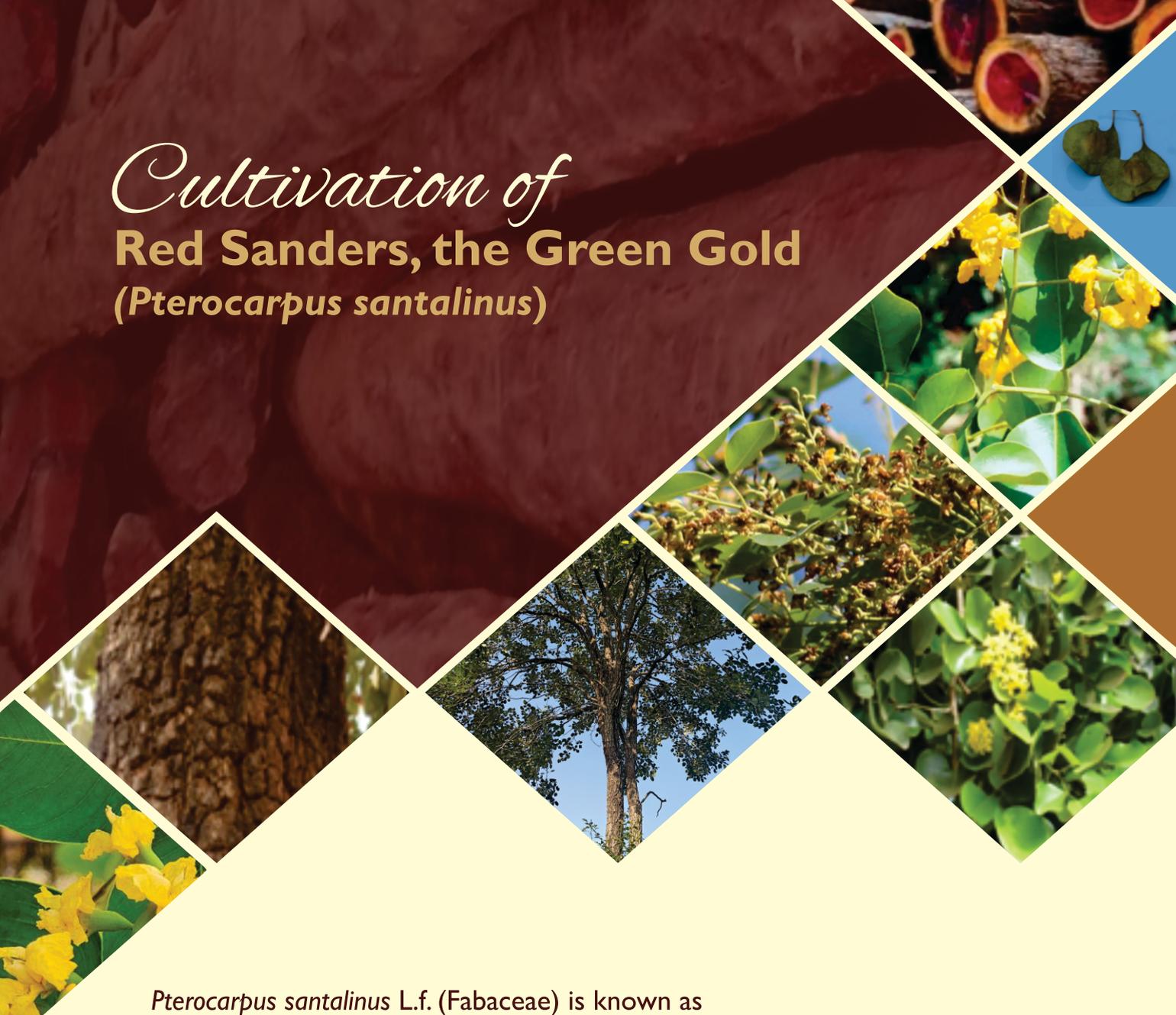


Cultivation of **Red Sanders, the Green Gold** *(Pterocarpus santalinus)*



Pterocarpus santalinus L.f. (Fabaceae) is known as Raktachandanah, Raktasarah in Sanskrit.; Lal chandan in Bengali & Hindi; Raktachandan in Bengali, Hindi & Oriya and Red sanders, Red sandalwood in English.

The species is highly valued in international markets for its heavy, dark claret-red heartwood used in making furniture and carvings, musical instruments, medicine, and also in dye.

It is a moderate sized deciduous tree up to 11 m in height with blackish brown bark, deeply cleft into rectangular plates and dark purple heartwood. Leaves compound, leaflets 3-5, broadly ovate or nearly orbicular, obtuse, under surface pale, clothed with fine hairs. Flowers yellow, in short, simple or sparingly branched axillary or terminal racemes. Fruits oblique pods, gradually narrowed into a short stalk, winged, the central hard portion containing the seed, seeds reddish brown, smooth.

Flowers appear in April and continue till June and the pods start ripening next year.

It occurs in tropical dry deciduous forests in Cuddapah District in Andhra Pradesh and adjoining areas of Tamil Nadu and Karnataka up to 900 m.

Owing to its occurrence in a small area, poor regeneration and over exploitation due to illegal felling the red sanders is under severe threat in its natural habitat. Some state Forest departments have raised plantations of red sanders successfully. Many tree growers and farmers have also started cultivating this species on farm lands in Andhra Pradesh, Tamil Nadu, Karnataka, and Gujarat and in many other states.

In its natural habitat, the species generally grows well on dry, hilly and rocky grounds where other species struggle for survive. Deep gravelly lateritic loam soils are preferred for its cultivation. Well drained gravelly soils with neutral to acidic pH are better suited. It coppices vigorously and can resist fire to some extent. Compact clayey soils with alkaline pH and saline soils should be avoided. It does not tolerate waterlogged and shallow soils.

Preferred rainfall range is 500-1000 mm. The species is well suited to hot dry climate and prefers mean annual temperature range 26-28°C and maximum may reach up to 45°C.

Artificial regeneration of red sanders

Planting material:

- ◆ One year old potted seedlings are planted directly in the field.
- ◆ For getting better survival and growth stumps are prepared from 1-2 year old seedlings, preferably from 2 years old seedlings and transplanted directly in the field.

Seed collection, treatment before sowing on seed beds

- ◆ Collection time of mature, dry pods is March to April. Pods are collected from the trees as soon as they ripe; otherwise they blow off in masses.
- ◆ Viability of seeds: Up to one year.
- ◆ Seed weight: 880 to 1410 dry pods/Kg.
- ◆ **Seed pretreatment:** Dried pods are soaked in water overnight and dried during day. Alternate soaking and drying for 3 days before sowing in seed bed enhances germination. Pods can also be soaked in water for 72 hours or in cow dung slurry for 72 hours before sowing in seed bed. Pods pretreated with GA3 (Gibberellic acid) +BA (Benzyladenine) @ 250 PPM helps in early and optimum germination.

Preparation of seed bed for raising one year old seedlings and sowing of seeds

- ◆ Raised seed beds of 1.0 m wide X 0.15-0.20 m in depth and of convenient length are prepared with small pebbles, gravels and coarse sand or sandy loam or loamy soil mixing with FYM in April.
- ◆ Seed beds should be prepared on open site and so that it can receive ample sunlight.
- ◆ Pretreated pods are spread on the prepared bed and covered with a layer of coarse sand or mixture of sandy loam or loamy soil and FYM and finally covered with thin layer of straw in the month of April.
- ◆ The beds are lightly watered at regular intervals using a rose water can.
- ◆ About 1.500 kg seeds are required for raising sufficient seedlings for one hectare planting.
- ◆ Germination commences after 8-10 days of sowing and germination continues up to 20-25 days.
- ◆ Germination percentage is generally 50-60% if raised properly in proper time.
- ◆ Soon after commencement of germination the straw cover is removed carefully.
- ◆ Tender seedlings at 2-3 leaves stages are then pricked out from seed beds and transplanted in poly pots of size 12.5 cm X 22.5 cm filled with mixture of sandy loam or loamy soil and well decomposed FYM.



- ◆ General nursery practices like watering, weeding-cleaning in nursery beds, looking after and taking care for protection of seedlings from pest and diseases etc. should be done as usual. In the rainy season the seedlings are susceptible to be infected by fungal attack, so necessary care should be taken to avoid this problem. After one year the seedling may attain height of 60 cm to 75 cm and become ready for transplanting in the main field.

Preparation of seed bed for raising 1-2 year old seedlings in the beds for preparation of healthy stumps

- ◆ Raised seed beds of 1.0m wide X 0.30m and convenient length are prepared with small pebbles, gravels and sandy loam or loamy soil mixing with FYM in April.
- ◆ Pretreated pods may be sown in lines and allowed to grow the seedlings after germination in the beds for 1-2 years.

Transplanting in the field

Land preparation:

- ◆ The land is ploughed and harrowed repeatedly after removal of old stumps and bushes and the soils are brought to a fine tilth.
- ◆ Transplanting pits of size 45 cm X 45 cm X 45 cm are dug at a spacing of 4 m X 4 m. Dug up soil is retain on both side of each pit well advance to get better pulverize and drying.
- ◆ The pits are filled with pulverized topsoil mixed thoroughly with 10 –15 kg FYM (farmyard manure) and 10 g Dithene M-45 to protect the planting stock from soil-borne fungi well advance before transplanting of seedlings.

Transplanting and optimum spacing:

- ◆ One year old healthy seedlings are transplanted in the filled up pits at the end of June-July, i.e, on set of monsoon at a spacing 4 m X 4 m.
- ◆ A light irrigation is provided just after transplanting for establishment of seedlings if there is no rain.
- ◆ Stumps obtained from two year-old nursery plants are also transplanted in the filled up pits at a spacing 4 m X 4 m.
- ◆ Vacancy filling is done within 15-20 days of transplanting, so that uniform stand is achieved.

Seedling transplanting rate:

- ◆ On an average 800 potted seedling are required per hectare to get a stand of 600 trees at a spacing 4 m X 4 m.
- ◆ In case of stump (prepared from 2 years old seedling) planting the requirement of stumps is less than one year old potted seedlings.

Application of manure and Fertilizer:

- ◆ 10 -15kg of well decomposed FYM per plant per year for the first five years is applied in a plantation after removal of weeds from the stand at regular interval.
- ◆ Along with FYM, 150 : 100 :100 g of NPK per plant per year is applied for the first five years followed by irrigation. Fertilizer is applied in the circular shallow trench made at a distance of 45cm from the plant and then covered with loose soil.

Inter-culture and maintenance

- ◆ Weeding is done manually as and when required and particularly just before application of manure and fertilizer.
- ◆ The soil around the basin is loosened frequently by hoeing.

Irrigation practices:

- ◆ A light irrigation is provided just after transplanting for establishment of seedlings if there is no rain.
- ◆ After getting establishment Irrigations is provided as and when required depending upon the weather condition.

Disease and pest control:

- ◆ Leaf-eating caterpillars may damage the crop. These can be controlled by spraying 0.2% Monocrotophos twice at weekly intervals.

Rotation and Harvesting

Clear data on rotation is not readily available. Generally red sanders are mainly harvested for red coloured heartwood, and such type of heartwood formation starts at 15-20 years of age and the heartwood increases with the age. On the other hand red sanders trees are slow growing by nature, and it is estimated that it may take 80 - 100 years to reach maturity stage with 70 - 80 cm girth in natural habitat in Andhra Pradesh. Generally, trees are harvested for their valuable heartwood after at least 40 - 50 years of growth, which is when it develops properly its red colour. But the farmers harvest the trees by felling at the age of 20 - 25 years for extraction of bark and heartwood.



Currently only natural red sanders wood is traded in the market. After felling the trees, the logs are dressed completely removing the bark and sapwood to expose the red coloured heartwood. The wavy grained heartwood has much demand in the international market and exported to Japan and China where the heartwood is used for making musical instrument, medicine and furniture.

Expected Yield:

On an average 250 kg heartwood per tree may be available from 20-25 old trees.

Legal and procedural requirements

Harvesting of the red sander tree is a legally regulated process that requires permission from the state forest department. Harvesting involves felling the tree for wood extraction or selectively stripping the bark, which requires a permit and is a long-term, sustainable process due to the tree's slow growth and protected status.

- ◆ **Permits are mandatory:** One cannot legally cut, harvest, or sell red sander trees without prior permission from the state forest department.
- ◆ **Plantation registration:** Farmers must register their plantations with the Forest Department, including details on the total area, number of saplings, and land survey details.
- ◆ **Individual tree registration:** Each tree must be individually registered with the forest department.
- ◆ **Transit permits:** All transportation of red sander timber requires an official transit permit.
- ◆ **Illegality:** Unpermitted harvesting is punishable by law.

Market Trend:

Present price: In India, trees aged around 30 – 40+ years generally have a legal market value of approximately Rs. 50,000 – Rs. 70,000 per kg, while premium, export-grade heartwood can fetch Rs. 1–2 lakh per kg. International prices (notably in China and Japan) are often higher due to demand for luxury furniture, musical instruments, traditional medicine, and crafts.

Current trend: Demand remains strong, but supply is constrained by strict forest protection, slow biological growth (30 – 40+ years), and regulated auctions. This leads to price volatility, limited legal liquidity, and persistent illegal trade.

Given demand and price, there's growing interest in plantation and agroforestry models:

Farmers and investors planting red sandalwood for long-term investment. Mature trees (12–15+ years) could yield heartwood worth Rs. 10 – 15 lakh per tonne depending on grade and market access. However, legal frameworks and clear market connections are crucial to avoid illegal sales and ensure returns.

Future outlook: Global demand is expected to grow at ~9–10% CAGR till 2030, driven by Asia and niche luxury markets. With no rapid expansion in legal supply, prices are likely to remain firm or rise long-term, especially for certified, traceable material. Sustainable plantations could moderate volatility but will take years to impact supply.

For more information please contact :

Prof. (Dr.) Asis Mazumdar PI-cum-Nodal Coordinator coordinatorrcfc@jadavpuruniversity.in	Dr. Soumyajit Biswas Project Manager rdrcfc@jadavpuruniversity.in
---	--

Regional-cum-Facilitation Centre, Eastern Region (RCFC-ER)
National Medicinal Plants Board (NMPB), Ministry of AYUSH, Govt. of India
Jadavpur University, Kolkata - 700 032
Tel : +91-33-2414 6979, Fax : +91-33-24146886
E-mail : rcfcnmpb@jadavpuruniversity.in