

Study of international status and distribution pattern of white sandalwood *Santalum album* L.

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Abstract—*Santalum album* is an ancient, natural tree species which has the capability to adapt various soil and ecological condition. Flourishing of white sandalwood can be seen from the sea level to approx. 1900m. However, this commercially as well as medicinally important plant is getting disappearance from the nature due to human activity. White sandalwood trees are mainly distributed in Australia South-East Asia and foothills of Himalaya. There are so many scientific debates regarding the phylogenetic study of *Santalum* Sp. In spite of all these arguments, it has remarkably evidenced that India is the country of exercising *Santalum* sp. in regard to domestic and commercial utilization first time in the world.

Index Terms—Ancient, Flourishing, Foothills, Phylogenetic etc.

I. INTRODUCTION

Sandal wood is an ancient medicinal as well as timber yielding plant since human civilization. Though there are two types of sandal plants-white sandal (*Santalum* sp.) and red sandal (*Pterocarpus* sp.), but the white sandal i.e., *Santalum* sp. is more economic and widely used than the red sandal. In this context we highlighted the details information on white sandal.

White sandal i.e., *Santalum* has more than seventy species under this genus. Out of all these species *Santalum album* which is Indian indigenous species, most valuable and precious in terms of Santalol quality as well as quantity, its total mass production in a unit area within a specific period in the country like India, a country of mega biodiversity. India is divided into eight agronomical zones on the basis of

temperature, humidity and other physical and soil environments. But it has been found that *Santalum album* can grow each and every agro-climatic zone in the country, provided suitable congenial edaphic factors. It is further observed that it grows in 6 – 48°C temperature with 30 – 96% relative humidity.

II. AIMS AND OBJECTIVE

The aims and objective of this study is to check the world-wide distribution of white sandalwood

Material:

research articles, books, newspaper report etc.

Method:

careful study of several literatures and recording of data for future analysis.

III. INTERNATIONAL STATUS REVIEW

Santalum album L. is distributed between 30° N and 40° S from Indonesia in the West to Juan Fernandez Island in the East and from Hawaiian Archipelago in the North to New Zealand in the South. Now a days Australia is in a position to perform quality research on white sandal actively. Indeed, is importing lot of white sandal seed from India (Source IWST, Bangalore).

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IV. DISTRIBUTION

- A) Country wise distribution of *Santalum album*
- B) The distributions of species of *Santalum album* country-wise in the globe have been furnished below.

Table: 1 - Country wise distribution of *Santalum album* (Source: Institute of Wood Science and Technology, Bengaluru, Indian Council of Forestry Research and Education, Vol. 2, Issue 2, July - September 2021.)

Countries	States / Provinces / Islands / Areas
India	Tamil Nadu (Salem, Coimbatore, Nilgiris up to 900 m. altitude), Karnataka (Mysore, Coorg), Andhra Pradesh, Bihar, Gujrat, Madhya Pradesh, Maharashtra.
China	Hainan, Guangdong, Yunnan, Taiwan
Sri Lanka	Southern and central provinces
Indonesia	Timor and Sumba
Africa	Tanzania and Ghana
United States	Hawaiian Islands
New Zealand	
Malaysia	
Philippines	
Australia	Coastal areas of Northern Australia

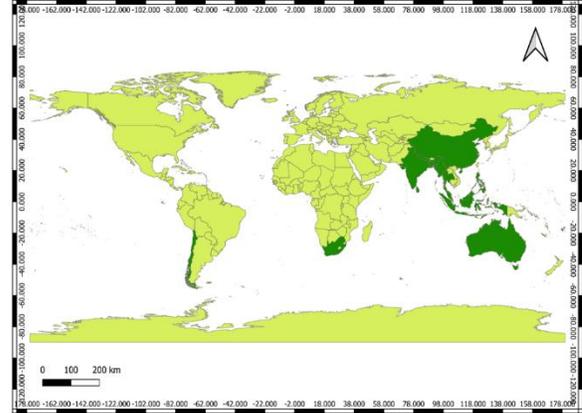


Fig:1 Green colored regions of the map showing country wise distribution of white sandalwood.

Hrold St. John reported 19 accepted, naturally occurring species of *Santalum* from java to Juan Fernandaze, Hawaii and Bonin Islands. The 19 accepted species along with their distributed region is given below:

Table: 2 – Country wise distribution of different species of *Santalum album* L. (Source: Chavan, S.B., Uthappa, A.R., Chichaghare, A.R. *et al.* Past, present and future of Indian sandalwood (*Santalum album*) cultivation and commercial prospects. *Discov Appl Sci* 6, 627 (2024). <https://doi.org/10.1007/s42452-024-06337-8>)

Species of <i>Santalum</i>	Distributed region
<i>Santalum album</i> L.	Java & Timor
<i>Santalum macgregorii</i> F. Muell <i>Santalum papuanum</i> Summerh.	New Guinea
<i>Santalum lanceolatum</i> R.Br. <i>Santalum obtusifolium</i> R.Br. <i>Santalum ovatum</i> R.Br.	Australia
<i>Santalum austrocaledonicum</i> Vieillard	New Caledonia, Loyalty Islands, New Hebrides
<i>Santalum yasi</i> Seen	Fiji
<i>Santalum insulare</i>	Tahiti, Raiatea, Austral Islands, Rapa, Marquesas
<i>Santalum bendersonense</i> F.B.H.Br.	Henderson Island
<i>Santalum fernandezianum</i> Phil. (Now extinct)	Juan Fernandez

<i>Santulum ellipticum</i> Gaud. <i>Santulum freycinetianum</i> Gaud. <i>Santulum haleakalae</i> Hbd. <i>Santulum lanaiens</i> Rock <i>Santulum paniculatum</i> H. & A. <i>Santulum pilgeri</i> Rock <i>Santulum pyrularium</i> Gray.	Hawaiian Islands
<i>Santulum boninse</i> (Nakai) Tuyama	Bonin Islands

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Distribution of *Santulum album* in India

Sandal is thought to have been introduced to India from Timor in Indonesia (Shetty, 1977). *S. album* is primarily found in the Deccan Plateau of India. *Santulum album* is found in all over India in around 90% of the area of the state Karnataka and Tamil Nadu covering 8300 sq. Km. *Santulum album* grows naturally in the southern as well as western parts of Karnataka over an area of 5000 sq. km. It is distributed over an area of 3000 sq. km. in Tamil Nadu and dense population of *Santulum album* exists in North Arcot (Javadis and Yelagri hills) and Chitteri hills. *Santulum album* is also found in other states of India like Andhra Pradesh, Kerala, Maharashtra, Madhya Pradesh, Orissa, Rajasthan, Uttar Pradesh, Bihar and Manipur. It has been reported (Das & Tah, 2013) in an international assemble in Institute of Wood Science Technology (IWST), Bangalore in 2013 that West Bengal has achieved the potentiality to grow and maintain properly more than 2000 white sandal (*Santulum album*) plants in the districts viz Bankura, Burdwan, Birbhum, Purulia and Midnapore west in the state of West Bengal.

Distribution of *Santulum* sp. In India has been furnished in the table below.

Table:3 – State and district wise distribution of *Santulum album* (Source: Institute of Wood Science and Technology, Bengaluru, Indian Council of Forestry Research and Education, Vol. 2, Issue 2, July - September 2021.)

+	Districts / Areas
Karnataka	<i>Mysore, Coorg.</i>
Tamil Nadu	<i>Salem, Coimbatore, Nilgiris up to 900 m. altitude.</i>
Kerala	Agali Forest Range, Marayur (Idukki district), Meppadi (Wayanad district), Wadakkanchery (Thrissur district), Ottapalam (Palakkad district), Kannavam (Kannur district) and some fragments of Kollam and Kasargod districts.
Madhya Pradesh	Seoni
Rajasthan	Distributed in the semi- arid areas of the south and east—in natural forests; agricultural lands, old havelis, etc.
Uttar Pradesh	Bundelkhand forest division
Orissa	Thaumul – Rampur (2000 ft.), Near Jeypur town, throughout the forest in Sambalpur like little jungle on Motijharan Hill, Marayoor range etc.
West Bengal	Bankura, Burdwan, Birbhum, Purulia and Midnapore west.

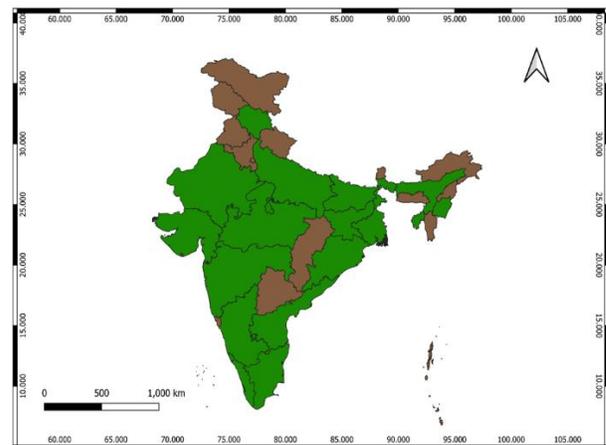


Fig:2 Green colored regions of the map showing distribution of *Santulum album* L. in India

V. STATUS OF SANDALWOOD IN WEST BENGAL

White Sandal is an exotic in West Bengal. The principal sandal tracks are confined to some parts of Karnataka (70%), Kerala & Tamil Nadu, though it is reported in other parts of India sporadically. 600m to 900m is the elevation where it treive best. In West Bengal; it was tried experimentally in Sukna & Arabari nurseries in 1960s and some success had been achieved. In Sukna garden this species produced first flowers at the age of five years (Homfray and Roychoudhury, 1960). Sandalwood (*Santalum album* L.) is found mostly in the lateritic tracts having rainfall from 1200mm to 1600mm with maximum temperature 45°C and minimum temperature 7°C of the following areas of South-West Bengal both in forest area and in adjoining non-forest areas of the blocks. An enumeration of the existing stock of Sandalwood plants was done in 2012 in South-West Bengal particularly in Midnapur, Bankura, Burdwan and Birbhum district and found that there were about 15000 to 17000 plants

In India, it is found distributed all over the country and more than 90% lies in Karnataka and Tamil Nadu covering 8300 sq. kms. Other states where sandal trees are found distributed are Andhra Pradesh, Kerala, Maharastra, Madhya Pradesh, Orissa, Rajasthan, Uttar Pradesh, Bihar and Manipur [Srinivasan et al., 1992).

Status of *Santalum album* L. in the districts of west Bengal

Regeneration of white Sandalwood plants has been attempted in numerous sites around South West Bengal since the 1960s. The majority of the land is covered in laterite soil, with rainfall ranging from 1200mm to 1600mm and temperatures ranging from 45°C to 70°C. To ensure protection, Sandalwood plants were grown in various forest Range & Beat Office compounds located in the districts of Bankura, Birbhum, Burdwan, Purulia, and West Midnapur after collecting and procuring quality seeds on a regular basis.

VI. RESULT AND DISCUSSION

From the above study it is found that Australia (Coastal areas of Northern Australia), South-East

Asia including China (Hainan, Guangdong, Yunnan, Taiwan), Indonesia (Timor and Sumba), Malaysia, Philippines, India, Sri Lanka (Uva province (Badulla-Welimada region), Nepal and the foothills of Himalaya are the places where majority of the sandalwood tree occurs.

Though the sandalwood plant has been serving the world since human civilization, but indeed no adequate literature is available for the research advancement of the medicinal as well as precious timber yielding plant like white sandal. Some research references have been available surfing various websites. These research findings have been cited here in very nut shell according to ancient years till to date.

According to Harold St. John, cause of extinction of sandalwood is extermination of the plant during sandalwood trade from the islands and it also a common belief of residents of Hawaiian Islands. In this article it is found that the sandalwood has numerous uses in different aspects such as uses of sandalwood in religious purposes, used in medicine and many other ornamental uses. Sandalwood is abundantly used in the orient, particularly in China, Burma and India for centuries due to its pleasant fragrance. Harold st. John stated that *Santalum album* is believed to be native to India but is now considered to have been introduced in to India many centuries ago and cultivated therefore its economic and sentimental values. Recently *Santalum album* is widely distributed. According to Skottsberg, 1930 and Fischer, 1938 *Santalum album* is certainly indigenous in Timor and apparently all along the southern chain of the East Indies to eastern Java.

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