

**GOVERNMENT OF INDIA  
CENTRAL VISTA OVERSIGHT COMMITTEE**



सत्यमेव जयते



**REPORT OF THE  
SANDALWOOD DEVELOPMENT COMMITTEE**





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DECEMBER, 2024**







## LIST OF CONTENTS

<b>List of Abbreviations</b>		<b>1-3</b>
<b>Foreword / Acknowledgements</b>		<b>4-5</b>
<b>Executive Summary</b>		<b>6-9</b>
<b>Chapter 1: Background</b>		<b>10-15</b>
1.1	Introduction	10-11
1.2	Uniqueness of Indian Sandalwood	12-13
1.3	Reasons for Decline in Sandalwood production in India	13-14
1.4	Central Government agencies dealing with Sandalwood	15
1.5	Importance of developing indigenous Sandalwood plantation/industry	15
<b>Chapter 2: Sandalwood Products / By-products and their usage</b>		<b>16-18</b>
<b>Chapter 3: International Scenario - Australian model of Sandalwood plantation and marketing Sandalwood products and their usage</b>		<b>19-23</b>
<b>Chapter 4: Domestic vis-à-vis International markets/trade for Sandalwood &amp; its by-products</b>		<b>24-29</b>
<b>Chapter 5: Sandalwood plantation and marketing in India</b>		<b>30-33</b>
<b>Chapter 6: Existing legal provisions relating to Sandalwood plantation and marketing under the statutes of the Government of India and the major State Governments</b>		<b>34-38</b>
<b>Chapter 7: Sandalwood Development Committee</b>		<b>39-41</b>
i.	Constitution and Composition of the Sandalwood Development Committee	39
ii.	Terms of Reference	40
iii.	Stakeholder consultations	41
<b>Chapter 8: Issues identified during stakeholder consultations</b>		<b>42-48</b>
<b>Chapter 9: Recommendations of the Committee</b>		<b>49-57</b>
<b>Chapter 10: Recommendations Implementing Agencies</b>		<b>57-61</b>





<b>List of REFERENCES</b>	<b>62</b>
<b>ENCLOSURES</b>	<b>63-80</b>
<b>Enclosure 1 - Draft Sandalwood (Promotion and Facilitation) Act, 2024</b>	64-71
<b>Enclosure 2 - Draft Proposal to establish Sandalwood Board of India</b>	72-80
<b>Annexes</b>	<b>81-113</b>
<b>Annex 1 - OM regarding Constitution of Sandalwood Development Committee</b>	82-85
<b>Annex 2 - OM regarding Reconstitution of Sandalwood Development Committee</b>	86-87
<b>Annex 3 - Minutes of the SDC meeting held on 7.2.2021</b>	88-92
<b>Annex 4 - Record Note of discussions held during Stakeholder consultation meeting of SDC on 25.8.2023</b>	93-97
<b>Annex 5 - Record Note of discussions held during Stakeholder consultation meeting of SDC on 19.12.2023</b>	98-103
<b>Annex 6 - Record Note of discussions held during Stakeholder consultation meeting of SDC on 22.12.2023</b>	104-108
<b>Annex 7 - Record Note of discussions held during Stakeholder consultation meeting of SDC at Mumbai on 24.4.2024</b>	109-113





## ABBREVIATIONS

ACF	Assistant Conservator of Forest
ADTH	Air Dry Tonnes of Heartwood
AICRP	All India Coordinated Research Project (Under ICAR)
AICTE	All India Council for Technical Education
APCCF (R&T)	Additional Principal Chief Conservator of Forests (Research & Training)
APCCF (SF)	Additional Principal Chief Conservator of Forests (Social Forestry)
BDC	Beekeeping Development Committee
BIS	Bureau of Indian Standards
CAGR	Compound Annual Growth Rate
CAU	Central Agricultural University
CAFRI	Central Agroforestry Research Institute, Jhansi
CAMPA	Compensatory Afforestation Fund Management and Planning Authority
CCF	Chief Conservator of Forest
CEO	Chief Executive Officer
CoC	Certificate of Conformity
COO	Certificate of Origin and Ownership
COVID-19	Corona Virus Disease 2019
CVOC	Central Vista Oversight Committee
DAC&FW	Department of Agriculture Cooperation and Farmers' Welfare
DARE	Department of Agricultural Research and Education
DBT	Department of Biotechnology
DFO	District Forest Officer
DGFT	Directorate General of Foreign Trade
DST	Department of Science and Technology
EAC-PM	Economic Advisory Council to the Prime Minister
e-NAM	e- National Agriculture Market
FC&RI	Forest College and Research Institute, Mettupalayam
FMCS	Foreign Manufacturers Certification Scheme
FPC	Forests Product Commission of Western Australia
FPO	Farmer Producer Organization
FSSAI	Food Safety and Standards Authority of India



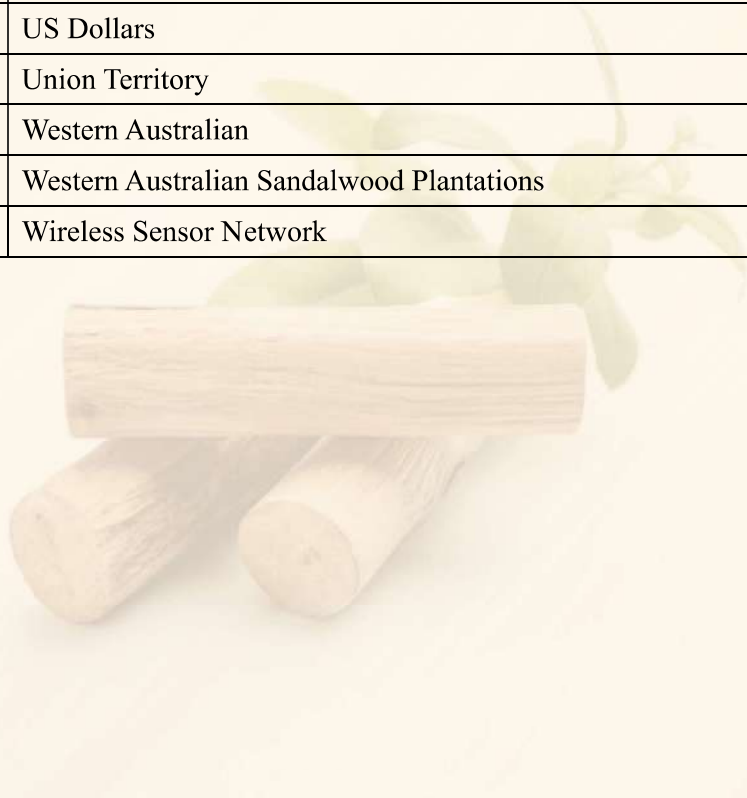


GLC	Gas Liquid Chromatography
GoI	Government of India
HYV	High Yielding Varieties
ICAR	Indian Council of Agricultural Research, New Delhi
ICFRE	Indian Council of Forestry Research and Education, Dehra Dun
IFA	Indian Forest Act, 1927
IFGTB	Institute of Forest Genetics and Tree Breeding, Coimbatore
IIT	Indian Institute of Technology
INR	Indian Rupee
IT	Information Technology
IWST	Institute of Wood Science and Technology, Bengaluru
KFRI	Kerala Forest Research Institute, Thrissur
KS&DL	Karnataka Soaps & Detergents Limited
KSHDC	Karnataka State Handicrafts Development Corporation
MHA	Ministry of Home Affairs
MoA&FW	Ministry of Agriculture and Farmers' Welfare
MoAYUSH	Ministry of AYUSH
MoC&I	Ministry of Commerce and Industry
MoEF&CC	Ministry of Environment, Forest and Climate Change
MoMSME	Ministry of Micro, Small & Medium Enterprises
NABARD	National Bank for Agriculture and Rural Development
NITI Aayog	National Institution for Transforming India Aayog
NMPB	National Medicinal Plants Board, Government of India
NSR	Nachivayal Sandal Reserve, Marayoor, Kerala
PCCF & HoFF	Principal Chief Conservator of Forests (Head of Forest Force)
QCO	Quality Control Order
QPM	Quality Planting Material
R&D	Research and Development
RKVY	Rashtriya Krishi Vikas Yojana
SA	Sandalwood (Promotion and Facilitation) Act, 2024
SAU	State Agricultural Universities





SDC	Sandalwood Development Committee
SEZs	Special Economic Zones
SFAC	Small Farmers Agribusiness Consortium
SLSB	State-level Sandalwood Boards
SSD	Sandalwood Spike Disease
SWBI	Sandalwood Board of India
TNAU	Tamil Nadu Agricultural University, Coimbatore
TOFI	Trees Outside Forests in India
TOHFA	The Nilgiris Organic Horticulture Farmers' Association
USAID	The United States Agency for International Development
USD	US Dollars
UT	Union Territory
WA	Western Australian
WASP	Western Australian Sandalwood Plantations
WSN	Wireless Sensor Network





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**No. CVOC/2024**

**31<sup>st</sup> December 2024**

### **FOREWORD / ACKNOWLEDGEMENTS**

Farming of sandalwood can act as a platform for rural employment generation and significant foreign exchange generation through exports of sandalwood and its various other by-products. India can be Atmanirbhar while meeting the Sandalwood needs of our society in the present and in the future. Several measures and reforms would be required to be undertaken by the Central and State Governments to regain the past glory of Indian Sandalwood.

2. With an aim to identify the issues being faced by the stakeholders and make recommendations for development of Sandalwood in the country, I took initiative as the Member Secretary of the erstwhile Economic Advisory Council to the Prime Minister (EAC-PM) and constituted the Sandalwood Development Committee (SDC) in March 2021. However, owing to the devastating COVID-19 second wave and completion of the term of the then EAC-PM, SDC could not proceed with its work. Subsequently, consequent to my appointment as Chairman of the Central Vista Oversight Committee (CVOC), SDC was reconstituted in March 2022 with me as Chairman and Shri K. Rajeswara Rao, Principal Adviser, CVOC as Member Convener. Apart from the experts in Sandalwood, representatives of various ministries / departments / organisations of the Government of India dealing with Sandalwood are Members of the SDC. As CVOC was busy with overseeing the construction work of the prestigious New Parliament Building (NPB), the reconstituted SDC started its work after the completion and inauguration of NPB by the Hon'ble Prime Minister in May 2023.

3. It gives me an immense pleasure to present this Report of the Sandalwood Development Committee. SDC held consultations with diverse stakeholders, assessed the status of Sandalwood and recommended appropriate measures in this Report for the development of Sandalwood in India.





4. I extend my heartfelt gratitude to all the Members of SDC for their enthusiastic participation in the discussions and for offering valuable insights into the challenges and potential solutions for advancing Sandalwood in the country. My appreciation and thanks to Dr. M.P. Singh, Former Director; Shri Rajesh Kallaje, Director; Dr. Arun Kumar A.N., Scientist-F and their team of Scientists/Officers in the Institute of Wood Science & Technology (IWST), Bengaluru for their consistent support and contribution towards completion of the work of SDC.

5. My special appreciation and thanks also to Dr. K.T. Parthiban, Former Dean and Professor, along with his team of officials and Research Scholars, Forest College & Research Institute (FC&RI), Mettupalayam for his immense contribution in drafting and finalising of this report. I also thank Shri Nihar Ranjan, Dean and Dr. A. Balasubramanian, former Dean of FCRI, Mettupalayam for their invaluable inputs. I must thank Dr. M.R. Srinivasan, Professor of Entomology, TNAU, Coimbatore for extending his invaluable support in fine tuning the SDC report. Thanks are due to the management of TNAU, Coimbatore for allowing FC&RI and Dr. M.R. Srinivasan to assist Shri K. Rajeswara Rao, Member Convener, SDC and associate with the work of SDC.

6. I would like to thank the State Governments, State Forest Departments, Sandalwood Experts, Scientists, Institutions, Farmers, Sandalwood Agencies/Federations, etc. for their participation in the stakeholder consultation meetings and providing valuable inputs and suggestions. Further, I thank Dr. Anantha Padmanabha, Australia Sandalwood Expert for providing valuable inputs about the current status of Sandalwood in Australia.

7. I am grateful to Shri K. Rajeswara Rao, Principal Adviser, CVOC and Member Convener, SDC for his tireless efforts in coordinating with various stakeholders and bringing together the complex issues involved while preparing this report with specific recommendations for development of Sandalwood in India. Without the excellent support and involvement of Shri Rajeswara Rao, it would have not been possible for the SDC to complete its work and bring out this report.

8. I sincerely urge the Central Government and the State Governments to make use of this report and take urgent necessary action in implementing the recommendations of the SDC.

*Ratan P. Watal*  
(Ratan P. Watal)



## EXECUTIVE SUMMARY



Sandalwood (*Santalum album* L.) is a prized gift of the plant kingdom integrated into the cultural and heritage system of India. It is one of the most valuable trees in the world. It exhibits a very long history of human use and appears in Sanskrit texts as early as 2000 BC. This sought after wood and the oil extracted from this wood are essential part in wide range of industrial applications. It is highly significant in religious and cultural festivals of not only in India but across the world. The Sandalwood is valued for its quality and found major utilization in carving and furniture. The aroma present in the oil has a profound utility in perfume and cosmetic industries which attracted a global market. The traditional medicines have also realized the potential of Sandalwood oil for its therapeutic uses as anti-bacterial, anti-inflammatory, antioxidant, anti-hyperglycemic and hemo-preventive effects. Such a pristine species with multitude of benefits have received both national and global attraction. Till the recent past, India was the largest producer and exporter but currently Australia leads the global market with a market share of about 69 % followed by India with a market share of about 20 % only.

The export and import of Sandalwood in India indicates that the export valued at USD 0.62 million and import at USD 5.59 million during the year 2023-24 (Soundarajan et al. 2015). The country once a major producer of Indian Sandalwood oil is slowly translated into a massive importer due to non-availability of wood. It is also witnessed that the global Sandalwood market is steadily increasing which was valued at USD 265.8 million in 2023 and is expected to grow to USD 502.2 million in 2030 witnessing CAGR of 9.4% during the forecasted period. All these developments indicated that Indian Sandalwood has to be brought once again into the limelight in order to reap the growing demand and capitalizing the domestic and global markets.

In India, Sandalwood predominantly grew in southern peninsular India with the natural distribution of 9600 Sq. Km mainly in the states of Karnataka, Kerala and Tamil Nadu. The species has been extensively exploited which resulted in removal of superior genetic stocks and leaving only an emaciated population. Simultaneously, the demand for Sandalwood has increased steadily both for domestic utilization and the global requirement. The decline in supply from the natural forests and increasing demand in the global market has ushered in a total mismatch between demand and supply. Considering this demand globally into an account, several international agencies from across several regions of the world have initiated Sandalwood plantation development programme and today most of these countries particularly companies in Australia take the pride of over 70% sandal market share in the global market. This resulted in loss of the glory of Indian Sandalwood and necessitated massive interventions to restore the glory once again in the global market. To regenerate and to promote Sandalwood plantations, several initiatives were taken by Government of India and State Governments





which attracted the promotion of Sandalwood plantations. Currently, many private institutions, organizations and farmers are involved in raising commercial large scale sandal plantation across the country particularly in non-traditional sandal growing states like Andhra Pradesh, Telangana, Gujarat, Madhya Pradesh, Maharashtra and Rajasthan. It is estimated that Sandalwood development in farmlands has reached an area of over 30,000 hectares which is further expanding at the rate of 600 hectares per annum.

All these developments have attracted sandal-based tree husbandry by all sectors of stakeholders. However, the sandal growth, development, harvesting, and marketing are the major challenges faced by the farmers and other stakeholders involved in promotion and development of sandal farming. Several farmers and stakeholders in the country have been experiencing and witnessing the challenges which has been expressed to the Government in the form of petitions, memorandums and proposals. All these proposals and grievances expressed by the stakeholders are reviewed and Government of India through Central Vista Oversight Committee (CVOC), New Delhi constituted Sandalwood Development Committee (SDC) under the chairmanship of Shri Ratan P. Watal, Chairman, CVOC to review the current status, identify the issues and make recommendations in consultation with the stakeholders for making suitable changes in policy and legal frameworks by the central and state governments.

Accordingly, the committee conducted several stakeholder consultation meetings in major sandal growing states, reviewed the present status and development in both domestic and international market and made policy recommendations. These consultations were held in various locations viz., New Delhi, Bengaluru (Karnataka), Gandhinagar (Gujarat), Mettupalayam (Tamil Nadu) and Mumbai (Maharashtra) covering various states in different regions of India. During the several stakeholder consultations conducted across the country, the Sandalwood Development Committee identified the following challenges related to Sandalwood plantation development, trade and marketing:

- i. Dearth of quality planting materials and package of practises for Sandalwood cultivation
- ii. Illegal felling, theft and lack of plantations protection system
- iii. Lack of financial support, incentives and of insurance coverage
- iv. Legal issues related to harvesting, transportation and sale of farm-grown Sandalwood Need for further research and development on improved varieties and propagation methods, pest and diseases management and value chain system





v. Absence of market mechanism and price supportive system

vi. Absence of traceability and the associated certification standards

To bring back the glory of Indian Sandalwood and to make India play a vital role in global sandal market, the committee thoroughly reviewed the challenges and concerns that exists and expressed by the stakeholders from the entire Production to Consumption System in sandal cultivation and suggest the following recommendations:

1. Sandal wood cultivation needs to be promoted and developed through a technological advancement judiciously involving research and development institutions, forest department, farmers, organization and other institutions involved in sandal plantation development.
2. The Central and State Governments should ensure and revise the existing law and legislations to facilitate easy harvest, transportation and marketing of farm grown Sandalwood and treating farm grown Sandalwood as farm produce. The MoEF&CC should amend Indian Forest Act, 1927 exempting farm grown Sandalwood from the list of forest produce (Section 2 (4)) and from the list of timber (Section 2 (6)), and free it from the purview of forest products similar to the amendment made in case of Bamboo (*"In the Indian Forest Act, 1927, in section 2, in clause (7), the word "bamboos" shall be omitted"*).
3. The financial institutions should ensure necessary institutional credit and insurance mechanism for sandal plantation development by developing scale of finance and other input cost requirements.
4. The government implementing institutions should extend all incentive mechanism for Sandalwood plantation establishment and the associated value chain process.
5. Need for deregulating the restrictions of sandal import and exports particularly for farm grown sandal products.
6. The certification mechanism for QPM, Sandalwood plantation, CoC (Chain of Custody), products, etc. should have to be developed and implemented by the respective institutions
7. Need for a strong research and development mechanism with a continued funding support to R&D institutions to develop varieties, clones, value added products, agroforestry models, etc. to match the global competency. ICFRE, ICAR, SAUs could develop QPM standards, Agroforestry models and value addition technologies. R&D institutions should develop strategies for in-situ and ex-situ conservation of Sandalwood biodiversity.





8. The information access to market, pricing system and other value added products have to be created by the respective government institutions to ease the art-of Sandalwood business.
9. To attract sandal farming and the associated socio-economic developments, the committee suggests to create an exclusive Sandalwood Development Board along with regional centres by formulating necessary legal provisions. The committee also makes the following specific recommendations to promote sandal cultivation towards re-establishing the glory of Indian Sandalwood.
10. MoEF&CC, MoA&FW, MoAYUSH and NABARD could incorporate Sandalwood for extending institutional credit, incentives and insurance.
11. Relaxation of policy related to Sandalwood by different states and adoption of common legal system for Sandalwood across the country by enacting Sandalwood (Promotion and Facilitation) Act, 2025.
12. MoEF&CC, MoA&FW, MoAYUSH and MoCI could develop mechanisms for market and price supportive system.
13. MoA&FW should notify Sandalwood Oil Control Order to ensure that selling of certified oil conforming to BIS standards (IS 329:2004) only in the market.
14. MoEF&CC should develop standards for Sandalwood certification and MoA&FW to make necessary legal provisions for AGMARK certification of sandal and its by-products.
15. GoI should enact Sandalwood (Promotion and Facilitation) Act, 2025 as per the draft proposed (Enclosure-1) and establish a Sandalwood Board similar to various other Boards such as Tobacco Board, Spice Board and Coffee Board under the Ministry of Commerce & Industry, Government of India, to ease Sandalwood trade process and facilitate creation of sandal FPOs. This Sandalwood Board could play a pivotal role in making India a global leader in Sandalwood production and trade, ensuring the sustainable and equitable growth of this valuable resource. State Level Sandalwood Boards could also be established under the provisions of the above proposed Act.
16. If enacting the proposed Act takes longer time, SDC recommends that the Sandalwood Board could be established by the GoI under a policy decision as per the proposal in Enclosure-2.



## Chapter 1



### BACKGROUND

#### 1.1. Introduction

*Santalum album* L., commonly known as Indian Sandalwood, is a tropical, medium sized, evergreen, partially root parasitic tree, renowned for its fragrant heartwood. It is an evergreen tree mostly grown for extraction of timber and essential oil. The tree is famously called white Sandalwood (in English), belongs to the Santalaceae family, Safed Chandan (in Hindi) and srigandha (in Sanskrit). Sandalwood has also been intricately associated with Indian history, culture, heritage, folklore and scriptures. It is widely accepted as the most precious and commercially valuable tree species for its fragrant heartwood and essential oil. Sandalwood is a tree which generally grows in the dry deciduous forests. It can grow to a height of 20 m and a girth of 1.5m. It thrives best under rainfall conditions of 500-2000 mm and at elevations of 650-1200m. Sandalwood is capable of growing in different kinds of soils.



*About 50 year old Sandalwood tree with an approximate girth of 50 cm in Marayoor, Kerala*



*Sandalwood tree host association*

Sandalwood flowers and fruits twice a year during March-April and September-October. In early stages, it grows well under partial shade, but at the middle and late stages, it shows intolerance for heavy over-head shade.

In India, the States of Tamil Nadu and Karnataka are the two largest repositories of Indian Sandalwood. Previously, more than 90 % of the Sandalwood was distributed in the states of Karnataka and Tamil Nadu covering around 9,000 km<sup>2</sup> of which more than 70 % occurred in Karnataka. Over a





*About 150 year old Sandalwood tree with an approximate girth of 200 cm in NSR - 2, Marayoor, Kerala*

period of time, it has been introduced to other parts of the country and is currently cultivated in Andhra Pradesh, Kerala, Jharkhand, Madhya Pradesh, Orissa, Uttar Pradesh, Uttarakhand, Chhattisgarh, Rajasthan, Bihar and Manipur. Currently, it is estimated that the Sandalwood development in farmlands has reached an area of 30,000 hectares, which is further growing at the rate of 600 hectare per annum.



*Sandalwood tree planted near a Household in Marayoor, Kerala*





## 1.2. Uniqueness of Indian Sandalwood

Worldwide, the distribution of Sandalwood is between 30°N and 40°S latitude. There are 17 species, 14 varieties and one extinct species reported in the genera *Santalum*. Of the 17 species, seven species are considered commercially important. Among them, the potential of *Santalum album* is very significant due to its high demand and higher price in the international market. This is primarily due to its high-quality oil and used as a premium standard to compare other Sandalwood oils. The species *Santalum album* is regarded as most valuable also because of high  $\alpha$  and  $\beta$ -santalol content in the oil. Currently, *Santalum album* accounts for about 95 per cent of total global production.

The Indian Sandalwood has been acclaimed as the most precious and valuable among Indian forest trees since time immemorial. The oil extracted from the heartwood is in high demand by perfume manufacturers, and is also used in indigenous medicine. The heartwood is considered as one of the finest woods for carving. The following features make the Indian Sandalwood more special and unique and the most preferred *Santalum* species in the world.

### Ability to grow under versatile growing conditions

Indian Sandalwood thrives in varied environmental conditions, including well-drained soils and a warm, tropical and subtropical climate. This ability of the plant to thrive in versatile growing conditions and yielding fragrant wood and oil makes it suitable species for growing across several states in the country.

### Cultural Craftsmanship

Indian Sandalwood has been intricately woven into the cultural fabric of India, with skilled artisans and craftsmen utilizing its wood for carving, sculpture, and decorative arts. The craftsmanship associated with Indian Sandalwood adds an extra dimension of value and appreciation.

### Distinctive Heartwood Color and Texture

The heartwood of Indian Sandalwood is prized for its rich golden-brown color and fine, even texture. The wood is highly valued in woodworking, carving, and furniture making, adding both aesthetic appeal and intrinsic value to crafted items.



*Sandalwood stored in a State Forest Department in Marayoor, Kerala*



### **High Oil Content**

Indian Sandalwood typically contains a higher percentage of essential oil compared to other Sandalwood species. This high oil content contributes to its intense fragrance and therapeutic properties, making it a prized ingredient in perfumes, incense, and essential oils. The fragrant heartwood has oil content up to 6%.

### **Medicinal Properties**

Indian Sandalwood has a long history of use in Ayurvedic medicine for its various therapeutic properties. It is believed to have antimicrobial, anti-inflammatory, and soothing properties, making it valuable for skincare, aromatherapy, and holistic healing practices.

### **1.3. Reasons for Decline in Sandalwood production in India**

The commercial value of Sandalwood became known mostly in 1792 when Tipu Sultan, the then ruler of Mysore declared it as a 'Royal tree'. Due to this historical presence, Sandalwood has continued to remain under government control. However, the Sandalwood cultivation and the associated supply chain suffers due to wide range of challenges and constraints which led to decline in Sandalwood production. The following are some of the reasons for the decline of Sandalwood production in India

#### **Excess harvesting**

Historically, there has been significant overharvesting of Sandalwood trees due to high demand for their wood and oil. This unsustainable harvesting has led to the depletion of natural Sandalwood populations, particularly in regions where the trees were once abundant.

#### **Illegal Logging and Smuggling**

Illegal logging of Sandalwood trees continues to be a major problem in India. Smugglers often target mature Sandalwood trees for their valuable heartwood contributing to the decline in natural populations. This illegal trade undermines conservation efforts and perpetuates the depletion of Sandalwood resources.

#### **Habitat Loss**

Deforestation and habitat loss pose a significant threat to Sandalwood trees and their natural ecosystems. Rapid urbanization, agricultural expansion, and infrastructure development have resulted in the destruction of Sandalwood habitats, reducing the available area for natural regeneration and cultivation.





### **Slow Growth and Long Maturation Period**

Sandalwood trees have a slow growth rate and a long maturation period, often taking several decades to reach harvestable maturity. This slow growth makes Sandalwood cultivation a long-term investment that requires patience and careful management. As a result, many farmers and landowners may prefer faster-growing and more lucrative crops, leading to a decline in Sandalwood cultivation.

### **Regulatory Challenges**

Complex regulations and hurdles related to Sandalwood cultivation, harvesting and trade also hinders legitimate production efforts. Licensing requirements, permit systems, and government controls aimed at preventing illegal logging and smuggling also act as barriers for farmers and businesses interested in cultivating Sandalwood.

### **Pests and Diseases**

Sandalwood trees are susceptible to various pests and diseases, which affect their growth and productivity. Infestations of insects, fungi, and other pathogens often damage Sandalwood trees, reducing their yield and quality. Lack of effective pest management practices and limited access to disease-resistant varieties may exacerbate the problem. Changing climatic conditions are responsible for status shift of minor pest to major pests as in case of red stem borer, *Polyphagozerra coffeae* especially in farmer field where Sandalwood is grown along with other horticultural crops pest shift to Sandalwood is also evidenced.

### **Lack of Incentives**

Lack of sufficient incentives and support mechanisms for Sandalwood cultivation may deter farmers from investing in this crop. Limited access to financial resources, technical assistance, and market information also impedes efforts to expand Sandalwood production and encourage sustainable practices.

Now, India is hardly able to satisfy its domestic Sandalwood needs and rely mostly on Australia and African nations to meet its requirements. India faces a wide gap between demand and supply. India is a huge importer of Sandalwood oil and powder, especially from Australia, Ethiopia and Tanzania and Wooden Frames from China. Sandalwood is categorised as vulnerable by International Union for Conservation of Nature (IUCN).





#### **1.4. Central Government agencies dealing with Sandalwood**

There are several Central Government agencies such as MoEF&CC, MoA&FW, Ministry of AYUSH, Ministry of Commerce, National Medicinal Plant Board, etc. dealing with Sandalwood. There is a need for a single agency in the Government of India to govern the state-owned Sandalwood resources and to initiate policy making process.

#### **1.5. Importance of developing Sandalwood plantation/industry**

If India needs to compete against contenders like Australia and Africa whose export trends have seen a steep incline, India should attempt to augment production of Sandalwood. Efforts are required to grow Sandalwood under Agroforestry, farm forestry, corporate and government plantations. Moreover, Sandalwood has religious importance, apart from usage in traditional perfume or attar. Therefore, there is likely to be a huge domestic as well as international demand for superior quality Indian Sandalwood. India can become '*Atmanirbhar*' while meeting the Sandalwood needs of our society both in the present and also in the future.

All the above issues resulted in farmers expressing concerns and submitting proposals to various state government and central government to relax the existing rules and to resolve the various challenges and constraints faced by the sandal growing farmers.

Considering these challenges and grievances expressed by the Sandalwood growing farmers and other stakeholders across the country, the Government of India through Central Vista Oversight Committee, New Delhi constituted Sandalwood Development Committee to resolve the issues with a suitable policy and legal directions. Accordingly, the committee conducted several consultation workshops in major sandal growing states, reviewed the current status and development in both domestic and international market and drafted suggestive and policy notes which are presented in this report.



Chapter 2



**SANDALWOOD PRODUCTS/BY-PRODUCTS AND THEIR USAGE**

Sandalwood is much prized as a wood for carving and is used for making souvenirs and other items requiring fine workmanship. In India, sapwood of sandal is used for wood turning, particularly toy making: the wood comes mainly from trimmings and immature trees killed by spike disease. Sawdust from heartwood prepared for distillation is valuable enough to be collected and sold for use as incense for religious purposes as well as for scenting clothes and cupboards.

Outside India, where export of logs is prohibited, there is a thriving market for Sandalwood as incense in joss-stick manufacture. Australia supplies most of this market at present, mainly from *S. spicatum* which has a low oil content and which is, therefore, less attractive as a direct source of oil. Exports of logs from Western Australia were almost 2,000 tons in 1989, valued at USD 11.5 million (Adviser Edge (2008)). Log exports from other sources have amounted to a few hundred tons or less from individual species. The major commercial end uses of Sandalwood in western markets are used as a key component in fine fragrances, toiletries, aromatherapy and incense, and as an insect repellent. Factors influencing demand in Western markets include growing consumer preference for natural ingredients; manufacturer preference for sustainable, ethically produced ingredients; and a growing global beauty industry (Camin et al. 2017)



*Sandalwood by-products*





### **Sandalwood oil and Sandalwood paste**

The Sandalwood oil is one of the most valuable essential oils, valued by perfumers for its woody notes, providing a deep rich base note to perfumes and acting as a natural fixative. Sandalwood oil is still one of the main remedies used in the Ayurveda system of medicine. Asians and Arabs use it in self-treatment for a great number of diseases. Traditionally Sandalwood has been used for treating digestive complications arising from diarrhea, nausea, colic and gastritis. It is listed as a carminative and digestive muscle relaxant. Its antiseptic properties have been used for treating genito-urinary infections Such as gonorrhea and leucorrhea. Indigenous physicians observed that the oil and heartwood possessed antispasmodic properties and so utilized it for treating bronchitis, coughs, sore throat and Related diseases. Its use in treatment of skin problems is legendary. It is an excellent moisturizer and nourishes all skin types. It's astringent, anti-inflammatory, antiseptic, and pain-relieving properties have been put to good use in healing wounds, scars, and acne. Applied to the forehead in the form of a paste it has a cooling effect and is used to bring down fevers. In cosmetic preparations, it is excellent for reducing wrinkles.

### **Value addition**

#### **Personal Care**

Indian Sandalwood has been used for centuries in personal care products due to its therapeutic properties and luxurious aroma. It is known for its ability to soothe the skin and reduce inflammation, making it a great addition to skincare and haircare products.

#### **Aromatherapy**

Indian Sandalwood has proven therapeutic benefits that can be harnessed in aromatherapy. The calming and grounding properties of Sandalwood have been shown to reduce anxiety, decrease system arousal, and increase alertness and focus. It also aids learning and memory and improves sleep quality. It can also be added to massage oils or bath salts, providing a soothing and therapeutic experience for the body and mind.





### **Skincare and Cosmetics**

Indian Sandalwood is a powerful ingredient for use in skincare and cosmetic products due to its active benefits for the skin. Its anti-inflammatory properties help to soothe and calm the skin, while its potent antioxidant properties make it an effective ingredient for reducing signs of aging such as fine lines and wrinkles. The versatility of Sandalwood allows it to be incorporated into various products, such as face creams, toners, serums, lip balms, and body lotions, providing long-lasting benefits to the skin (Kumar et al., 2012).

### **Fragrance and cosmetics**

Indian Sandalwood is not only a hero ingredient in skincare and cosmetics, but it also has numerous benefits in fragrance. Its warm, woody, and earthy aroma makes it a popular choice in perfumes. As a base note in perfumes and colognes, Sandalwood can provide a deep and long-lasting scent. It is often combined with other woody scents such as cedarwood or patchouli to create a complex and intriguing fragrance. For those looking to incorporate Sandalwood into fragrance products, there are several options. Custom fragrances can be created using Sandalwood as a base note, or it can be incorporated into existing perfume lines to add a unique and impactful aroma. Additionally, Sandalwood can be used in other fragrance products such as candles, diffusers, and body sprays. Moreover, Sandalwood's fixative properties make it an excellent choice for perfumers, as it helps to enhance the longevity and sillage of fragrances, making them last longer and smell better.

### **Flavour**

Indian Sandalwood's unique flavor and delicate aroma has made it a popular ingredient in Indian and Middle Eastern cuisine for centuries. In fact, research suggests that Indian Sandalwood's essential oil is used as a natural flavor enhancer in food products, adding both taste and health benefits (Kumar et al., 2012). Indian Sandalwood has been linked to improving digestion and reducing inflammation, making it an excellent choice for those looking to incorporate more natural and healthy ingredients into their diets.



Chapter 3



## INTERNATIONAL SCENARIO - AUSTRALIAN MODEL OF SANDALWOOD PLANTATION AND MARKETING SANDALWOOD PRODUCTS AND THEIR USAGE

Sandalwood is an important international commodity, recognized for its aromatic oil which is a key ingredient in many fragrances and cosmetics. Western Australian (WA) Sandalwood (*Santalum spicatum*) is known to be a cheaper alternative for the superior Indian Sandalwood (*Santalum album*) as it has lower oil content and lower quality oil. The natural stocks of *S. album* have declined due to overharvesting, illegal felling (theft), mismanagement, and disease incidences. WA Sandalwood's natural stands have also reduced due to historical mismanagement. As a result, WA Sandalwood (*S. spicatum*) has been established in plantations in the southern half of WA to attempt to meet the demands of the Sandalwood industry. Plantations of WA Sandalwood is promoted to farmers as Agroforestry, with the promise of economic and environmental benefits. While these benefits are attractive, Sandalwood has an estimated 25-year rotation.

The Australian model of Sandalwood plantation has been a remarkable endeavor, particularly with regard to Indian Sandalwood (*Santalum album*).



*Australian Sandalwood plantation*



### Pioneering Research:

- The Western Australian Forest Department initiated Indian Sandalwood research in the early 1980s.
- This research laid the foundation for the world's largest plantations and Sandalwood supply companies, primarily based in Western Australia.
- The government research plantations provided valuable insights into various aspects, including seed germination, seedling health, plantation design, irrigation, pest management, and silvicultural treatment.
- Harvested research trees contributed to developing growth, heartwood, and oil yield models.
- Armed with this knowledge, the emerging commercial plantation industry gained confidence to invest in Indian Sandalwood plantations in Australia.

### Location

The wheat-sheep belt of Western Australia is the centre of the interest and expertise in Australian Sandalwood.

### Establishment

The main consideration when selecting a site for growing Sandalwood is drainage. Soils prone to seasonal water logging are unsuitable as are very free draining sands. Whilst well-adapted to low rainfall areas, the higher the rainfall the greater the growth rates although there is some concern about the wood quality of Sandalwood growing in areas of more than 750mm. The rainfall in the Western Australian Wheatbelt ranges from between 300 and 600mm with a pronounced summer drought.

- WA Sandalwood Plantations (WASP), established in 2001, is a leading player in the Sandalwood industry and is the world's largest manager of Australian Sandalwood (*Santalum spicatum*).
- WASP owns and manages on behalf of sophisticated and institutional investors over 19 million trees grown on 15,126 hectares located in the central Wheatbelt of Western Australia where Sandalwood has naturally occurred for thousands of years.
- The WASP Sandalwood production system is the combination of more than 20 years of Sandalwood research, 15 years of developing commercial plantations and 7 years of managing





### Market overview of Australian Sandalwood model

The natural range of Western Australian Sandalwood is throughout the medium and low rainfall regions of Western Australia from just north of Carnarvon, along the coast to above Albany, through the wheatbelt and goldfields to some small areas of South Australia.

Sandalwood of different varieties is also grown in the Indonesian archipelago and the Pacific Islands, but overexploitation and restrictions on harvesting has meant that the volume produced is minor. Current world market demand for Sandalwood is thought to be around 5,000-6,000 tons per year, with this figure incorporating demand for a number of different products, sourced from a variety of Sandalwood species.

Major market destinations for export of Sandalwood are Taiwan, China, Malaysia, Korea, Hong Kong and India. Australia is one of the major players in the international Sandalwood market, harvesting just over 2,000 tons of *S. spicatum* from Crown Land in Western Australia and 200 tons from private landholders in the same state and further 250 tons is harvested from Queensland plantations of *S. lanceolatum* (Thomson, 2020).

### Private Sector Investment

The first privately owned commercial plantations of Indian Sandalwood were established in Australia in 1999. Over two decades later, Indian Sandalwood planting continues across the tropical northern half of Australia, including Western Australia, Northern Territory, and Queensland.

Suitable land for growing Indian Sandalwood is not abundant; factors such as climate, water availability, soil types, and competing agricultural land uses limit its expansion. While most Indian Sandalwood plantations are in the tropical northern two-thirds of the country, successful growth below the 30° latitude line is possible in frost-free areas, albeit usually for non-commercial garden-based trees.

### Prospects of Sandalwood market

Prospects of Sandalwood market at present, is very encouraging and the price of one-kilogram Indian Sandalwood oil is about USD 3,000, or about five times as much as silver in 2017 (Durai, 2021; Thomson, 2020).

- Price is rising by at least 20 to 25% a year. Although Sandalwood products are consumed globally, Asia is the largest consumer, with China alone accounting for half of expected global demand growth.





- The demand for Sandalwood is expected to increase fivefold (20,000 tons per year) by 2025. Factors influencing demand in eastern markets include increasing prosperity, a growing market and consumer preference for natural products, and significant growth in demand from China.
- It is reported that future value of Sandalwood plantation from Australia range from 20,000 to 41,000 Australian dollar per ton for Indian Sandalwood (*S. album*) and 3,000 to 16,500 Australian dollar per ton for Australian Sandalwood (*S. Spicatum*).
- Although it is difficult to quantify the actual size of the global market for Sandalwood due to a lack of availability of trade data and illegal trade (likely around 33% of the total market), the most reasonable estimate of the annual global Sandalwood market in recent times is 6320 Air Dry Tonnes of Heartwood (ADTH) during 2011–2012.
- Price of Sandalwood rose rapidly during the year 2000 and the price of *S. album* Sandalwood in India increased at a compounded rate of 15.1% between 1992 and 2014 and the wholesale price for high-quality Indian Sandalwood oil reached more than or equal to USD 3000 kg<sup>-1</sup> (for perfumes and new pharmaceutical uses in the United States) in 2016.
- The global Sandalwood oil market is predicted to double in value over the next five years, to USD 197 million by the end of 2026. The price elasticity for Sandalwood products can be counterbalanced and buffered by both product diversification and regional market diversification with strong economies, such as China, Europe, India, the Middle East and North America.
- There are growing middle classes with high disposable incomes in China and India, nations with traditional cultural associations with Sandalwood, which will maintain upward pressure on price even as supply increases or if individual products or markets face a downturn.
- Nevertheless, Sandalwood is a luxury item, the price of and demand for which would inevitably decline to some extent in a major global economic downturn. It is likely that a range of new uses will be developed and traditional uses will be re-established when more reliable and consistent supplies of high-quality Sandalwood oil are generated through sustainably managed plantations.





- Due to the presence of a substantial unmet demand for high- and mid-range perfumes, body-care products, aromatherapy, traditional eastern medicines, new pharmaceutical products, and top-of-the-range solid furniture and associated increased demand in China, India and other Asian economies will help underpin the price of Sandalwood oil for the foreseeable future.
- The inferior oil quality species such as *S. spicatum*, may struggle to maintain their market share in the future, with lower grades of *S. album* products. Synthetic santalols are expensive to produce and in lesser demand in the perfume sector, which may help the Sandalwood to retain its market.



## Chapter 4

## DOMESTIC VIS-À-VIS INTERNATIONAL MARKETS/TRADE FOR SANDALWOOD & ITS BY-PRODUCTS

Sandalwood has huge demand in international market and India was the main producer till the last century. However, with the reduced availability and production, in the recent past India has started importing Sandalwood oil.

### Market trade of Indian Sandalwood and Sandalwood oil in India

The export and import details of Indian Sandalwood that exists during the period between 1996 and 2024 are presented in Table 1.

**Table 1: Export and Import of Indian Sandalwood**

Sl. No.	Year	Quantity ('000' m <sup>3</sup> )	Value (Rs. in lakhs)	Value (US\$ Million)	Quantity ('000' m <sup>3</sup> )	Value (Rs. in lakhs)	Value (US\$ Million)
		Export			Import		
1	1996-97	-	685.90	1.93	-	-	
2	1997-98	-	732.34	1.97	-	-	
3	1998-99	-	938.42	2.23	-	-	
4	1999-00	-	972.35	2.24	-	-	
5	2000-01	-	853.79	1.87	-	-	
6	2001-02	-	245.73	0.52	-	45.77	0.10
7	2002-03	-	844.53	1.75	-	31.31	0.06
8	2003-04	1.78	192.67	0.42	2.17	797.64	1.74
9	2004-05	0.03	4.62	0.01	6.33	1597.98	3.56
10	2005-06	2.12	376.12	0.85	5.09	2338.30	5.28
11	2006-07	2.14	356.08	0.77	0.31	243.64	0.54
12	2007-08	0.62	65.37	0.16	0	0.00	0
13	2008-09	2.6	424.61	0.97	0.07	16.92	0.04
14	2009-10	3.9	264.38	0.54	0.85	134.25	0.28
15	2010-11	0.05	19.32	0.04	1.34	330.29	0.73
16	2011-12	2.55	599.67	1.26	0.02	3	0.01



17	2012-13	0.02	22.94	0.04	0.17	21.78	0.04
18	2013-14	0.34	99.73	0.16	0.63	159.67	0.26
19	2014-15	0.8	188.69	0.31	0.79	211.73	0.35
20	2015-16	-	-	-	0.01	592.71	0.07
21	2016-17		-		0.62	645.20	0.97
22	2017-18		-		0.07	129.13	0.20
23	2018-19	0.60	306.74	0.43	0.33	460.24	0.66
24	2019-20	0.05	25.18	0.04	0.16	119.56	0.17
25	2020-21	0.06	51.50	0.07	0.33	849.29	1.15
26	2021-22	0.01	289.88	0.39	7.61	2325.26	3.12
27	2022-23	0.05	634.31	0.78	61.00	3128.23	3.99
28	2023-24	2.30	514.76	0.62	67.56	4627.15	5.59
<b>Total</b>		<b>20.02</b>	<b>9709.63</b>	<b>20.37</b>	<b>155.46</b>	<b>18809.05</b>	<b>28.91</b>

(Source: Export import data bank version 7.1 Tradestat, Government of India, Ministry of Commerce & Industry, Department of Commerce)

Similarly, the export and import details of Indian Sandalwood oil during the period between 1996 and 2024 are presented in Table 2.

**Table 2. Export and Import of Indian Sandalwood Oil**

Sl. No.	Year	Quantity ('000' Kg)	Value (Rs. in lakhs)	Value (US\$ Million)	Quantity ('000' Kg)	Value (Rs. in lakhs)	Value (US\$ Million)
		<b>Export</b>			<b>Import</b>		
1	1996-97	11.52	95.48	0.27	0.96	10.32	0.03
2	1997-98	27.93	110.56	0.3	26.74	75.52	0.2
3	1998-99	2.75	29.29	0.07	0	1.31	0
4	1999-00	7.03	66.59	0.15	0	0	0
5	2000-01	17.67	51.20	0.11	2.05	9.53	0.02
6	2001-02	4.77	35.47	0.07	0.41	1.74	0
7	2002-03	13.65	76.56	0.16	3.15	5.85	0.1
8	2003-04	3.14	521.34	1.13	5.3	150.44	0.33
9	2004-05	9.67	1047.90	2.33	3.2	96.92	0.22
10	2005-06	5.71	913.20	2.06	1.41	140.02	0.32





11	2006-07	3.07	737.06	1.61	3.18	299.2	0.67
12	2007-08	6.48	606.83	1.5	19.64	1597.95	3.98
13	2008-09	2.49	719.35	1.69	61.1	2061.88	4.53
14	2009-10	3.78	29.65	0.06	43.27	1879.29	3.97
15	2010-11	2.13	25.36	0.06	27.15	4087.82	8.97
16	2011-12	1.11	105.07	0.22	29.19	5326.18	11.11
17	2012-13	0.25	30.85	0.06	30.75	7669.07	14.09
18	2013-14	0.42	56.26	0.09	34.44	9865.11	16.44
19	2014-15	0.64	314.28	0.51	26.95	7590.71	12.42
20	2015-16	0.35	73.96	0.11	25.21	9418.99	14.35
21	2016-17	0.54	245.36	0.37	27.31	13267.08	19.79
22	2017-18	0.51	359.60	0.56	23.86	9885.75	15.33
23	2018-19	1.97	1130.19	1.61	19.80	4545.62	6.50
24	2019-20	2.33	810.96	1.14	15.80	7240.42	10.25
25	2020-21	1.19	927.16	1.25	15.30	7,447.97	10.08
26	2021-22	1.48	1,296.36	1.74	20.23	11,182.38	14.97
27	2022-23	5.53	1,128.89	1.41	19.97	11,497.29	14.28
28	2023-24	0.90	659.93	0.80	18.64	10,968.25	13.26
<b>Total</b>		<b>139.01</b>	<b>12204.7</b>	<b>21.44</b>	<b>505.01</b>	<b>126323</b>	<b>196.21</b>

(Source: Export import data bank version 7.1 Tradestat, Government of India, Ministry of Commerce & Industry, Department of Commerce)

Sandalwood and its wide range of byproducts related to chips and dust are also witnessed good export and import. The details are furnished in Table 3.

**Table 3. Export and Import of Indian Sandalwood Chips and Dust**

Sl. No.	Year	Quantity ('000' Kg)	Value (Rs. in lakhs)	Value (US\$ Million)	Quantity ('000' Kg)	Value (Rs. in lakhs)	Value (US\$ Million)
		<b>Export</b>			<b>Import</b>		
1*	1996-97	887.32	3,152.22	8.88	6.07	5.65	0.02
2*	1997-98	237.20	1,286.53	3.46	1.71	1.69	0.00
3*	1998-99	679.30	1,810.07	4.30	11.25	20.61	0.05





4*	1999-00	252.48	968.7	2.24	6.64	11.2	0.03
5*	2000-01	842.68	4,279.73	9.37	4.09	5.38	0.01
6*	2001-02	472.42	1,790.04	3.75	22.40	14.61	0.03
7*	2002-03	726.78	3,179.30	6.57		-	
8	2003-04	351.59	1,919.78	4.18	3.00	4.18	0.01
9	2004-05	105.47	1,422.43	3.17		-	
10	2005-06	170.04	3,532.14	7.98	32.47	358.37	0.81
11	2006-07	113.81	2,444.77	5.37	81.24	548.4	1.22
12	2007-08	43.28	962.48	2.39	57.35	453.42	1.14
13	2008-09	33.37	1,232.76	2.87	194.03	361.09	0.79
14	2009-10	22.38	505.72	1.04	56.80	204.69	0.44
15	2010-11	158.09	924.37	2.04	92.30	458.54	1.00
16	2011-12	48.36	1,057.51	2.20	161.74	1,020.26	2.09
17	2012-13	38.45	617.56	1.13	131.78	1,349.12	2.50
18	2013-14	78.25	1,504.52	2.51	180.75	1,773.48	2.92
19	2014-15	74.51	2,400.79	3.94	310.01	2,334.11	3.78
20	2015-16	74.10	1,534.03	2.35	433.32	3,324.47	5.09
21	2016-17	60.73	1,028.68	1.53	806.50	7,145.13	10.68
22	2017-18	41.15	633.31	0.98	106.89	769.84	1.19
23	2018-19	22.42	450.76	0.64	191.62	1,444.91	2.09
24	2019-20	125.65	689.29	0.97	37.42	93.93	0.13
25	2020-21	80.49	795.39	1.08	109.75	1,213.29	1.66
26	2021-22	60.32	969.11	1.30	306.30	3,759.67	5.05
27	2022-23	140.52	1,934.28	2.40	388.38	4,037.55	4.98
28	2023-24	200.41	434.52	0.52	624.05	5,713.47	6.89
<b>Total</b>		<b>6141.57</b>	<b>43,460.79</b>	<b>89.16</b>	<b>4357.86</b>	<b>36427.1</b>	<b>54.6</b>

(Source: Export import data bank, Ministry of Commerce & Industry, Department of Commerce, Government of India)





## Indian Market for Sandalwood

### National Trade

- The price of Indian Sandalwood of I class Heartwood at present is Rs. 7,500 per kg and oil is around Rs. 1, 50,000 per kg as per the Government rate.
- The price in the international market is about 15 to 20% higher than the domestic market (Bunney et al. 2023)

### International Markets

#### Australia:

The local demand for Sandalwood products in Australia is minor (as a proportion of global use). The main consumption is through imported value-added products incorporating Sandalwood oil, such as perfumes, body-care products and medicines. In 2040, almost the entire (>98%) Australian Sandalwood production is planned for export. The product, export market and price will vary depending on species and other factors. In 2040, Quintis and Santanol plantations in Northern Australia are expected to produce approximately 100 tonnes of oil, equivalent to more than 30% of current world market demand for high-quality Sandalwood oil.

#### Sandalwood Market Size:

The global Sandalwood market was valued at US\$ 265.8 million in 2023 and is anticipated to reach US\$ 502.2 million by 2030, witnessing a CAGR of 9.4% during the forecast period between 2024 and 2030.

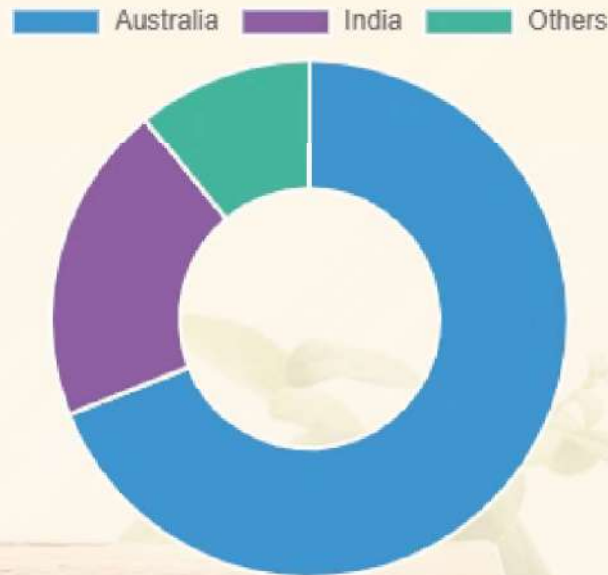


Sandalwood market size (Source: Valuates Report, 2023)



Australia is the largest Sandalwood market with about 69% market share. India is follower, accounting for about 20% market share. The key players are Quintis, FPC, WA Sandalwood Plantations, Australian Sandalwood, Santanol Group, KS&DL, and Sandalwood Forest etc. Top 3 companies occupied about 72% market share.

Sandalwood Market share by sales region



*Sandalwood market share by sales region (Source: Business Research insight, 2023)*

### **Current scenario of Australian Sandalwood model**

The committee had a discussion with resource persons associated with Australian Sandalwood scheme and it has been ascertained that the companies who have promoted Sandalwood cultivation has collapsed. The reasons of failure are several but the most significant factors are high upfront cost, sizeable expenditure on account of financial advisers, fund diversion, excessive administrative spending, poor management decision and business structure coupled with the government policies. Above all companies have estimated the Sandalwood oil price of US\$ 4500 per litre against the actual price of US\$ 3000 per litre. The companies have also targeted Indian market but due to the existence of regular and grey market the achievement in this front is dismally modest. All these developments and the associated discussions with the experts concerned indicate that the Australian Sandalwood model has collapsed due to administrative and financial mismanagement but the technologies implemented looks attractive.





## SANDALWOOD PLANTATION AND MARKETING IN INDIA

Sandalwood, known for its aromatic fragrance and versatile uses, has long captivated people around the world. However, the increasing demand for Sandalwood products has highlighted a significant problem - the struggle to sustainably cultivate and protect Sandalwood trees.

### 1. Problems in Sandalwood Cultivation

- One of the primary challenges faced in Sandalwood tree plantation is its slow growth rate and extensive maturity period. Sandalwood trees require a minimum of 15-20 years to reach maturity, posing a significant hurdle for plantation owners to maximize their short-term profits. This prolonged waiting period often leads to unsustainable cultivation practices and illegal logging of wild Sandalwood trees, further contributing to deforestation and environmental degradation.
- The high commercial value of Sandalwood has given rise to rampant illegal logging and poaching activities. Unscrupulous individuals exploit the long gestation period by tapping into existing Sandalwood reserves illegally, threatening the survival of these majestic trees. The plundering of Sandalwood also disrupts the delicate ecosystems they thrive in, endangering other flora and fauna in the process.
- Sandalwood trees have specific environmental requirements, typically found in regions with warm climates and well-drained soils. However, due to their limited natural habitat, Sandalwood trees face immense pressure from human activities such as urbanization, agriculture expansion, and deforestation. This has led to a sharp decline in natural Sandalwood populations, necessitating plantation efforts to compensate for the loss.
- The regulations concerning the cutting, possession, and transportation of Sandalwood vary across different states in India, with some states lacking specific regulations altogether. This disparity in policies restricts the financial benefits for Sandalwood cultivators, as they are often subjected to cumbersome bureaucratic procedures and do not receive the full market value for their produce. Therefore, there is a pressing need to standardize Sandalwood-related legal provisions nationwide to promote free trade and market access, ensuring better and faster returns for farmers and encouraging private cultivation of Sandalwood.





- In Rajasthan and Gujarat, farmers face challenges of accessing Quality Planting Stock (QPM) for Sandalwood cultivation, as private nurseries often sell seedlings from unknown sources. It is crucial to establish improved seed sources to produce high-quality planting stock and address this shortage promptly.
- There is a lack of scientific management inputs in Sandalwood plantation management, resulting in suboptimal heartwood and oil yield. Research gaps exist regarding harvesting age, heartwood yield, factors influencing yield, age of heartwood initiation, and the relationship between tree girth and heartwood content. Addressing these gaps is essential for maximizing production under managed conditions.
- Insufficient data exists on Sandalwood growth in various climatic and soil conditions, spacing requirements, and performance in Agroforestry systems in Gujarat and Rajasthan. The impact of different hosts on heartwood and oil yield remains poorly understood. Standardizing cultivation practices according to local agro-climatic conditions and cropping patterns is necessary.
- Growing Sandalwood from seeds results in variations in growth, heartwood, and oil content due to genetic factors. To ensure uniform, high-yielding planting stocks, tissue culture or the clonal technology is the preferred method, although current protocols are only established under laboratory conditions and are yet to be implemented in the field.
- Sandalwood plantations are highly susceptible to theft and smuggling, particularly between 4 and 5 years after planting until maturity (14-15 years). Protecting these trees from smugglers poses a significant challenge for both farmers and government agencies across India.
- Establishing a joint tree protection force involving police and forest department personnel at the state and central levels is crucial to combat Sandalwood theft and smuggling. This force would aid in protection efforts and gathering intelligence on illegal activities concerning valuable forest resources on both government and private land.

## 2. Issues relating to Sandalwood Marketing

Markets for Sandalwood continue to grow, and in recent decades, plantations of Sandalwood have been established to fill the growing demand and to create a sustainable, legal supply of Sandalwood. Supplementing commercial harvest of wild-grown Sandalwood with plantation-grown





Sandalwood is necessary for supporting the conservation of Sandalwood species. Many countries, including Australia, India, China, Fiji, Tonga, New Caledonia, Vanuatu, Malaysia, Thailand, Vietnam and Sri Lanka, have shown interest in developing Sandalwood plantations. Growing Sandalwood is a long-term investment as it takes approximately 25 years for trees to mature and reach optimal levels of oil production. However, Sandalwood is commonly harvested as young as 15 years and identifying opportunities for early return on plantation investments is being explored as a priority to encourage smallholders to delay harvest. Expected production of Sandalwood in 2040 indicates that India is positioned to be the largest producer globally, followed by Australia and Indonesia, with substantial growth in production in the Pacific and South East Asian regions (Kucharska et al. 2021).

In India, there has been interest and investment in plantation development, especially in northern part of the country. Initial attempts to establish plantations in southern India were unsuccessful due to the complication of the hemi parasitic nature of Sandalwood and their germination and early establishment requirements Wright and Timor (2001). Unfortunately, subsequent efforts to develop plantations in southern India have been heavily impacted by spike disease and poaching. However, plantations established in northern India are expected to be less affected by spike disease (Kumar et al. 2012)

### **3. Illegal Activities along the Sandalwood Supply Chain**

Despite legislative changes, illegal harvest of wild Sandalwood is a continuing problem globally. In India, it has been estimated that 75% of Sandalwood growing in Karnataka has been harvested illegally, and approximately 33% of the global Sandalwood market is sourced illegally (Rashkow et al. 2014). Enforcing sustainable forestry practices is further hindered by fraudulent documentation, bribery and money laundering. In Sandalwood producing countries, there are active and organized criminal Sandalwood harvesting syndicates and intricate laundering of Sandalwood to avoid penalties. Illegally logged Sandalwood can be transported across borders into jurisdictions with fewer protections to evade regulations. Proving a piece of Sandalwood has been illegally harvested requires the ability to determine the geographic origin of the wood. A lack of uniform legislation across Sandalwood producing states and countries, combined with a lack of tools to independently verify the source of Sandalwood products, contributes to the inability to monitor illegal activity and enforce sustainable harvest laws in Australia and internationally.

### **4. Illegal mixing and adulterants in Sandalwood oil and Quality Control**

Fraud in the form of substitution and mixing has been identified as a problem further along the Sandalwood supply chain. Due to reduced supplies and increased prices for Sandalwood oil, inferior or





synthetic oils are labelled as Sandalwood or used to dilute Sandalwood oils. Bureau of Indian Standards (BIS), the National Standards Body of India has developed Indian Standards IS 329 for Sandalwood Oil, forming the basis for the Product Certification Schemes, which provides Third Party Assurance of Quality, Safety and Reliability of products to consumers. However, this certification scheme is at present voluntary in nature, which needs to be made mandatory.

### **5. Overall Issues for decline in Sandalwood production**

Overall, the following reasons could be attributed to the decline in Sandalwood production in India:

1. No effort at sustainable production from forests
2. Threat from Invasive species like *Lantana camara* has altered ecology of natural sandal ecosystems
3. Legal Hassles Faced by Potential Sandalwood Farmers
4. Security Concerns
5. Absence of Quality Planting Material of Sandalwood
6. Lack of organized tree improvement program
7. Threat from Sandalwood Spike Disease (SSD)
8. Less Incentives for Sandalwood Cultivators
9. Long rotation nature of the crop
10. Absence of Sandalwood Tree Insurance
11. Procedural formalities in getting export license
12. No single agency in the Government of India to govern the state-owned Sandalwood resources and to initiate policy making in this regard.





## EXISTING LEGAL PROVISIONS RELATING TO SANDALWOOD PLANTATION AND MARKETING UNDER THE STATUTES OF THE GOVERNMENT OF INDIA AND THE MAJOR STATE GOVERNMENTS

### (i) Legal provisions in Tamil Nadu

#### Tamil Nadu Sandalwood Trees Patta Land Rules, 2008

- **Form and manner of making an application to sell the Sandalwood tree to the Government.**
  - (1) The owner of a Sandalwood tree who desires to sell the Sandalwood tree to the Government shall make an application to the District Forest Officer in Form-I appended to these Rules.
  - (2) The application for sale of Sandalwood tree shall be accompanied with the following documents namely:-
    - (i) A certificate of ownership of the land in which the Sandalwood trees are grown, as issued by the Tahsildar;
    - (ii) Extract of Chitta / Adangal;
    - (iii) Sketch of the patta land;
    - (iv) A copy of the deed of tenancy, lease, mortgage with possession or otherwise executed in favor of the owner of the Sandalwood tree;
    - (v) List of Sandalwood trees proposed to be sold.
- **Verification of ownership of Sandalwood tree on patta land.** - The District Forest Officer, shall examine the application in Form-I and other documents furnished by the applicant and satisfy himself as to the ownership of the Sandalwood trees that are proposed to be sold to the Government.
- **Extraction and processing of Sandalwood tree:**

**(1) Enumeration** - The District Forest Officer shall, before granting permission under sub-rule (2) of this rule, require the Forest Ranger having jurisdiction over the area in which the Sandalwood trees are grown to inspect all the Sandalwood trees which are proposed to be sold and to mark such trees for extraction and make a report in writing to the District Forest Officer in Form-II. The District Forest Officer (or) the Assistant Conservator of Forests shall check at least 10% of the Sandalwood trees (i.e., one in every ten trees) and record their report in writing.





**(2) Extraction.**

(a) The District Forest Officer shall verify the condition of the Sandalwood trees proposed to be sold and the documents furnished by the owner of the Sandalwood tree along with the report of the Forest Ranger and shall grant permission to sell those Sandalwood trees to the Government and to extract the same subject to such conditions as he may think fit and in accordance with the provisions of the rules and communicate a copy of such order to the owner of Sandalwood tree and the concerned Forest Ranger. The District Forest Officer may also refuse to grant such permission, after recording the reason therefore.

(b) The District Forest Officer shall before granting permission for extraction obtain necessary permission from the concerned District Committee, if the area in which the Sandalwood trees are grown is notified either under the Tamil Nadu Preservation of Private Forests Act, 1949 (Tamil Nadu Act of 1949) or the Tamil Nadu Hill Areas (Preservation of Trees) Act, 1955 (Tamil Nadu Act of 1955).

**(3) Hammer Marking** - The District Forest Officer shall direct the Forest Ranger to extract the Sandalwood trees, hammer mark them and transport the extracted trees to the nearest "Final Cleaning Depot" under proper permit. The extraction of trees and recording their measurement in the column 1, 2 and 3 in Form-III shall be done in the presence of the owner of Sandalwood tree or his authorized agent and the signature of the person referred to above shall be obtained. The other details in Form-III shall be maintained by the concerned Depot Ranger.

**(4) Final Cleaning and Assessment of work** - After processing the final cleaning of the extracted Sandalwood trees in the "Final Cleaning Depot", the final cleaning records will be made available to the owner of the Sandalwood tree or his authorized agent on demand. The particulars regarding the weight of the "Final cleaned wood" shall be recorded in Form-IV. The quantity of final cleaned wood including sapwood and their value calculated based on the average sale price of previous sale of the concerned "Final Cleaning Depot" shall be intimated by the District Forest Officer of that "Final Cleaning Depot", to the District Forest Officer of the concerned division from whose jurisdiction the Sandalwood trees were extracted.

"Final Clean Wood" means the wood as sorted and classified in rule-29 of the Rules regarding Selection, Felling, Cleaning, Classification and disposal of Sandalwood and method of maintaining depot accounts and other register.

**(5) Save as otherwise provided in these Rules**, Felling, Cleaning, Classification and disposal of Sandalwood and the method of maintaining depot accounts and other registers shall be carried out as provided in the Rules regarding, Selection, Felling, Cleaning, Classification, Disposal of Sandalwood and method of maintaining depot accounts and other registers.





**(6) Fixation of price** - The District Forest Officer shall calculate and fix the sale price of the final cleaned wood based on the average sale price of previous sale of Sandalwood conducted in that "Final Cleaning Depot" and if there is no sale for that particular class of Sandalwood the fair or base price approved by the Government for the sale may be taken into consideration. 10% of such sale price shall be deducted from the total sale price of the Sandalwood for charges towards extraction, transport and final cleaning and another 10% for administrative charges. The 80% of the sale price shall be the "net sale price" and that will be paid to the owner of the Sandalwood tree. The owner of the Sandalwood trees shall be paid 20% of the "net sale price" within 30 days of the extraction and the balance shall be paid within 90 days.

**(7) Appeal** - If the owner of the Sandalwood tree is aggrieved by an order of the District Forest Officer in fixing the price of the Sandalwood under rule 6, may within 30 days from the date of receipt of such order, prefer an appeal in writing to the Conservator of Forests concerned. The Conservator of Forests shall, after giving the appellant an opportunity of being heard, pass such order thereon as he may think fit. The orders of the Conservator of Forests shall be final.

#### **Acts/Rules for Felling and Transit Regulation of Sandalwood/Various Tree Species Grown on Forests/Non- Forest Lands of Tamil Nadu**

- Tamil Nadu Sandalwood Transit Rules 1970 allows the Sandalwood purchased from neighbouring states like Mysore, Kerala and Andhra Pradesh
- Under this Rule exemption of small quantities of Sandalwood (up to 5 Kgs) carried by a bonafide traveler for their own use and also allows the landlord to cut and carry the Sandalwood grown on patta lands for his own bonafide personal use with proper certificate from the village munsif
- The Tamil Nadu Sandalwood Trees on Patta Land Rules 2008 allows cultivation and the ownership of the patta land owner to produce the relevant documents and sell the same to the forest department and get 80 % of the sale price
- This is the latest notification by Government of Tamil Nadu encouraging the private land owner to take up cultivation of Sandalwood in their private land

#### **Acts/Rules for Felling and Transit Regulation of Sandalwood/Various Tree Species Grown on Forests/Non- Forest Lands of Different States**





### Legal provisions in Karnataka

- Karnataka Forest (Amendment) Bill, 2001 allows cultivation of Sandalwood trees in private lands. This comes as a major policy change as far as Sandalwood cultivation is concerned. This particular policy/legislation amendment of Government of Karnataka to abolish control over Sandalwood cultivation has paved the way for community and private entrepreneurs to cultivate Sandalwood which is in high demand
- This Karnataka Forest (Amendment) Act 2001 clearly states that 'every occupant or the holder of land shall be legally entitled to the Sandalwood tree in his land'
- The Government of Karnataka authorized Karnataka Soaps and Detergents Limited (KSDL) and Karnataka State Handicrafts Development Corporation (KSHDC) to buy Sandalwood directly from landowners though applications still have to be filed and routed through Forest Department.
- In the year 2022, through the Karnataka Forest (Amendment) Act the owners of the Sandalwood trees have been permitted to sell the Sandalwood to any entity including government agencies. However, the rules for this Act have not been framed and hence the Act is not operational.

### Legal provisions in Puducherry/Pondicherry

- Pondicherry Timber Transit Rules 1983
- Issue of permit for the transportation of timber and registration is to DFO
- Teak, Rosewood, Sandalwood and Red Sanders are protected wood and such species cannot be kept in possession or transported by any individual/farm without special permit

### Legal provisions in Andhra Pradesh

- The Andhra Pradesh Sandalwood Possession Rules 1969
- The Andhra Pradesh Sandalwood and Red sanders wood Transit Rules 1969
- Under these rules, no person shall have in his possession any quantity of Sandalwood in excess of ten Kgs, except under a license granted by the District Forest Officer





- The Andhra Pradesh Forest Produce Transit Rules, 1970 is not applicable to red sanders and Sandalwood
- During 2006 Principal Chief Conservator of Forests, Andhra Pradesh issued circular in addition to the guidelines and supplementary to the statutory Acts and Rules for the procedure to be grant of transit permits in patta lands for red sander wood
- Under this, regulation and possession of red sanders and Sandalwood should be dealt under Andhra Pradesh Sandalwood and Red sander wood transit Rules 1969 and Andhra Pradesh Red sanders wood Possession Rules 1989. These Rules provide detailed provisions for verification of the material, issue and checking of transit permit, registration of property marks and fixing of marks on the trees and felled logs etc.

#### Legal provisions in Maharashtra

- Felling of trees in private lands is regulated by following three Acts:
  - Maharashtra Felling of Tree (Act 1964)
  - Maharashtra (Urban Areas) Preservation of Trees Act, 1975
  - The Maharashtra Land Revenue Code 1966
- Permission for transportation of forest produce, so obtained after receipt of felling permission from the Tree Officer, is generally given by the concerned Dy. Conservator of Forests under the provisions of the Indian Forest Act 1927 and the rules made there under namely the Bombay Forest Rules, 1942
- Sandal (*Santalum album*) is included in the Schedule
- The Maharashtra (Urban Area) Preservation of Trees Act, 1975 is for regulating felling of any tree in Urban Area. Felling permission is granted by the “Tree Officer” appointed by the Tree Authority. This being the local area, provisions of Bombay Forest Rules, 1942 regarding transportation of forest produce are not applicable, hence no transit pass is required for local limits
- The Maharashtra Land Revenue Code, 1966 regulated the felling in the non-forest areas other than Urban Area and for the species which are not included in the Schedule attached with above mentioned Act of 1964



## SANDALWOOD DEVELOPMENT COMMITTEE



### 7.1. Constitution and Composition of the Sandalwood Development Committee

Recognising the fact that in order to compete against contenders like Australia and Africa whose export trends have seen a steep incline, India will need to attempt to grow Sandalwood both under *in-situ* and *ex-situ*. India can be Atmanirbhar while meeting the Sandalwood needs of our society in the present and in the future. Keeping in view that farming of Sandalwood can act as a platform for rural employment generation and significant foreign exchange generation through exports of Sandalwood and its various other by-products, the erstwhile Economic Advisory Council to the Prime Minister (EAC-PM) vide OM No. EAC-PM/Sandalwood/2021 dated 3rd March 2021 constituted the Sandalwood Development Committee (SDC) with the following composition:

i.	Dr. Bibek Debroy, Chairman EAC-PM-	Chairman
ii.	Shri Ratan P. Watal, Member Secretary, EAC-PM -	Co-chairman
iii.	Secretary, MoA&FW or his nominee -	Member
iv.	MoEF&CC or his nominee -	Member
v.	Secretary, M/O AYUSH or his nominee -	Member
vi.	Secretary, Ministry of Commerce or his nominee -	Member
vii.	CEO, National Medicinal Plants Board-	Member
viii.	Dr. M.P. Singh, Director / Dr. Arun Kumar, Scientist - F. Institute of Wood Science & Technology, Bengaluru	Member
ix.	Dr. Shyam Vishwanath, Director, Kerala Forest Research Institute, Thrissur	Member
x.	Dr. K.T. Parthiban, Dean, Forest College & Research Institute, TNAU, Mettupalayam	Member
xi.	Shri Pradeep Kapoor, Jagat Aroma Oils Distillery, Kannauj	Member
xii.	Shri K. Rajeswara Rao, Sr Adviser, EAC-PM	Member Convener

Copy of the OM dated 3rd March 2021 is at Annex-1.

### 7.2. Re-constitution of Sandalwood Development Committee

The Sandalwood Development Committee held its first meeting on 7<sup>th</sup> April 2021 under the chairmanship of Shri Ratan P. Watal, Former Member Secretary of the Erstwhile EAC-PM. Thereafter, owing to the devastating second wave of COVID-19, further meetings/stakeholder consultations could not be held. In the meantime, the erstwhile EAC-PM completed its term on 25th September 2021 and GoI appointed Shri Ratan P. Watal as Chairman, Central Vista Oversight Committee (CVOC) and Shri K. Rajeswara Rao as Principal Adviser, CVOC. Vide OM No. CVOC/Sandalwood/2022 dated 10th March 2022, the SDC was then reconstituted under the chairmanship of Shri Ratan P. Watal, Chairman, CVOC and Shri K. Rajeswara Rao, Principal Adviser, CVOC as Member Convener and the nominees





of various departments/organisations, who attended the meeting on 7th April 2021, as Members. The composition of the re-constituted SDC is as under:

i.	Shri Ratan P. Watal, Chairman, CVOC	Chairman
ii.	Dr. Suneesh Buxy, Inspector General of Forests (representing Secretary, MoEF&CC)	Member
iii.	Dr. Suresh K. Malhotra, Agriculture Commissioner (representing Secretary, MoA&FW)	Member
iv.	Shri S. Suresh Kumar, Joint Secretary (representing Secretary, Ministry of Commerce)	Member
v.	Dr. J.L.N. Sastry, CEO, NMPB (representing Secretary, M/o AYUSH)	Member
vi.	Dr. M.P. Singh, Director & Dr. Arun Kumar A.N., Scientist-F, IWST, Bengaluru	Member
vii.	Dr. Syam Viswanath, Director, Kerala Forest Research Institute, Thrissur	Member
viii.	Dr. K.T. Parthiban, Dean, Forest College & Research Institute, Mettupalayam	Member
ix.	Shri Pradeep Kapoor, Jagat Aroma Oils Distillery Kannauj	Member
x.	Shri K. Rajeswara Rao, Principal Adviser, CVOC	Member & Convenor

Copy of OM dated 10<sup>th</sup> March 2022 is at Annex-2.

### 7.3. Terms of Reference of SDC

Following are the Terms of Reference of the Sandalwood Development Committee:

- i. To identify issues relating to Sandalwood plantation and marketing in consultation with various State Governments and agencies;
- ii. To examine the legal provisions and suggest amendments to increase Sandalwood plantation and marketing in different parts of the country;
- iii. To study the Australian model of Sandalwood plantation and its marketing, including its by-products, and suggest measures to adopt the same or any other better ways in India;
- iv. To study the domestic & International markets/trade for Sandalwood and its by-products and suggest measures for promoting production and marketing to increase value addition and employment domestically; and
- v. Any other matter relating to the development of Sandalwood in the country.





#### 7.4. Stakeholder consultations

Consequent upon their appointment as Chairman and Principal Adviser of the CVOC, Shri Ratan P. Watal and Shri K. Rajeswara Rao were busy with CVOC overseeing the projects of Central Vista Avenue covering Kartavya Path (erstwhile Raj Path) area and the New Parliament Building so as to expedite their completion. After successful completion and commissioning of these two projects of national importance, while overseeing of the other projects under the Central Vista Re-development Plan continued, stakeholder consultation process of the SDC under the chairmanship of Shri Ratan P. Watal was re-commenced in August 2023.

SDC held stakeholder consultation meetings in major sandal growing states, reviewed the current status and development in both domestic and international markets. These stakeholder consultation meetings were held at New Delhi, Bengaluru, Gandhinagar, Mettupalayam and Mumbai covering various states in different regions of India. Apart from these meetings, as suggested by the Director, IWST, field visit to Marayuru in Kerala was also undertaken. Further, discussions were held with various experts in government and non-government agencies to elicit their views on how to develop Sandalwood in the country.





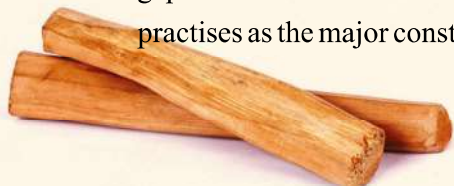
## ISSUES IDENTIFIED DURING STAKEHOLDER CONSULTATIONS

The Sandalwood Development Committee conducted series of consultations and interactive workshops judiciously incorporating all levels of stakeholders across the existing and promising sandal growing states of the country. This besides, the committee has also visited and interacted with sandal growing farmers, forest department officials, nurseries, consuming industries, etc. and assessed the existing challenges and constraints towards Sandalwood cultivation, plantation development, legal issues in harvesting and marketing coupled with the barriers in value addition and other supply chain process. Similarly, consultations and discussions were also held with respective forest department officials to understand the current status. These wide range of discussions and interactions have identified different levels of issues and barriers which are summarized below in the following five sectors.

- i. Challenges and barriers in Sandalwood plantation development and market
- ii. Legal and policy challenges
- iii. Research and Development issues
- iv. Value addition and the associated domestic and export market
- v. Lack of institutional mechanism

### (I) ISSUES RELATING TO SANDALWOOD PLANTATION AND MARKETING

- **Quality Planting Material (QPM)** - Most plantation activities in the country deploy seedlings from unorganized seed sources that exhibit wide variation in growth, development and quality. The uncertainty in growth and development coupled with occurrence of pest and disease at the plantation level are causative factors that demand deployment of quality planting material from genetically improved seed sources/clones.
- **Promotion of Sandalwood plantations** – Currently, Sandalwood plantations are found across the States of Tamil Nadu, Karnataka, Andhra Pradesh, Maharashtra, Gujarat, Madhya Pradesh, Uttar Pradesh, Chhattisgarh and Kerala. These plantations are promoted and established predominantly by private sectors that lack in adoption of site-specific silvicultural technologies like spacing, host association and other management practices. This has resulted in uncertain and erratic growth and development of Sandalwood trees that in turn has diminished the charm of sandal plantation development. The committee identified technology gap with reference to Sandalwood cultivation and non-availability of standard package of practises as the major constraint and challenge across the country.





*Sandalwood nursery*

- **Promotion of Sandalwood based Agroforestry** – Agroforestry is gaining momentum across the country and Sandalwood has been identified as one of the potential and prioritized species. However, the absence of site-specific Agroforestry model, poor understanding of tree crop combinations and their interactions are the major barriers affecting both growth and promotional activities of Sandalwood-based Agroforestry.



*Sandalwood based agroforestry (Sandal + Papaya)*





- Institutional credit and insurance – Another major challenge expressed by the stakeholders is the absence of institutional credit and insurance mechanism for sandal farming. Since sandal is a highly priced and premium tree, it gets the threat of illegal felling and theft that demand suitable insurance coverage. Being a long rotation crop, credit and insurance mechanisms will provide encouragement to sandal growing farmers. The financial institutions are highly resistant to extend the institutional credit to this cause.
- Plantation Security measures – Sandal is highly amenable for theft and illegal harvests. However, suitable security systems employing advanced methods and models have not been deployed in most places. Barring rare and exceptional cases, most other sandal plantations are without any organised protection system.
- Incentives for Cultivation: – The huge cost of seedlings, increased plantation establishment and management cost, long rotation etc are the critical factors that needs suitable incentives to benefit the farmers. The stakeholder consultative meetings recognized the requirement of incentives for Sandalwood promotion and cultivation across the nation.
- Lack of Marketing Support:- There is no marketing support for farmers in states other than Karnataka. Even in Karnataka, there is an inordinate delay in getting the sale value of Sandalwood

## (II) LEGAL AND POLICY PROVISIONS

- Legal and policy issues – One of the major challenges and issues identified is the existence of varied legal provisions of different state governments for felling and transit of farm grown trees. Without a uniform felling and transit policy, a tree felled in one state, may be stopped at the adjacent or the subsequent state borders from transporting which can hamper trade. Hence, this needs to be resolved through suitable amendments in the existing acts and policies at central and state level to ease the felling and transit of farm grown sandal.
- Permit system – the Government of India has introduced a National Permit System but it is observed that several state governments have not adopted the mechanism for easy transit of farm-grown trees including sandal.
- Legality and theft complaint redressal – The stakeholder's consultations revealed that in the event of theft of sandal, the existing complaint or redressal mechanism is not very clear due to





the absence of suitable legal and policy provisions. This also varies from state to state as expressed by the stakeholders.

- **Quality Control Order for Sandalwood Oil:** Bureau of Indian Standards (BIS), the National Standards Body of India has developed Indian Standards IS 329 for Sandalwood Oil, forming the basis for the Product Certification Schemes, which provides Third Party Assurance of Quality, Safety and Reliability of products to consumers. However, this certification scheme is at present voluntary in nature. However, for a number of products compliance to Indian Standards is made compulsory by the Central Government under various considerations viz. public interest, protection of human, animal or plant health, safety of environment, prevention of unfair trade practices and national security. For such products, the Central Government directs mandatory use of Standard Mark under a Licence or Certificate of Conformity (CoC) from BIS through issuance of Quality Control Order (QCO). The Central Government, after consulting BIS, publishes QCOs in exercise of the powers conferred by sub-sections (1) and (2) of section 16 read in conjunction with section 17 and subsection (3) of section 25 of the BIS Act, 2016 thereby bringing the products under BIS Mandatory Certification. After the date of commencement of the QCO, no person shall manufacture, import, distribute, sell, hire, lease, store or exhibit for sale that product covered under the QCO without a Standard Mark except under a valid Licence or CoC from BIS. QCO applicable to domestically produced Sandalwood Oil shall apply, mutatis mutandis, to imports, unless specifically exempted. Then, for Sandalwood Oil, the manufacturer in foreign country will be required to obtain a Licence or CoC from BIS under the Foreign Manufacturers Certification Scheme (FMCS) of BIS.
- **Absence of standard such as AGMARK:** For other value added products– currently it is seen that a wide range of other sandal products including value added products are available in the market but for want of suitable standards and specifications such as AGMARK certification, their sale is hampered. Hence the possibility of incorporating farm grown sandal products under AGMARK certification needs to be explored and implemented.
- **Need for a separate Legislation for Sandalwood -** There are varied legal provisions in different states towards cultivation, harvest and sale of Sandalwood. Therefore, it is necessary to have a pan India Act which facilitates in bringing uniformity across the country with regards to legal aspects of Sandalwood.





### (III) RESEARCH AND DEVELOPMENT

- Genetic improvement of sandal – The absence of genetically superior varieties/clones in sandal is the most significant challenge. Suitable research and development mechanism to identify superior genetic stocks and multiply them through clonal technology are lacking. Development of commercially viable micro propagation protocol to ensure the availability of quality planting material with a higher productivity with free from pest and diseases is the need of the hour.
- Monitoring of sandal spike disease – Sandalwood is susceptible for an important disease known as spike disease. This is caused by phytoplasma and is found in Karnataka and Kerala. Recent studies have indicated the presence of phytoplasmas in the seeds and seedlings and for the first time the transmission of SSD through seed has been confirmed. It is strongly recommended that seeds should be not be collected in those areas that are affected by Sandalwood spike disease and thereby prevent the spread of SSD to other areas. Continuous research and development to monitor and control SSD through suitable physical, chemical and biological methods is very much essential.
- Replication of Australian model and evaluation – as indicated earlier the Australian plantation technology looks attractive on a large scale plantation model but needs a thorough study for its introduction due to decentralized and fragmented small landholding system in India.
- Traceability and value chain management – Since sandal is a highly commercial product that exhibit multipartite supply chain, an organised value chain management coupled with ability to trace the product and a supply chain database of Sandalwood and its value added products are highly essential for sustainability of the system but lacking at present.



*Sandalwood flowers and fruits*





#### (IV) DOMESTIC/INTERNATIONAL MARKETS AND VALUE ADDITION

- **Information and access to market source** – Sandal is a demanded product both for domestic and international market and the product is finding greater utility in health care, cosmetics, varnishes, medicine, detergents, perfumes and agarbatti along with use in rituals and religious festivals. However, the information pertaining to producers and consumers particularly the market mechanism both for domestic and export is not available which limits the sandal promotional activity. Organised market mechanism and the value addition are the potential sectors which may help to substitute the imports and generate significant domestic income and employment. Hence, there is a need to identify and make them available to the producers and consumers to augment the existing supply chain and to benefit through responsible production and consumption. A suitable institutional mechanism needs to be designed to study and disseminate both domestic and international markets.
- **E-portal market mechanism** – the absence of market mechanism also demand creation of an exclusive online portal to resolve the issues
- **Price support system** – all the stakeholders consultation meetings identified great variation in the pricing pattern of both sapwood and heartwood along with other plantation residues across the states and locations. This price variability and the absence of assured buy-back mechanism, undermine the desirability of sandal cultivation. Hence, buy-back and price support system is a major challenge which warrants suitable interventions
- **Marketing of value added products** – the existing supply chain of sandal value added products is highly unorganized resulting in wide variability in price and market support system. This needs to be suitably addressed.

#### (V) CERTIFICATIONS AND INSTITUTIONAL MECHANISMS

- **Sandal certification** - one of the major constraints and the challenge faced in marketing of sandal products is the absence of traceability and the associated certification standards. Hence, there is a need to incorporate sandal in the existing certification process. The newly introduced Indian Wood Certification scheme have to be incorporated in the existing Sandalwood plantations.





- **Awareness and capacity building on technology and marketing** - lack of awareness, absence of skill and expertise coupled with the traditional myth on sandal are the major obstacles for the promotion of technology leveraged sandal cultivation. Mechanism to create necessary skill and expertise on sandal cultivation, harvest, value addition, management of supply chain, market and trade is lacking.
- **Institutional mechanism** – sandal is a pristine species endemic to south India that has got great attraction and is being promoted across central and north India. The absence of institutional mechanism along with absence of networking and linkages among the stakeholders involved in the entire production to consumption system in sandal is the major challenges. This needs suitable interventions.





## RECOMMENDATIONS OF THE COMMITTEE

Sandalwood is highly priced and valued for its fragrant oil and has established a very long history of cultural and economic significance across several regions of the world. It is estimated that the Sandalwood market was valued at USD 265.8 Million in 2023 and it is expected to reach USD 502.2 Million by 2030 witnessing a CAGR of 9.4 % during the period between 2024-2030. Considering this estimated economic growth and development in the Sandalwood market, the committee strongly recommends that the Government of India and the State Governments would have to take measures to reap the benefits of both domestic and global market.

In India, Sandalwood has been harvested extensively which has resulted in the over exploitation and utilization leading to the erosion of superior genetic stocks leaving only an emaciated population. This resulted in decline in the availability of the prestigious East Indian Sandalwood oil for the domestic consumption and export purposes. The population explosion, industrialization, urbanization and the associated increasing attraction of sandal in cultural and religious requirements besides applications in health care, cosmetics, food and medicinal industries have increased the demand particularly for East Indian Sandalwood oil originated from Indian Sandalwood trees at an unprecedented rate. The increasing demand on one hand and the reduction in supply from natural forest on the other hand has ushered in a total mismatch between demand and supply.

All these developments and demand have attracted the promotion and establishment of Sandalwood plantations outside the natural forest in the farmlands through agroforestry or plantation forestry or any form of trees outside forests. These establishments though increasing across the country but are faced with a wide range of challenges. Among various challenges and constraints, the technological gaps, regulatory restrictions for felling and trade and the lack of institutional mechanisms are identified as the most significant. A wide range of representations have been received from across different sectors of stakeholders to resolve these challenges and constraints in order to promote Sandalwood plantations outside the natural forest range and to bring back the glory of Indian Sandalwood. For this purpose, the Government of India through the Central Vista Oversight Committee has formed the Sandalwood Development Committee under the Chairmanship of Shri. Ratan P. Watal and Shri. K. Rajeswara Rao as Member Convenor along with identified member representatives. The committee met wide range of Stakeholders from farmers, Forest department, processing industries, traders, nursery growers and others involved in the entire Production to Consumption System in Sandalwood based supply Chain. Based on consultations and review, the committee has identified different sectors of challenges as furnished in chapter 8.





With the thorough understanding, deliberations, consultations, field visits, industrial visits etc. the committee framed recommendations, strategies and ideas to resolve the challenges in Sandalwood production, processing and utilization. The sector wise recommendations along with the potential agencies to be involved are presented here to help to create enabling ecosystem to promote Sandalwood plantations which may help to auger the productivity and profitability of Sandalwood growing farmers besides conserving and re-establishing the glory of East Indian Sandalwood oil.

The decline in Sandalwood supply from India have attracted several Southeast Asian and Pacific regions to promote Sandalwood plantations in order to cater to the global market. This growing demand of sandal and the associated economic benefits to be realized with Sandalwood has attracted several international agencies to promote and establish exclusive Sandalwood plantations leveraging technology. However, the collapse of Australian Sandalwood model once again attracted the glory of Indian Sandalwood which needs to be promoted and expanded through all Trees Outside Forests development programme preferably in the form of farm and agroforestry judiciously incorporating superior genetic stock, precision silvicultural technology, host plant interaction, pest and diseases management to augment the productivity and profitability.

Under such circumstances, the committee elaborately reviewed and studied the massive requirements in terms of technology, legal and policy changes, value addition technology and the associated supply and value chain processes. The quintessence of the recommendations is furnished below sector wise.

#### **(I) ISSUES RELATING TO SANDALWOOD PLANTATION AND MARKETING**

- **Quality Planting Material (QPM)** – the availability of QPM shall be ensured to encourage and promote technology leveraged sandal development both as plantation and Agroforestry. The Ministry of Agriculture and Farmers Welfare has already designated ICAR - Central Agroforestry Research Institute (CAFRI), Jhansi as a nodal agency for providing technical support for supply of quality planting material and its certifications including accreditation of nurseries. Hence CAFRI shall develop QPM standards for sandal and facilitate accreditation of sandal based nurseries
- **Promotion of Sandalwood plantations** - A detailed technical guide/package of practises or monograph on sandal cultivation from the entire production to consumption system need to be developed and disseminated to the stakeholders both in print and electronic media. The IWST along with identified ICAR or SAUs or Forest departments shall develop the technical guide





both in English and local vernacular language. For this purpose, the MoA&FW, GoI through RKVY programme and MoEF&CC, GoI through its CAMPA funds shall facilitate necessary financial support.

- **Promotion of sandal based Agroforestry** – The ICAR-CAFRI through its ICAR-AICRP on Agroforestry shall develop region specific sandal based Agroforestry model taking into consideration the local edapho climatic conditions, tree-crop combinations and the associated interactions.
- **Institutional credit and insurance** – The NABARD, public and private sector financial institutions shall incorporate sandal for extending institutional credit and insurance. The State Forest Department/ ICAR/ SAUs etc. shall extend the indicative unit cost of investment for Sandalwood that will enable its incorporation in agriculture and allied activities document prepared by the NABARD. The insurance firms shall facilitate institutional insurance for Sandalwood using the input cost developed through judicial incorporation of all biotic and abiotic perils including theft.
- **Plantation Security measures** –A Real time monitoring of high value trees using e-protection system with the Wireless Sensor Network (WSN), LED & infrared grid technology system can also be used for detecting unusual disturbance of the tree for monitoring its illegal cutting. In addition, the research institutions (ICFRE, ICAR, SAUs, AICTE Institutes, IITs) shall have to develop modern security systems using advanced technologies to monitor the safety of Sandalwood plantations.
- **Incentives for Cultivation:** – the MoEF&CC, MoA&FW, MoAYUSH shall devise and extend incentives at various stages of sandal cultivation namely seedling development, plantation establishment, plantation management and plantation protection. NMPB under MoAYUSH has been providing funds for undertaking these kinds of activities to develop sandal plantation. The information need to be made available to all stakeholders through suitable advertisement/awareness campaigns.

## (II) LEGAL AND POLICY PROVISIONS

- Liberalisation of felling and transit system for farm grown Sandalwood—the MoEF&CC should amend Indian Forest Act, 1927 exempting farm grown Sandalwood from the list of forest produce (Section 2 (4)) and from the list of timber (Section 2 (6)), and free it from the





purview of forest products similar to the amendment made in case of Bamboo (“In the Indian Forest Act, 1927, in section 2, in clause (7), the word “bamboos” shall be omitted”).

- The MoEF&CC shall direct all state governments to de-regulate farm grown Sandalwood from the purview of felling and transit. All state governments shall make necessary amendments in their respective existing Sandalwood rules and regulations by exempting farm grown Sandalwood from the purview of felling and transportation. These proposed amendments shall help to facilitate Sandalwood cultivation in India and bring back the glory of Indian Sandalwood besides creating significant socio-economic development.
- Treating farm grown Sandalwood as farm produce - the Government of India should direct all the State Governments to develop suitable policy framework for treating farm grown Sandalwood as farm produce.
- Permit system - all state governments shall adopt National Permit System (NPS) to facilitate easy transit of Sandalwood and its products across the country.
- Legality and theft complaint redressal– the MoEF&CC, GoI and MHA, GoI shall provide clear directions to fix responsibilities to designated agencies regarding the legality of sandal theft complaint case. The same needs to be made available to all public through awareness/advertisement campaigns.
- Sandalwood Oil Quality Control Order- Bureau of Indian Standards (BIS) has developed Indian Standards “IS 329: 2004; Oil of Sandalwood - Specification (Third Revision)” in 2020 with the following specifications for Sandalwood Oil:
  - Colour and appearance (Nearly colourless to golden yellow somewhat viscous oily liquid); Odour (Pleasant, sweet, woody and persistent); Relative density at 27°C/27°C (0.9635 - 0.9775); Optical rotation (-20 to -15°); Refractive Index at 27°C (1.5000 - 1.5070), Ester, calculated as santalyl acetate (Percent by mass) max. (7); Total alcohol calculated as Santalol (percent by mass) min. (90); Steam-distillation residue for 10 h, (percent by mass), max. (5); Major chemical constituents by GLC analysis: (i) cis- $\alpha$ -santalol percent (41-55) and (ii) cis- $\beta$ -santalol percent (15-24).
- In order to ensure that selling of certified oil conforming to the above standards IS 329:2004 developed by BIS only in the market, a Sandalwood Oil Control Order may be notified by the GoI.





- AGMARK Certification – The MoA&FW shall make necessary legal provisions to incorporate sandal and its by-products through the AGMARK certification.
- Sandalwood (Promotion and Facilitation) ACT, 2025 - It is strongly recommended that the GoI may consider enacting Sandalwood (Promotion and Facilitation) Act, 2025, which should be adopted by all the states uniformly. The proposed draft Bill is appended as **Enclosure-1**.

### (III) RESEARCH AND DEVELOPMENT

- **Genetic improvement of Sandalwood** – the ICFRE-IWST, and SAU, state forest departments, DBT and DST shall initiate genetic improvement of Sandalwood in a mission mode approach by extending the needed financial support to develop high yielding varieties (HYV), technology for mass multiplication, value addition and the associated value chain process. The identified superior trees may be developed and released as clones for cultivation using already standardised tissue culture technology at IWST, Bengaluru.
- **Sandal host species interaction** – Sandalwood is a partial root parasite and the existing studies indicate wide range of host species association. This needs to be thoroughly studied in order to identify potential host for Sandalwood cultivation towards augmenting productivity and profitability.
- **Conservation of Sandalwood diversity for posterity** - Sandalwood starts producing seeds by the end of three years. This has also resulted in an abundance of Sandalwood regeneration in the naturally growing areas of Karnataka, Tamil Nadu, and Kerala. Considering the dwindled population of mature trees, the respective state forest departments have already taken initiatives to conserve these natural habitats with an aim for conserving the genetic diversity and also as a source material to initiate future genetic improvement programs in Sandalwood for posterity.

In Karnataka, the forest department introduced the 'Sandal Estate Scheme' in the 1980s. This scheme's primary objective was to artificially regenerate Sandalwood in those areas where Sandalwood naturally grows well and to protect and develop the areas with substantial natural regeneration. There are also numerous examples of Sandalwood naturally regenerating into luxuriant patches across the State. The Department has also started a new scheme titled 'Siri Chandana Vana' that has been focusing on such Sandalwood areas and improving their status further by providing very secure barriers such as





chain-link fences, stone walls, or brick walls, and also by planting and/or dibbling seeds wherever necessary. The plantations are provided rigid protection by several watchers who keep watch throughout the day and night. In some of the plantations, protection is further strengthened by engaging squads of native dogs.

In the case of Tamil Nadu, the government has taken considerable initiatives for the conservation of Sandalwood. With the objective of replenishing Sandalwood growing stock, nucleus plots were created in high-density Sandalwood-bearing areas within the Sandalwood estates during the 1990s. The chosen areas were provided with chain link or barbed wire fencing, and fire lines were cut along boundaries to prevent grazing and fire. Tending operations like climber cutting, clearing miscellaneous growth, topping the leading shoots, sowing of seeds, and artificial regeneration were undertaken. The Tamil Nadu government sanctioned a new Sandalwood plantation scheme at an outlay of Rs.100 crores for 2015-16 to 2024-25. Works include raising Sandalwood plantations over 15,000 ha. in the traditional natural Sandalwood-bearing areas of Javadhi, Shervarayon, Kolli, Pachamalai, and Chitteri Hills, providing incentives to tribal communities in 300 project villages, and conducting research on improved seed pelletization. The impact of this programme is yet to be assessed.

Kerala Forest Department has a Sandalwood population known Marayoor Sandalwood Reserve. This reserve has ~58000 trees with more than 30 cm of girth at breast height spread across an area of ~1460 hectares. Only dead, dying, or fallen trees are harvested and subsequently auctioned. This reserve is well protected, and during the period 2015-2019, an average of only 20.6 trees have been illegally felled. As per the working plan, the primary focus of this reserve management is to increase the growing stock of Sandalwood trees, promote a participatory approach as a protection strategy, and popularise the cultivation of Sandalwood on private farms. Sandalwood seed collection and sale is one of the important works being carried out in this reserve. The Marayoor conservation model specially with reference to protection measures has been proved successful.

Similarly, such conservation strategy in the form of Marayoor model can be followed in other states where forest department has taken initiatives to grow Sandalwood in the forest areas.

- **Monitoring of sandal spike disease** - the respective state forest departments, ICFRE institutes, ICAR-AICRP centers and SAUs shall have to monitor spike disease both seasonally and periodically and pursue continued research to control the disease through preventive and remedial mechanisms. The existing prevalence of disease in Marayoor, Kerala and few pockets of Karnataka needs immediate control measures through the participation of all agencies in co-ordination with ICFRE-IWST, Bangalore.

