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## PHYTOCHEMISTRY AND PHARMACOLOGY OF SANTALUM ALBUM L. SANDALWOOD POWDER

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### ABSTRACT -

The most valuable and ancient sources of natural aroma ,which have enormous medical and economic value. S.album has been cultivated in India for the past 25 centuries and is renowned across the world for this its aromatic oil,which is delicious,long-lasting ,valuable for medical purposes.Many conventional medical practices , including Ayurveda have uses sandalwood and the essential powder made from the sandalwood , bearwood and various illness are treated and prevented using Siddhan and Uanai medicine.Sandalwood multifaceted therapeutic and medical significance is related to its abundant source of phytochemicals, particularly sesquiterpenes.

### KEYWORDS -

Cosmetics, Natural Santalum album linn, Alternative Medicine, Anti- inflammatory, Anti-oxidant, Alpha-santalol, Beta-santalol.

### INTRODUCTION -

The santalaceae family, namely the genus Santalum contains the commercially and culturally significant plant species known as sandalwood powder.Over the course of many centuries, sandalwood derived from the heartwood has been utilized for fragrance, therapeutic, religious, and cultural purposes. Particularly in Asia and Arab worlds, the wood and its powder are utilized for various purposes. All species of sandalwood have been classified as obligatory wood hemi-parasites meaning they take in specific nutrients.Santalum is a genus that contains about 18 different species of sandalwood, including S. S.peniculatum & pyrularium , S.involutum, S.accumulation, S.freycinetianum, S.haleakalae,& ellipticum, S.boninese, S.insulare, S.austrocaledonicum, & yasi, 5 macgregorii, S.murray tobacco obtusifolium, S.lanceolatum and S.fernandezianum. Sandalwood is the 2<sup>nd</sup> most expensive wood in the world.

Numerous studies have revealed that sandalwood has a significant genetic diversity for various features. However, there is little information available regarding the heartwood and powder content, mostly due to the lack of sandalwood plantations. Pharmaceuticals, cosmetics, aromatherapy, and perfumes are all use in sandalwood powder. *S.album* placed on the IUCN red list under the vulnerable category. It is a challenging to additional research on these two crucial characteristics because wild populations are quickly declining. We highly recommed that appropriate incentives be used to promote the creation of community or corporation-owned sandalwood plantations in various regions of India.

### HISTORICAL BACKGROUND-

**Biological Source-** It consists of heartwood of the stems and roots of *Santalum album* linn, an evergreen small tree.

**Geographical Sources-** The plant is widely distribute in India and is cultivated under gov. control in Southern India.

**Category -**Trees, Parasites, and Hemiparasites, with sucking roots.

**Other-** Average water needs water regularly.

**Colour-** Dark brown, Reddish, Dark grey.

**Fruting-** October to December.

**Seed Collection and Storage –** Sandal Fruits are collected fresh from the trees in Dec & are soaked in water & remove the soft pulp. Then thy are dried. The seeds are store well.

**Chemical Constituents-** Alpha-santalol & Beta-santalol & Santenone

Sandalwood contains 2 to 5 % of volatile oil which contains 90 to 97 % of sesquiterpene alcohols called santalols.

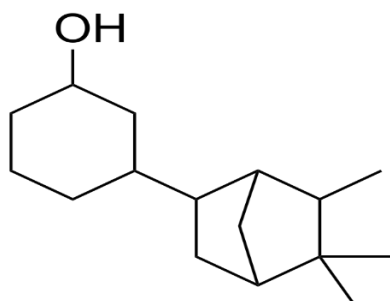
Sandalwood oil contains 95% two isomeric.

An aldehyde santalol  $C_{15}H_{22}O$ , santanene,santenone.

**Family-** Santalaceae

**Species-** album(AL-bum)

**Chemical name -** Isobornyl Cyclohexanol



**Chemical Formula -**  $C_{15}H_{24}O$  Sandal

**Synonym -** Breynia album

**Genus -** Santalum

**English -** Sandal Tree

**Hindi -** Sandan, chandal

Marathi - Chandan



#### Pharmacological Status -

1. Antioxidant activity
2. Treatment on anginal attacks
3. Antibacterial activity on oil & bark
4. Skin Cancer
5. Antiviral activity of sandalwood tree
6. Insect growth inhibitor from bark of S.album
7. Clinical evaluation
8. Anti-inflammatory
9. Effect on blood pressure/ respiration
10. Antipyretic effect
11. Effect on CNS



**BENEFITS -**

- . Dark spots
- . Heal your skin tissue
- . Also use sandalwood powder for skin whitening as it removes skin impurities to give an even tone.
- . Helps to reduce skin burns
- . Prevents pimples
- . Natural antiseptics
- . 100% natural & chemical free
- . Keep your skin glowing
- . Removes tan & patches

**Other name of sandalwood -**

It has Various names in various vernacular languages, including-

- Chandala, Bavana, Agarugandha, & Bhadrasri in Kannada
- Chandanam (Malayalam:Chandanamutti)
- Gandhachakoda in marathi
- Valgaka in Oriya
- Anukkam, Asam, and Sandhanam in Tamil □ Sandal and Safaid in Urdu, etc.

Indian sandalwood, also known as chandan in sanskrit, has a long history of use in India. It is regarded as a sacred component of Hindu traditions. Typically, wood has been extracted is used.



## Properties of Sandalwood -

- The section below contains a list of sandalwood's health benefits.
- Its antioxidant properties make it usable.
- Activity it might possess anti-inflammatory qualities.
- It might possess anti-proliferative (cell growth-inhibiting) properties. □ It might possess anti-microbial qualities.

I recently read a study that suggests that consuming a concoction of white sandalwood, tamarind, and neem may reduce vaginal discharge and pain in females with vaginal infections, according to early research. Sandalwood is renowned for its calming and anti-inflammatory qualities. A class of woods known as sandalwood is made up of Santalum tree species. Contrary to many other fragrant woods, these hefty, golden, fine-grained woods maintain their fragrance for many years. The woods are used to obtain sandalwood powder. One of the priciest woods in the world is frequently used as being sandalwood. Sandalwood has more antioxidants than vitamin E. Sandalwood powder has shown the native species to India, to be an anti-microbial, analgesic, anti-inflammatory and anti-proliferative. There are two types of sandalwood powder-

1 White sandalwood

2 Red sandalwood

## Potential uses of sandalwood powder -

The main trunk of the tree, which has a distinctive scent, is made of sandalwood. This sandalwood's oil, also known as East Indian sandalwood oil, is used to treat a variety of medical ailments. The wood can also be pulverized and used.



## Potential Uses of sandalwood for skin –



## Potential uses of sandalwood for psoriasis -

Psoriasis is a skin disorder that causes itchy, scaly, and red patches to appear on the scalp, elbows, knees, and other body parts. In tests, sandalwood has been proven to lessen the severity of the condition when applied topically to the areas where the psoriasis plaques (patches) are present. This is because it may have anti-inflammatory properties. This information is insufficient, and more human trials are needed before sandalwood can be recommended for the treatment of psoriasis. As a result, consumers should see their doctor before using sandalwood and only when directed to.



## Potential benefits of sandalwood for wrinkles, scars, and darkening of the skin -

It has the long history of use as a significant cosmetic item. Because it lessens wrinkles, scars, and skin discoloration, sandalwood has traditionally been used as an anti-aging treatment. This is as a result of its anti-inflammatory, antioxidant, and toning properties.

## Sandalwood potential applications for wounds -

Sandalwood may aid in wound healing due to its putative anti-microbial properties (i.e, anti-bacterial, anti-fungal, and anti-viral properties.) as well as its anti-inflammatory effects. It is use as same as more investigation is needed to suport these satements though.

## Potential Brain benefits of sandalwood -

Animal studies have demonstrated that it has anti-inflammatory effects, sedative and soothing effects, and the potential to improve memory. As a result, additional research is required to determine whether it can be used to treat Alzheimer's disease, anxiety, or sleeping issues. We should also seek medical advice before using sandalwood for these problems because there is insufficient evidence of it working on humans.

### Potential Applications of Sandalwood in the Treatment of Cancer -

Animal and cell culture experiments have shown that the sandalwood compound I-santalol has anticancer potential. It may therefore be useful in the treatment of skin tumors, but more research is necessary before it can be applied to humans. Additionally, a professional should identify and manage cancer.



### Potential Uses Of Sandalwood For the Treatment of Ulcer -

An ulcer is a tear in the stomach or intestine lining. Sandalwood contains anti-inflammatory and antibacterial effects, according to studies. The bacterium *H. pylori*, which causes the formation of gastric ulcers, may be successfully combated by the sandalwood powder. As a result, stomach and intestinal ulcers may be treated with sandalwood oil extract. Because they are dangerous, ulcers require medical attention.

### Potential Applications of Sandalwood in Infection Management -

Studies have demonstrated the anti-bacterial, anti-fungal, and anti-viral properties of sandalwood powder extract. Its anti-bacterial properties may be helpful in treating skin acne brought on by staphylococcal and streptococci bacteria, as well as ulcers brought on by the *H. pylori* bacterium, while its anti-viral properties may be helpful in treating skin warts, blemishes, and Molluscum contagiosum, an infection brought on by a poxvirus. Skin burrows, itching, red rashes, and inflammation are all symptoms of the skin ailment scabies, which is brought on by a mite. The skin webs between the fingers are the location that are most frequently impacted. Due to its antibacterial, anti-microbial, and anti-inflammatory properties, sandalwood may be helpful in lowering the redness, irritation, and inflammation that are associated with acne.

### Potential Heart Benefits of Sandalwood -

More research in humans is required, however sandalwood has shown to have cardioprotective effects through minimizing heart tissue damage, antioxidant, lipid-lowering, and blood sugar-lowering properties. More human trials and more complete information are needed to support the usage of sandalwood. Therefore, people should consult their doctors about their concerns and only take sandalwood if it has been prescribed.

### Potential Applications of Sandalwood in the Treatment of Diabetes -

Although further research is needed, sandalwood's blood sugar-lowering and antioxidant effects make it a good candidate for usage in diabetes.

## Sandalwood may be used to reduce fever -

Due to its antipyretic properties, which lower body temperature, sandalwood can be used to treat fever. Numerous animal studies support this property. Although there are studies demonstrating the potential utility of sandalwood in a variety of conditions, these are insufficient, and further research is required to determine the full range of sandalwood's positive effects on human health. I advise observing the dosage of your diabetic medicine when taking sandalwood. Consuming red sandalwood extract may reduce blood sugar levels. Red sandalwood extract may cause your blood sugar to drop too low when combined with diabetes medications. Keep an eye on your blood sugar levels.

## How is sandalwood used-

Sandalwood's heartwood is steam distilled to obtain the powder, which is then used. Its powder is made into a paste and administered externally on the skin. Before ingesting any herbal supplements, you must seek the advice of a licensed physician. Without first consulting a licensed physician, never stop or substitute an ongoing modern medicine treatment with an ayurvedic/herbal preparation.



## Medical Uses-

Cold

Cough

Bronchitis

Fever

Throat

Liver disease

Gall bladder problems

Heartstroke

Headache

Also treat UTIs

## Effects of sandalwood -

When used in moderation, sandalwood is probably safe, but repeated use could be harmful. The harmful outcomes that happened most commonly are used, the itching of sandalwood incense on the skin, blood in the pee (kidney damage) allergic skin responses brought on by skin surface. If it is used and noticed, seek immediate medical attention. Consult the ayurvedic physician who gave you the prescription; they will be able to identify the problem and offer a successful cure.

## Pregnancy -

Sandalwood oil may have an impact on the fetus when administered to pregnant women, according to studies on animals. As a result, it shouldn't be used against the consulting gynecologist's recommendations.



## Kidney -

People with kidney disorders should stay away from sandalwood since it can harm the kidneys. So, if you are on any medication and want to take sandalwood, you should talk to your doctor first because they can advise you on this the best.



## Conclusion -

Since the 2001 and 2002 liberalization of regulations governing sandalwood production in the traditional sandalwood-growing regions of Karnataka and Tamil Nadu, commercial sandalwood farming has gained momentum in India. In non-traditional sandalwood regions in the states of Gujarat, Rajasthan, and Madhya Pradesh, sandalwood farming initially exploded. States like Maharashtra, Telengana, and Andhra Pradesh have seen an increase in sandalwood farming recently. While Tamil Nadu and Northern Karnataka, two of the southern Indian states with drier climates, have seen an increase in cultivation, Kerala has been left out of the picture despite having the only remaining natural sandalwood forest reserve in Maryoor. survey of sandalwood plantations in Northern raised on private properties and forest lands

## References -

1. One is the ENVIS Center for Forestry. Sandal, from the *Santalum album* by Linn. Sandal.pdf is accessible from:  
<http://www.frienvic.nic.in/WriteReadData/UserFiles/file>
2. Council of American Botanists. Sandalwood. [Internet] Sandalwood is accessible from  
<https://www.herbalgram.org/resources/healthy-ingredients/>
3. The site for India's biodiversity. Album L by *Santalum*. [Internet] accessible from:  
<https://indiabiodiversity.org/species/show/31727>
4. Vinay Keshavamurthy and Bhattacharjee Rajsmitta, "Re-discovering Sandalwood: Beyond Beauty and Fragrance." *Indian Dermatology Online Journal*, 10(3), 296-297, May-Jun 2019. You can get this at:  
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6536050>
5. Geeta Joshi and A.N. Arun Kumar, "Sandalwood: History and Uses," both the present and the future. *Current Science*, December 2012; 103 (12); 1408-1416. Disponible à partir de:  
[https://www.researchgate.net/publication/260024158\\_Sandalwood\\_History\\_uses\\_present\\_status\\_and\\_the\\_future](https://www.researchgate.net/publication/260024158_Sandalwood_History_uses_present_status_and_the_future).

6. Manju Sharma and Corey Levenson, East Indian Sandalwood Oil (EISO) Alleviates Psoriasis' Inflammatory and Proliferative Pathologies. 2017 Mar; 8 (0): Article 125. Front Pharmacol. Available from: 10.3389/fphar.2017.00125 at Sci-Hub.HK Visa
7. Phytochemistry and Pharmacology of Santalum album L.: A Review by Rakesh Kumar and Nishat Anjum. World Journal of Pharmaceutical Research, Volume 4 (10), Issue 10, 1842– 1876, October 2015. Accessible from:  
[https://www.researchgate.net/publication/282638998\\_Phytochemistry\\_and\\_Pharmacology\\_of\\_Santalum\\_album\\_L\\_A\\_Review](https://www.researchgate.net/publication/282638998_Phytochemistry_and_Pharmacology_of_Santalum_album_L_A_Review)
8. Anticancer Effects of Sandalwood by Sreevidya Santha and Chandradhar Dwivedi (Santalum album). ANTICANCER2015 June; 35(6):3137-3145 in RESEARCH. Available with permission from:  
<https://ar.iijournals.org/content/35/6/3137>
9. The TAF CORN (Tamil Nadu Forest Plantation Corporation Limited) company. wood sandal goods. [Internet]. Accessible at: [www.taforcorn.tn.gov.in/sand.html](http://www.taforcorn.tn.gov.in/sand.html)
10. Kuntal Das; The Use of Essential Oils in Food Safety, Flavor, and Preservation. Chapter 82: Sandalwood Oils from the Santalum album. 2016; Academic Press; 723–730. It is possible to access this study at <https://www.sciencedirect.com/science/article/pii/B9780124166417000821>
11. Elizabeth L. Barbour, Emilio L. Ghisalberti, and Christopher GJ. Phytochemistry. 2006, 67(22), 2463–2468. Quantitative co-occurrence of sesquiterpenes: a technique for understanding their production in Indian sandalwood, Santalum album.
12. "Isolation & chiral GC analysis of beta- bisabolol trace components from the essential oil of Santalum album L (Santalaceae)," by Braun NA, Meier M, and Pickenhagen W. 2003, J Essent Oil Res, 15(1), 63–65
13. Kuttan R et al. : An intriguing occurrence of sulfoxide diastereoisomers in nature: The isolation and characterization of  $\gamma$ -L glutamyl S-(trans-1- propenyl)-L-cysteine sulfoxide from sandal (Santalum album L). 1974, Biochemistry 13(21), 4394–400.
14. Mrinal K et al., "Clinical Evaluation of a Native American Herbal Eyedrop Preparation" (preliminary report) The Indian Practitioner, vol.38, no.11, 1985, pp.149–53. 14. Organic Preservatives C. Anthony Dweck.
15. Organic Preservatives C. Anthony Dweck. Natural preservatives by acid papers at [www.scientificpapers.com](http://www.scientificpapers.com)
16. Shankaranaryana KH and Venkatesan KR, Rectification of Benzene Extract: A Simple Method for High-Yield Sandal Oil Extraction. (1981), Indian Perfumer, XXV (3&4), 31–34. Albert C. Chibnall and others,
17. Biochem Journal, 1981–1986.

18. Shankaranaryana KH et al., "Insect growth inhibitor from the bark of Santalum album," Oct. 1937 Phytochemistry,
19. , 1239–1240 (1986). Activities Antifongques In-Vitro de Sept Huiles Essentielles, Fitoterapia, Chaumont JP, Bardey I.1989, LX(3),263-266.
20. Antibacterial Efficacy of Some Indian Essential Oils, Perfumery, and Cosmetic by Chourasia OP and Rao J. Tirumala. 68(Jahrgang. 1987.Nr.9/87), 564-566
21. Antibacterial Activity of Sandal Bark Tannins against Staphilococcus aureus, Shankaranaryana KH et al. Van Vigyan. 1986

