatnagar *et al.* 1983; Liu 1990).

Silvicultural Characters

Although young deodar plants are capable of standing moderate shade and of persisting under it for some time, they are incapable of making satisfactory headway unless afforded overhead light. After the first two



Photo Courtesy: www.botany.hawaii.edu/faculty/carr/pin.htm

or three years, during which protection from the desiccating effect of the sun is advantageous on hot aspects, overhead light is essential to proper development. Plants in a state of suppression can at once be recognized by the absence of vigorous leader and a characteristic flat topped appearance. The deodar may be



Photo Courtesy: www.botany.hawaii.edu/faculty/carr/pin.htm

classed as a light-demander rather than a shade-bearer, in that it requires complete overhead light. Some of the finest deodar timber is produced in mixture with spruce, which affords dense lateral shade, causing the production of an exceptionally clean bole in the deodar.

Pests and Diseases

The deodar trees are easily damaged by snow, fire and browsing by goats. Among wild animals, bears, porcupines and monkeys are the most injurious. *Rosa moschata* scrambles into the crowns of young trees of this species and suppress them. Among parasitic fungi, *Fomes annosus* and *Peridermium cedri* are injurious, causing its mortality and formation of witches' brooms on the trees. *Pestalotiopsis cryptomeriae* fungus causes leaf blight on young trees, whereas *Ploioderma cedri* causes foliar infection and premature defoliation in plantations. An epidemic defoliator *Ectropis deodarae* has been reported to cause complete defoliation in this species. Cones and seeds of many conifers including *Cedrus deodara* are seriously damaged by *Dioryctria abietella* in the North-Western Himalayan region of India. In China, seedlings develop root rot, crown rot, chlorosis and defoliation, often resulting in death from attack of *Phytophthora cinnamomi* and *P. drechsleri*.

Uses

The timber of Deodar is used in construction industry due to its durability and rot resistance. The famous boat houses of Srinagar, Kashmir are built using this wood. It has fine close grain, which can sustain high polish. Historically, cedarwood was used in construction of temples and landscape around temples. During the colonial era, it was extensively used for construction of barracks, public buildings bridges, canals & railway cars.

The bark of cedarwood proves to be a good remedy in remittent and intermittent fevers, diarrhea and dysentery. The powder is used in the treatment of ulcers. The inner wood of the plant is aromatic and is thus, used to make incense. The inner wood is also distilled to make essential oils.



Photo Courtesy: www.juliadiets.com

The essential oil obtained from this plant is used as insect repellent on the feet of horses, cattle and camels, as insects avoid venturing close to it. Cedarwood possesses antifungal properties and has shown limited potential in controlling fungal deterioration of species, during storage. The outer bark and stem of the tree are used for making astringent. The biomedical actions of the plant are believed to be carminative and antispasmodic. It creates sweating and urination. The Ayurvedic functions of the plant promote digestive function, remove toxins from the bowel, alleviate coughing, and cure skin disorders, such as eczema and psoriasis.

As it possesses aromatic properties, cedar oil is often used in aromatherapy. It has a characteristic woody whiff,

which can change slightly in the course of drying out. The resins of the herb are used as anti-obesity agent. They are also effectual in clearing the respiratory tract and reducing cough and cold.

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Slate Flash (*Rapala manea* Hewitson) (Lepidoptera: Lycaenidae): A new pest record on Indian Rosewood

Dalbergia latifolia Roxb. (Indian Rosewood) is a large deciduous tree, belonging to the family Fabaceae. It is naturally distributed in the Indo-Malaysian region. In India, it occurs in the sub-Himalayan tract from Oudh eastwards to Sikkim, Bihar, Orissa, Central, Western and Southern India (Anon, 1952). *D. latifolia* is found in the dry and moist deciduous forests of India, up to an altitude of 1200 m. Our studies have revealed that, the population of this precious timber species is declining very fast in the forest areas of Tamil Nadu and Kerala and its natural regeneration in most of the places are not adequate.

More than 40 species of insects, including defoliators, bark feeders and sap suckers are known to be associated with living trees of *D. latifolia*, but none of them are reported as serious pests. While conducting studies on the pollination ecology of *D. latifolia* at Chelakode area of Thrissur District, Kerala State, during the flowering season in September-October 2014, occurrence of caterpillars, devouring the flowers was noticed. The caterpillars were green, sluggish, had a length of 14 mm, with prominently segmented body; 4th to 10th segments with dorsal and sub-dorsal tubercles / projections. The tips of tubercles / projections had longer hairs (Fig. 1). The caterpillars were attended by ants in large numbers, indicating a mutualistic association among them (Fig. 2). The caterpillar weaved a pad of silk before pupation and rested on it during pupal stage. The pupae were rosy-pink initially and subsequently became more or less dark brown on maturity (Fig. 3).



Fig. 1. Full grown caterpillar of Slate Flash butterfly



Fig. 2. Association between ant and caterpillar of Slate Flash butterfly



Fig. 3. Pupa and adult of Slate Flash butterfly

The caterpillars were collected from the field, reared in the laboratory and got the adult insect. The wing span of the adult was about 30 mm; the upper side of the wings had slate blue colour, while the underside was pale brown, marked with a thin, slightly curved darker band having whitish margins at its outer edge. The hind wings had a narrow tail on each. The underside of hind wings had two black spots; the upper spot was orange crowned. The insect was identified as *Rapala manea* Hewitson (Slate Flash), which is a butterfly coming under the family Lycaenidae (Fig. 4).



Fig. 4. Flower buds of *D. latifolia* infested by caterpillars of Slate Flash butterfly

Slate Flash has distribution in India, Sri Lanka, Pakistan, Nepal, Bhutan, Bangladesh and Myanmar (Kehimkar, 2008). In India, it has been reported from the Western Ghats areas in Kerala, Karnataka, Goa, Maharashtra and the Eastern Ghats in Andhra Pradesh; Himachal Pradesh and Sikkim. The recorded host plants of Slate Flash include *Trema orientalis* (Ulmaceae), *Lantana camara* (Verbenaceae), *Antidesma acidum*, *A. ghaesembilla* (Euphorbiaceae), *Acacia pennata*, *A. torta*, *A. megaladena* (Mimosaceae), *Sorbaria sorbifolia* (Rosaceae), *Camellia sinensis* (Theaceae), *Ziziphus* sp. (Rhamnaceae) and *Combretum indicum* (*Quisqualis indica*) (Combretaceae) (Kunte, 2000; Kehimkar, 2008; Saji and Soman, 2014).

The caterpillars of Slate Flash fed on the sepals and petals of *D. latifolia* from outside in the case of flower buds



Fig. 5. Premature falling of flower buds due to Slate Flash infestation

and the infested flower buds appeared brownish (Fig. 4). The attacked flower buds fell off prematurely from the inflorescence (Fig. 5). In the case of open flowers, the caterpillars fed on the sepals, petals and the reproductive parts of the flowers. The infestation was found to be about 52 percent in the study area. Our studies have also revealed that, though flowering in *D. latifolia* is quite high, under open pollination (natural fruit setting) only about 5.24 percent of flowers set fruits. Therefore, the damage caused by the caterpillars of Slate Flash has also to be reckoned as one of the factors responsible for the low fruit setting rate in this tree species.

Scanning of the literature shows that, *D. latifolia* has not been recorded as a larval host plant of Slate Flash so far and hence it is a new pest record on this host. Although *D. latifolia* is also propagated through root cuttings, propagation through seed route is important, while taking up large scale artificial regeneration. Therefore, management of this flower pest may become a necessity, in order to enhance the seed production.

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Incidence of *Cossus cadambae* Moore (Lepidoptera: Cossidae) on *Neolamarckia cadamba* (Roxb.) Miq. (Rubiaceae)

Cossus cadambae is one of the major insect pests of *Neolamarckia cadamba*. The larvae bore in the standing tree resulting death of the tree. It has annual generation with prolonged larval stage. Occurrences of the pest were noticed during August to January during 2012 to 2015 in *N. Cadamba* plantation at Maraimalai Nagar, Chennai. It was also observed that heavy infestation of *C. cadambae* with numerous bore holes all over the stem in almost 30-50% of the trees throughout the year. During initial phase of infestation considerable numbers of trees get affected (2012). However, intensity of infestation was found less during initial phase. During subsequent years, it was found that the already infested trees get reinfested, besides fresh attack to the unaffected trees in the plantation. This leads to increase in infestation of healthy trees and found more or less uniformly distributed infestation throughout the plantation.

Life cycle

Adult female moth deposits eggs singly in the bark crevices or near wounds during the month of May. Egg hatch within fortnightly. Larval period extended upto 8 months. Larvae pupate in the upper end of their tunnels.

When development is completed, the pupae wriggle to the mouth of the burrow and the adults emerge, leaving the empty pupal case protruding from the burrow entrance. Cohort (overlapping) generations were also observed on *N. Cadamba*.

Symptoms and Damage

Larval initially get established in the bark surrounding a wound caused by mechanical injury or pruning. Then they bore into the sap wood followed by heart wood. The larva feeding over a period of time leads to girdling of branches which die back. After girdling the branch, the larva starts boring into the wood, and particles eaten away by the larva may be found over the borer hole. Larvae frequently return to the burrow entrance to feed on the more succulent tissue in that area and to expel a mixture of wood fiber and frass (plate) they have cleaned out of the tunnels. The burrow entrance is kept sealed with a frass plug when larvae are not expelling waste material. Larvae continue to enlarge the tunnels as they grow. Initial infestations are difficult to detect until when larvae begin expelling noticeable quantities of frass from the burrows. Feeding by older larvae produces greater quantities of



C. cadambae borer infestation on *N. cadamba*

frass and may kill localized areas of the bark. These dead sections of bark may eventually separate and fall off. The presence of empty pupal cases is a sure sign that the tree has been infested regularly. While larvae seldom kill infested trees, their tunnelling decreases the tree vigour, may introduce various disease organisms, and increases the susceptibility of the tree to wind damage. Females are poor fliers and prefer to crawl. Consequently, the eggs are often deposited in the same tree they emerged from. For this reason the spread of larvae from one tree to the next is often slow. However, once a tree is infested, it will often be reinfested and support several generations.

Impact

Extensive larval feeding in tree leads to callus growth and distorted bark formation. The bark that is lost due to larval feeding never recovers, and as a result the wood is infected by pathogenic or saprophytic fungi leading to its decay. The presence of borer holes in timber attacked by *C. cadambae* is a serious defect which adversely affects its commercial value. Heavy and repeated attacks may also lead to tree mortality.

Management measures

Trees infested with *C. cadambae* are clear felled to prevent the spread of infestation to healthy trees. Affected trees in plantations with low infestation levels are also extracted during routine silvicultural thinnings. Avoid bark injuries while pruning that may invite the entry of borers. Insecticides such as carbaryl, acephate, fenvalerate and permethrin may be applied as preventative treatments to the trunk during the period of adult activity. These applications will kill newly-hatched larvae as they attempt to penetrate the bark. Two additional applications should also be made at two week intervals in order to keep the pest under check. It was followed in the *N. cadamba* plantations in Maraimalai Nagar, Chennai and found reduction in the spread of the *C. cadambae* infestation further.

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Soil Testing: an important tool for assessing soil health

Soil testing plays a very important role in diagnosing the physical, chemical and biological properties of the soils by providing the conditions of available nutrients which indicates the fertility and productivity of the soils. Soil test based nutrient use optimizes economic returns and minimizes risk of environmental pollution. The major objectives of soil testing are:

1. Soil fertility evaluation for making fertilizer recommendation for specific fields.
2. Classification of soil into different fertility groups for preparing soil fertility maps of a given area.
3. Assessment of the type and degree of soil-related problems like salinity, sodicity, acidity etc., and suggesting appropriate reclamation or amelioration measures.

Only a small fraction of the total nutrients in soil is actually available to plants at a given time. This available fraction in soil is highly dynamic in nature. Therefore, a reliable index of soil fertility is determined through soil testing. A soil testing programme has four phases as follows:

- a. Collection of soil samples - Soil sampling
- b. Chemical analysis of soil samples
- c. Calibration and interpretation of the results of chemical analysis
- d. Nutrient or fertilizer recommendation.

Soil sampling

Soil sampling is perhaps the most vital step for any analysis. Since a very small fraction of the huge soil mass of a field is used for analysis, it becomes extremely important to get a truly representative soil sample from it. For collecting a representative soil sample, due consideration must be given to the following points,

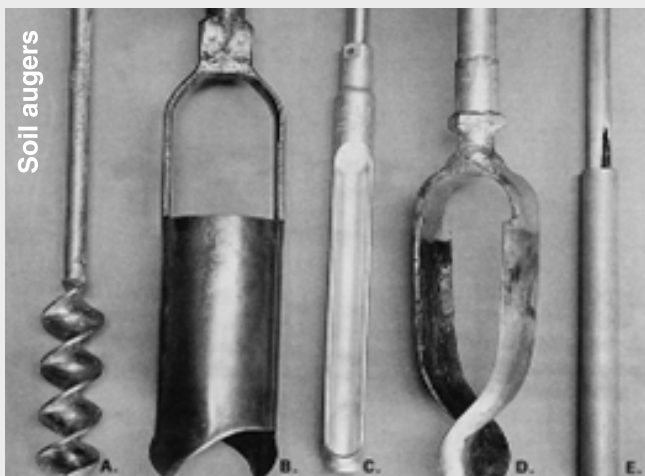
- a. The sample must truly represent the field it belongs to
- b. A field can be treated as a single sampling unit if it is appreciably uniform. Generally an area not exceeding 0.5 ha is taken as one sampling unit.
- c. Variations in slope, colour, texture, crop growth and management practices are the important factors that should be taken into account for sampling.

- d. Larger areas may be divided into appropriate number of smaller homogeneous units for better representation.

Depth of sampling

Surface samples (0-15 cm depth) are normally used for determining the soil properties. For cereals, vegetables and other seasonal crops the samples should be drawn from 0-15 cm *i.e.* plough layer or furrow slice. For plantation or fruit trees, composite sample from 0-30, 30-60 and 60-90 cm depth should be made from 4-5 pits dug in about 0.5 ha area. For saline or saline-alkali soils, salt crust, if visible on the soil surface, should be sampled separately and the depth of sampling recorded.

Soil sampling tools



distributed spots, moving in a zig-zag manner from each individual sampling site after scrapping off the surface litter, if any, without removing soil. Collection of samples in a zig-zag pattern across the field ensures homogeneity. If auger is not available, a 'V' shaped cut to a depth of 15 cm is to be made at each sampling spot. About 1-5 cm thick slices of soil from top to bottom of exposed face of the 'V' shaped cut is to be removed and placed in a clean container. Mix together the soil collected from all the spots in one sampling unit thoroughly by hand. Reduce the bulk to about 500 g by quartering process. For this, spread the entire soil mass, divide into four quarter, discard two opposite ones and remix the remaining two. Repeat this process until about 500g soil is left. Store soil samples in clean cloth bags and label the samples properly for identification. As soon as the samples arrive at the Laboratory, they are air dried in shade and the soil is sieved through 2 mm sieve.

Analysis of soil samples

Soil samples are analyzed for their physical, physico-chemical properties and chemical properties.



Analysis of Micronutrients (Fe, Mn, Zn, Cu)



Estimation of Available Nitrogen

Soil sampling procedure

For making composite sample, collect small portions of soil up to the desired depth by means of suitable sampling tools *viz.* auger, khurpi, spade from 15-20 well-

Physical properties- Bulk density, Pore space, Aggregate analysis, Moisture retention, Mechanical analysis of soil (texture), Moisture

Physico-chemical properties- pH, Electrical conductivity and Cation Exchange Capacity

Chemical properties- Organic carbon, Available nutrients (N, P, K), Exchangeable cations (Ca, Mg, Na, K), DTPA extractable micronutrients (Fe, Mn, Zn, Cu), Available Boron and Molybdenum.

Calibration and interpretation of the results of chemical analysis

For the calibration of soil test data, a group of soils ranging in soil fertility from low to high in respect of the particular nutrient are selected and the test crop is grown on these soils with varying doses of that particular nutrient with basal dose of other nutrients. The most common method is to plot soil test values against the percentage yield and to calculate the relationship between soil test values and per cent yield response. Based on the contents of available nutrients, soil test values (N, P, K) can be grouped into classes of low, medium and high.

Nutrient or Fertilizer Recommendation

The main objective of soil testing is to recommend the fertilizer for efficient and economic crop production. Soil tests give the relative level of a nutrient in the soil and must be calibrated to relate its level to the likely response to application of fertilizer.

Conclusion

Soil testing helps in assessing the capability and suitability of land for agriculture and allied activities and quantifies the soil constraints. It provides sound information for recommendation of correct amount of inorganic fertilizers to be integrated with organic amendments for improving soil health and quality.

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Recent literature on FGRs & TIP

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Upcoming Events

Event : **Short Term Course on Sustainable Waste Management Practices**
 Venue : ISM Industry Institute Interaction Facility, Kolkata
 Date : 17-19 February 2016
 Abstract deadline : -
 Registration deadline : 01 February 2016 (<http://www.ismenvis.nic.in/ViewEvents.aspx?Id=11016&Year=2015>)

Event : **AUSTimber 2016**
 Venue : Traralgon, Victoria, Australia
 Date : 11-16 April 2016
 Abstract deadline : -
 Registration deadline : Open now (<http://www.austimber.org.au/>)

Event : **5th International Conference for Young Researchers: "Multidirectional Research in Agriculture, Forestry and Technology"**
 Venue : Convention Centre, University of Agriculture in Krakow, Poland
 Date : 16-17 April 2016
 Abstract deadline : 15 February 2016
 Registration deadline : Open now (<http://mkd.org.pl/>)

Event : **IUFRO Conference on Global Change and Forest Health**
 Venue : Istanbul University, Istanbul Congress Center, Istanbul, Turkey
 Date : 25-29 April 2016
 Abstract deadline : 15 January 2016
 Registration deadline : 29 February 2015 (<http://www.foresthealth2016.com/>)

Event : **Gene Conservation of Tree species Workshop**
 Venue : Holiday Inn Mart Plaza, Chicago, USA
 Date : 6-19 May 2016
 Abstract deadline : 14 March 2016 (poster abstracts)
 Registration deadline : Open now (<http://www.fs.fed.us/about-agency/gene-conservation-workshop>)

Event : **International Conference on Forest Multi-functional Management**
 Venue : Nanjing, Jiangsu, China
 Date : 20-21 May 2016
 Full paper deadline : 29 February 2016
 Registration deadline : Open now (<http://www.gfsf2010.org/dct/page/70002>)

Event : **IUFRO Conference on Genomics and Forest Tree Genetics**
 Venue : Arcachon, France
 Date : 30 May - 03 June 2016
 Abstract deadline : 15 February 2016
 Registration deadline : 31 March 2016 (<https://colloque.inra.fr/iufro2016>)

ENVIS ACTIVITIES

World Soil Day 2015

The ENVIS Centre celebrated the World Soil Day 2015 on 04.12.2015. Dr Kannan C.S. Warriar, Co-ordinator ENVIS welcomed the gathering and gave an overview of the activities carried out by the Centre. Dr B. Gurudev Singh, Director (i/c) of IFGTB presided over the function. Prof. K. Arulmozhiselvan from Dept. of Soil Science & Agricultural Chemistry of Tamilnadu Agricultural University (TNAU), Coimbatore was the Chief Guest and presented a lead lecture "Soil: The Soul of Infinite Life". An awareness poster on significance of soil conservation and the 2nd issue of ENVIS newsletter *VAN VIGYAN* (Jul - Sep 2015) were released on the occasion. Dr V.N. Mutharaian, Programme Officer-ENVIS proposed the vote of thanks. Scientists, Forest Officers, research staff of IFGTB and Forest Range Officer Trainees from Tamilnadu Forest Academy participated in the event.



Release of awareness poster - World Soil Day



Release of Newsletter

International Mountain Day 2015

IFGTB-ENVIS observed the International Mountain Day on 11th December 2015. The function began with an invocation on mountains in Sanskrit by Dr Kannan C.S. Warriar, Scientist E and Co-ordinator ENVIS. Dr B. Gurudev Singh, Group Co-ordinator Research, IFGTB welcomed the gathering. The Director of IFGTB Shri R.S. Prashanth, presided over the function and gave a insight into the major mountain resources of India. Dr Kannan C.S. Warriar informed the initiatives by the FAO around the world in connection with the International Mountain Day and introduced the chief guest. Dr P.V. Karunakaran, Principal Scientist from Salim Ali Centre for Ornithology and Natural History (SACON), Anaikatty delivered the lead lecture, 'Mountains - The Land of Maxima'. His talk detailed on how mountains which cover just 22 per cent of the Earth's surface area supports the billions of living beings on the Planet. An awareness poster highlighting the importance of mountain ecosystems prepared by the ENVIS Centre was released on the occasion. Scientists, forest officers, research staff of IFGTB and Forest Range Officer Trainees from Tamil Nadu Forest Academy participated in the programme.



Release of awareness poster - International Mountain Day



A view of the participants

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 & Forests, Climate Change.

INSTRUCTIONS TO CONTRIBUTORS

Dear Author/ Subscriber/ Contributor,

We invite contributions to the ENVIS Newsletter issues! The ENVIS Centre 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 Centre. 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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Views expressed in this newsletter are not necessarily those of the Editors or of the Institute of Forest Genetics and Tree Breeding