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Reviving the royal tree *Santalum album* Linn.: Santalaceae

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Abstract

Sandalwood Plantations has been declined due to natural or unnatural reasons. Natural reasons includes natural calamities, epidemic, fire, drought, flood, grazing of seeds by animals etc. and unnatural reasons include unorganized cutting of the trees, smuggling, theft etc. The demand of elite Sandalwood perfume has been increased but the supply of the heartwood is decreased due to above mentioned reasons. However, the government is now encouraging the growers by providing subsidy upto 75% for plantation. The elite Indian Sandalwood is rich in Santalol content, which is responsible for aroma of the Sandalwood oil. The Indian Sandalwood- *Santalum album* L. is therefore high in demand in the globe but declared as vulnerable plant species (IUCN 2000), therefore the sps. must be conserved. We can revive the flourishing of the royal tree and also increase the supply to meet the higher demand. The largest Indian sandalwood plantation lies in 10,000 ha. Area in Australia. The plantation can be rapidly increased by planting tissue cultured plants which are free from bacteria, fungi and virus.

Keywords: Calamities, epidemic, smuggling, elite, vulnerable, IUCN, subsidy

Introduction

श्रीखण्डं चन्दनं प्रोक्तं महार्हं श्वेतचन्दनम् ।
गोशीर्षं तिलपर्णं च मङ्गल्यं मलयोदभवम् ॥
गन्धराजं सुगन्धं च सर्पावासं च शीतलम् ।
गन्धाद्भयं गन्धसारं च भद्रश्रीभोगिवल्लभम् ॥
शीतगन्धो मलयजं पावनं चाङ्कभुहवयम् । (रा.नि.)

The *Santalum album* Linn. locally known as “Chandan” belongs to family Santalaceae of kingdom plantae. Sandal wood name itself shows that it is a woody tree. The tree is popularly known as Sandalwood tree or white sandal in English and in trade it is known as East Indian Sandal wood. It is declared as vulnerable plant species (IUCN 2000).

The tree is known as sattvic tree. In Sanskrit it has many names like Anindita, Bhadrasara, Bhogivallabha, Chandrayuti, Chandana, Chandrakanta, Ekangi, Goshirsha, harichandan, Krishnachandana, Malayaja, Mangalaya, Pavana, Tajayoghya, Rauhina, Shrigandha, Shrikhanda, Tailaparna, Varnaka etc. In Gujarati and Hindi it is known as Chandan or Safed chandan.

Santalum album is a small to medium size ever green, glabrous, semi parasitic* tree with slender drooping branches, opposite leaves, hermaphrodite flowers, axillary or terminal, trichotomous paniculate cymose inflorescence and small globose fruiting berries. (Fig. a-d). The sapwood is white and odourless and heart wood is yellowish in colour and scented. The tree is root parasite, it forms haustoria which establishes contact with the host. It obtains lime and potash directly from soil through roots and for nitrogen and phosphorus it partially depends upon its host. Common hosts for Sandalwood tree are *Acacia*, *Albizia*, *Bambusa*, *Cassia*, *Erythrina*, *Erythroxyton*, *Gossypium*, *Pongamia*, *Semecarpus*, *Strychnos*, *Tectona*, *Thespesia* and *Vitex*.

Santalum album commonly known as “Chandan” or “Swet Chandan”. The tree is known as sattvic tree. In Sanskrit it has many names like Anindita, Bhadrasara, Bhogivallabha, Chandrayuti, Chandana, Chandrakanta, Ekangi, Goshirsha, harichandan, Krishnachandana, Malayaja, Mangalaya, Pavana, Tajayoghya, Rauhina, Shrigandha, Shrikhanda, Tailaparna, Varnaka etc. In Hindi it is known as Chandan or Safed chandan and in English it is known as Sandal, Sandal wood tree and White Sandal wood tree.

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Habit and Distribution

The tree is indigenous to peninsular India. There are reference to Sandalwood in the Indian mythology, folklore and scripture. Sandalwood is mentioned in Indian epics like

Ramayana and Mahabharata. There are evidences that *S. album* has been grown in India for the last 30 centuries and India has been the major and the only source of Sandalwood.



a-Plantation



b-inflorescence



c-flowers



d-fruits

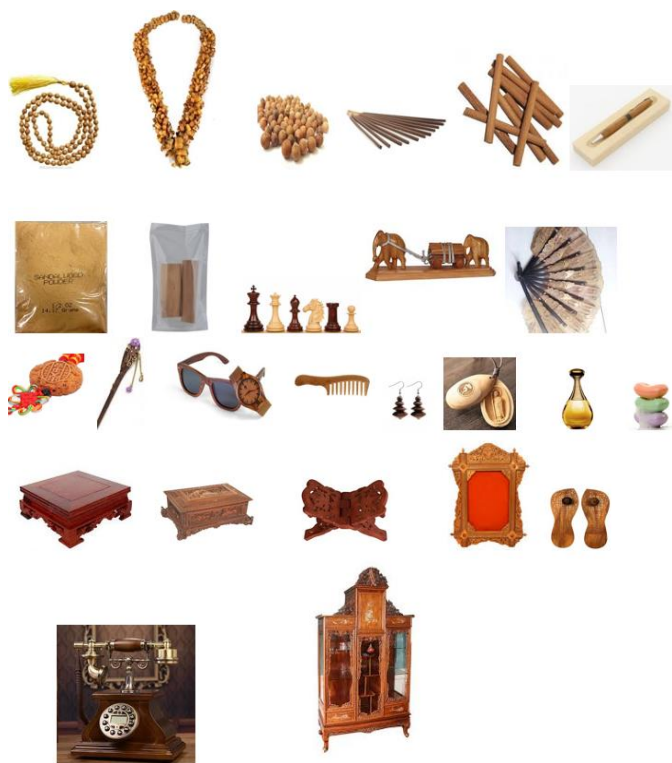
The trees which grow on hard rocky and ferruginous soils, grow slowly and develop thick heartwood which is rich in oil than the trees grown on fertile soils. The sps. found in Karnataka, Tamilnadu and Kerala ascending upto 1200 m. where the famed "sandalwood belt" is located. Among these states, Kerala has less acres of Sandalwood forests. Sandalwood trees are found in Marayoor and a few forest areas in Wayanad hills.

Apart from India, it is also found in Australia, Indonesia, Japan, Belgium, Spain, China, Cambodia, Madagascar, Germany, Great Britain, Holand, Norway, Russia, Switzerland and United States.

percentage of sandalwood oil of finest quality mainly contains 90-95 % santalol. Seed oil has various medicinal preparations used in skin diseases. It is dark red viscid fixed oil which is denser than castor oil.

The heartwood is bitter in taste, cooling and has, alexiteric, antipyretic, antiseptic and aphrodisiac properties. It is a tonic to the heart, used in thirst, biliousness, burning sensation, bronchitis, small pox, hyperacidity, general debility, forgetfulness, leprosy, jaundice, palpitation etc. It is also a good blood purifier. The legendary use of seed oil in the treatment of skin problems. The essential oil is used in pimples, priky heat, skin eruptions, itching, rashes, freckles and swelling. Sandalwood is an excellent moisturizer and also used to bring down fevers. Traditionally sandalwood has been used for treating digestive complications arise due to diarrhea, nausea, colic and gastritis.

The heartwood is used in many Ayurvedic preparations such as Ahsokarishtam, Chandanadi choornam, Chandanasavum, Anutailum, Dhanvantatam kashayam etc. The sandalwood is used in almost all medical system i.e. Ayurveda, Folk, Homeopathy, Sidhdha, Tibetan, Unani and Western.



Medicinal and aromatic importance

The wood, roots and seeds of *S. album* are medicinally important and having aromatic properties. Usually wood especially heartwood have medicinal and aromatic properties and it yields sandalwood oil. The roots contain high

The Sandalwood is an inevitable elite cosmetic material. The sandal wood oil is known as "liquid gold" is a popular perfume. Among the Sandalwood oil yielding species the *Santalum album* is the most important. Sandalwood has a mild but pleasing aroma. The oil mainly used in perfumery as it has unique fragrance and outstanding fixative property. The tree declared as "Royal tree" as mentioned in 1792 edict by Tipu Sultan, the ruler of the kingdom of Mysore.

Active ingredients

The oil contains Santalic acid, Santalal, α and β santalol, α and β santalene, phenols, lactones and borneols. The higher the Santalol content of the oil, greater is the value of oil.

Economical importance

The tree is regarded as most durable as it is not touched by white ants which destroys many varieties of timber plants. It is used for making many wood carving articles and idols like: Ganapathy - the elephant headed god, the trinity - Brahma, Vishnu and Shiva, little snake boats, elephants - a range of such sculptures, the most important the medicinal paste and preparation of sandalwood oil. Many more items prepared from sandalwood (fig.1-10) such as rosary from seeds, garland from chips, soaps, perfumes, incense sticks, powder etc. is long back industry of the people of ancient time. The wood used to make cabinets, caskets, jewel boxes and deed cases. The rich Hindus place pieces of sandalwood in funeral pile. The leaves are also economically important part of the tree which yield pale yellow wax.

The high value wood contains small natural marks known as birds eyes. The darker shaded wood considered as more fragrant, while lighter honey - coloured shaded wood is more favoured for ornamental works. It has occupied a very important place in Hindu religious ceremonials. The Parsis used it for the fire in their temples.

Unique characteristics

- The wood retains its aroma for many decades.
- The tree can bear shade and thrive well under the cover of hedges and scrubs, In the middle and later life it is intolerant of heavy overhead shade.
- Tree is regarded as most durable as it is untouched by white ants or termites which destroys many varieties of timber plants,
- Root suckers are profusely produced when the roots are exposed or injured or when tree has been fallen down.
- The tree cannot withstand prolonged drought and sometimes suffers from bark-scorching due to isolation. The best measuer is to retain the side cover around the plantation as long as possible.
- The tree is extremely sensitive to fire.

Harvesting

The seeds are obtained from 20 or more years old trees. The seeds are used for the propagation of the plants. Seedlings are prepared in nursery before planting in the field. In favourable conditions it begins forming the heartwood after 10 years of growth. At that point the girth of the tree becomes about 9 inches and its height 10 feet. After 20 years the heartwood begins to form rapidly and reaches its prime in the 50-60 year range at which point the tree becomes about 2-3 feet in girth and upto 60 feet height. The trees having reached this stage and considered ripe for harvest are uprooted not cut, as the roots are highest in oil content. The appropriate time for harvesting is just after the rainy season so as to reduce labor.

Processing

For production of heartwood, fully grown trees 27-30 yrs. old are uprooted. The cleaned heartwood sawn into billets about 2.5 ft. long and are trimmed and kept for drying in a closed warehouse. In this process the aroma and wood are improved. Generally the heart wood is equivalent to about one third of the tree by weight. As it is a slow growing tree and it takes many decades before it is harvested (by felling the tree). The oil is extracted from the wood. This is a highly expensive item to buy (Approx. Rs 60,000 (\$1500 per kg).

Constraints

The demand and high value of the tree trunk led to

widespread tree felling and smuggling and also exploited by thieves. They have developed many ingenious means for transporting the wood to people willing to buy illegally. In the forest, Veerappan, was often quoted with sandalwood smuggling around the forests of Mysore. At present tree are mainly found either in the forest or in the private lands which are under government control. Penalties for detection of illicit trading are severe. The government has made restrictions on the purchase of sandalwood which is even more stringent. The companies who purchase it through legal channels, maintain records showing how it is being used so that when officials check the records, the amount purchased and the amount sold match.

Global scenario

Global production of sandalwood is about 4,000 tons. Officially, India produces about 400 tons (2000-2007) (TOI, News home, Bangalore, Feb 29, 2012, 05.59 AM IST) the unofficial figure is about 2,000 tons, which is smuggled. Australia produces about 1,800 tons of the Australian variety; about 350 tons comes from Timor, Malaysia, Cambodia, Vietnam, Thailand and Myanmar India, Indonesia major exporters; China and Taiwan are the largest consumers of sandalwood. USA and France are the largest importers of sandalwood oil The first commercial harvest of *Santalum album* from Australian plantations in 2014 was estimated about 400 tons.

Countries like Australia are encouraging companies who enters into the plantation crops by extending huge rebates from income tax in the context of investment made towards the maintenance of eco balance. Such kind of rebates should be given by Indian government also to encourage the sandalwood plantations in India. However, our government encourages the farmers for cultivation of the *Santalum album*. Department of AYUSH has announced subsidy upto 75% to the growers of *Santalum album* plantations in states like Maharashtra and Gujarat. Many farmers have taken up the plantations of Sandalwood tree in states like Gujarat, Maharashtra, Karnataka and Kerala.

In 2010, cricketer Adam Craig Gilchrist owned the TSF company of Australia. The TSF company grows Indian sandalwood in 10,500 hectare land which is world's largest Indian Sandalwood plantation. He is now Brand ambassador of that company. He earned moreover 17 crores of rupees in 6 months (Divya bhaskar- gujarati news paper dtd.19.09.2016)

Several countries such as China, Australia, Thailand, Costarica, Cambodia, Srilanka are also venturing into *Santalum album* plantation because of its fragrance characteristics and high demand for natural products worldwide.

Conclusion

In India strict government laws were a major hinderance for cultivating sandal wood but these laws have now been liberalized. Increase in sandalwood plantation is the need of the nation. The tissue cultured plants are disease free. Bacteria, fungi and virus free plants are produced by this technique. It also decrease the period of time from the its sapling stage to harvesting stage. The tissue cultured plant cultivation will benefit farmers as sandalwood is the most economically rewarding crop in the world. Better protection and improved regeneration will result in increased number of healthy plantations and this will increase the income of the farmers.

India was in the first position in the export of raw materials of

Santalum album and it must be in the first position in future, therefore, we have to increase the area of healthy Sandalwood plantations, protect them and government should give priority for the Research and Development of the *Santalum album* to increase export of the quality raw material.

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