INTERNATIONAL JOURNAL OF PHARMACEUTICAL SCIENCES
[ISSN: 0975-4725; CODEN(USA): IJPS00]
Journal Homepage: https://www.ijpsjournal.com

OPEN ACCESS

Review Paper

A Comprehensive Overview on Pterocarpus Santalinus

Manisha Mendke, Varsha Sanap, Priyanka Mohite

Women's College of Pharmacy, Peth Vadgaon, Tal -Hatkanangale, Dist -Kolhapur, Maharashtra -416112

ARTICLE INFO

Published: 09 June 2025
Keywords:
Red sanders, Red Saunders, Yerra Chandanam, Chenchandanam, red sandalwood, Raktachandan.
DOI:
10.5281/zenodo.15624776

ABSTRACT

An essential part of the Indian traditional medical system, Ayurveda, is the medicinal herb Pterocarpus santalinus, which has a variety of uses. The plant is well known for its unique wood, which is distinguished by its stunning hue and beauty. Triterpenoids, steroids, flavonoids, and phenolic acids may be present, according to phytochemical study. This drug is used to treat eye conditions, ulcers, induce vomiting, and cause mental disorders. Heartwood is well-known for its cooling, aphrodisiac, diaphoretic, anthelmintic, antihyperglycemic, antipyretic, anti-inflammatory, and tonic qualities. Promising skin protecting benefits can be seen in phytoconstituents such as pterostilbene, cedrol, savinin, lupeol, betulin, β-eudesmol, and α-bisabolol that have been extracted and employed in dermatological formulations. P. santalinus's pharmacological effects on health and disease are examined in this review, which also offers a current assessment of its phytochemical, pharmacological, and therapeutic applications.

INTRODUCTION

Pterocarpus Santalinus, commonly known as red sandalwood, is a magical herb that has strong therapeutic and skin-care uses. It is an important component of traditional medicine because of its strong qualities and vivid red colour. The multilingual film Red sandalwood trees are popular, but their wood is trafficked into other nations, as Pushpa examines. Many years of fighting diseases taught man to look for pharmaceuticals in the bark, seeds, fruit bodies, and other parts of plants, which led to an awareness of the use of medicinal plants. Humans have been using medicinal herbs for a very long time—since ancient times. Original plant medicines, monuments, and written records all attest to their use. [1] Knowledge of their medicinal qualities has improved doctors' and pharmacists' capacity to address health issues. [2] Eighty percent of underdeveloped nations rely on traditional medicines for primary treatment, according to the World Health Organisation. In

***Corresponding Author:** Manisha Mendke
Address: *Women's College Of Pharmacy, Peth Vadgaon, Tal -Hatkanangale, Dist -Kolhapur, Maharashtra -416112*
Email ✉: manishamendke10@gmail.com

Relevant conflicts of interest/financial disclosures: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

order to promote sustainable practices, rural populations gather medicinal herbs from forests.[3] It has frequently been documented that traditional medicines and medicinal plants are used as therapeutic agents to maintain good health in the majority of developing nations. [4] The tropical tree Rakthachandan, which belongs to the Fabaceae family, has several health advantages, especially its medicinally useful heartwood.

The deciduous P. santalinus tree has pink stripes and thick, dark brown bark. It creates santalin, a natural dye used in food colouring and pharmaceutical formulations.is the botanical name for Pterocarpus santalinus, a medicinal herb with anti-inflammatory, hepatoprotective, antipyretic, and anti-hyperglycemic qualities. Its leaves contain active phytoconstituents such as triterpenoid and steroids that exhibit antifungal action. In Ayurveda, its heartwood is used to treat ailments like skin, diabetes, headaches, and jaundice.[5]

In addition to standardising Ayurvedic and Siddha formulations that use Pterocarpus santalinus heartwood as a powder ingredient, microscopic analysis attempts to identify and authenticate the raw medication. Numerous phyto-constituents, such as acylated isoflavone glucoside, isoflavone-liquiritigenin, isopterocarpone, pterocarptriol, cryptomeridiol, and santalin A and B, are found in the heartwood of red sandalwood.

[9]Adulterants and substitutes: Adenanthera pavonina Wild heartwood. Also called 'Ranjana' and 'Raktakambal' on the West Bengali side. 'Bari Gumchi' is another name for it in Northern India. It is a member of the family Mimosaceae. Tree-derived sawdust and artificially coloured wood shavings are marketed as low-cost alternatives to red sanders and are used to treat wounds, inflammation, and illnesses. Heartwood and red dye from Adenanthera pavonina Linn, whereas red sandal wood is mixed with Rose wood, Padauk, and Bijasel because of their similar appearances [10]. Wood is used instead. [9]

HISTORY

The Fabaceae family's Pterocarpus genus of trees [6] is well-known for its precious timber, especially padauk, which is also known as mukwa or narra."Wing fruit" is the Latinized Ancient Greek scientific name, which alludes to the peculiar form of the seed pods of this genus. Originating from either African or Asian Pterocarpus species, padauk wood is prized for its strength, stability, and aesthetic appeal. There are currently 35 recognised and widespread Pterocarpus species in the world, according to research. [7, 8] These include Pterocarpus amazonum (Benth.), Pterocarpus angolensis, Pterocarpus acapulcensis, Pterocarpus albopubescens, Harms, Pterocarpus antunesii (Taub.), Pterocarpus echinatus Pers., Pterocarpus brenanii, Pterocarpus claessensii, and Pterocarpus dalbergioides Eraceus Pterocarpus, Gilletii Pterocarpus, The Pterocarpus hockii, homblei, and Pterocarpus indicus Pashu Padauk, Pterocarpus macrocarpus, Pterocarpus marsupium, Pterocarpus mildbraedii Harms, Mutondo Pterocarpus, Jacq. Pterocarpus officinalis Orbiculatus Pterocarpus DC, Pterocarpus rotundifolius (Sond.) Druce, Pterocarpus rohrii Vahl, Pterocarpus osun Craib, Santalinoides Pterocarpus, Santalinus Pterocarpus, Rizzini, Pterocarpus ternatus, Harms, Pterocarpus tessmannii Welw's Pterocarpus tinctorius .The majority of these species—Pterocarpus velutinus, Pterocarpus villosus Benth, Pterocarpus violaceus Vogel, Pterocarpus zehntneri Harms, and Pterocarpus zenkeri Harms—are found in Africa, particularly in Nigeria, Cameroon, Sierra Leone, and Equatorial Guinea, and some in Asia. The most significant and frequently used Pterocarpus species is Pterocarpus santalinus Linn. However,

despite the species' growing demand, accurate data must be gathered.

TAXONOMICAL CLASSIFICATION - [Biological classification]

- Domain-Eukaryota
- Kingdom - Plantae
- Subkingdom-Viridaeplantae
- Phylum -Mangoliophyta
- Subphylum-Euphyllophytina
- Class-Mangoliopsida
- Subclass-Rosidae
- Order -Fabales
- Family – Fabaceae
- Subfamily -Faboideae
- Genus -Pterocarpus
- Species – P.santalinus
- Botanical Name – Pterocarpus santalinus L.f

SYNONYMS

Alternatives to Red Sandalwood Red sandalwood, scientifically known as Pterocarpus santalinus, is also known by a variety of colloquial names, including Redsanders, Rubywood, Saunderswood, Sandalwood Padauk, and Santal Rouge. [11]
Its other regional names include**:**
Hindi: Lal Chandan, Ragat Chandan Undum, Rathasanthanam
Tamil: Senjantanam
Sanskrit: Raktsaara, Rakta chandana
Malayalam: Rakthachandana
Kannada: Rakthachandanam
Telugu: Kempugandha
Marathi: Tambada Chandan
Gujrati: Patanjali [12, 13]

GEOGRAPHICAL DISTRIBUTION

Pterocarpus Santalinus is an endemic species that grows in the hills of Andhra Pradesh, Karnataka, and Tamil Nadu. It has also been brought to Sri Lanka and is grown in Maharashtra, Odisha, and West Bengal. [14]

CULTIVATION AND COLLECTION

Traditionally, P. santalinus is propagated by vegetative and seed methods. Red loam soils that drain effectively and a hot, dry climate are necessary for seed germination. For early germination, seeds need to be treated with GA3 and benzyladenine. For growth, the plant needs 800-1000 mm of rainfall every year. It can be soaked in slurry made from cow dung or cold water. Topsoil is carefully mixed with 1015 kg of farm yard manure and 10 g of lindane dust to fill the 45 × 45 × 45 cm pits, which are dug at a distance of 4 × 4 m. To safeguard planting stock, pits are filled with lindane dust, dung, and topsoil. In order to shield the planting stock from soil-borne fungus, soil is combined with lindane dust and farm yard manure in pits. The best months to raise seeds are March through May. Crops should be planted in late May or early June, when it's raining, and watered as soon as possible after transplanting, with intervals of up to 15 days. [15]

MORPHOLOGICAL CHARACTERISTICS:

The macroscopic and organoleptic features of the leaves and stem of P. santalinus, such as the long petiole, smooth surface, and alternating, simple leaf with a full edge. [16]

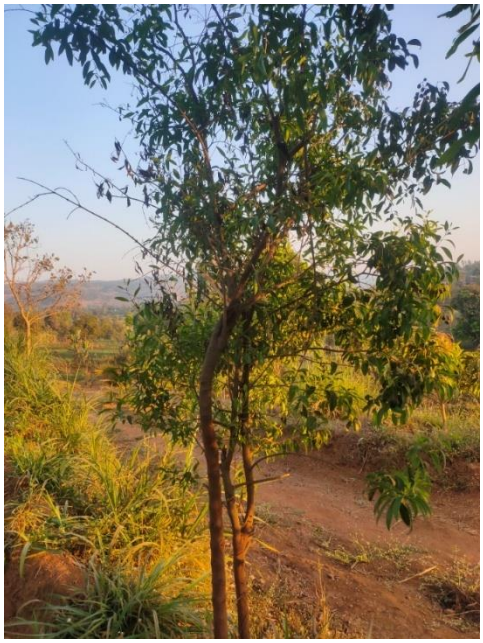



Table 1: Organoleptic features of P. santalinus leaf stem and bark [16]

Parts	leaves	stem	bark
Arrangement	**Alternate**	**-**	
Size	15.5 cm long, 13.7 cm wide(trifoliate leaf) 10.5cm long and 8.9cm wide(single leaf)	50 to 51cm diameter in trunk and 8 to 9 meter (26feet) tall	Heartwood about 1m long and 7-15 cm in diameter
Shape	Lanceolate to ovate	Cylindrical	Irregular and mostly cylindrical
Colour	Green	Reddish brown	Deep red, reddish brown or dusky red, black

Odour	Fragrant scent	Fragrant scent	Not specific odour, except mild woody smell
Taste	Fragrant taste	Aesthetics (Rasa	Slightly astringent and bitter
Appearance	Smooth	Rough & Scabrous	Rugged bark and pale sapwood
Margin	Entire	-	-
Apex	Subacute	-	--
Base	Symmetrical	-	-
Petiole	Long (5.5 cm)	-	-
veination	Reticulate veination	-	-
Texture	Semi smooth	Dark Radish brown color.	Hard, rigged and longitudinal striation
Outer surface	smooth	Rough surface	Rough surface

MICROSCOPIC CHARACTERISTCS:

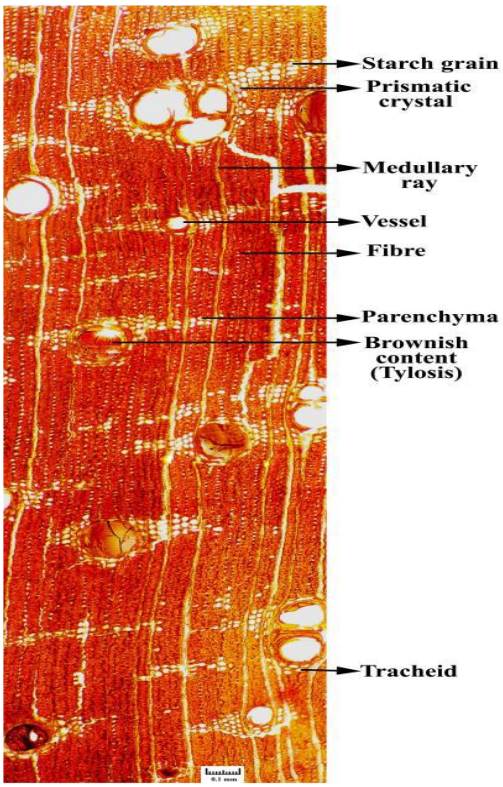


fig:1

The transverse portion of heartwood is reddish brown, and it features radial rows of two to three vessels with tylosis as well as dispersed porous vessels. The paratracheal, aliform, and medullary rays of the parenchyma are parallel and contain calcium oxalate crystals and starch grains. Fibres, parenchyma, tracheids, and vessels with pits and border pits intersect medullary rays.

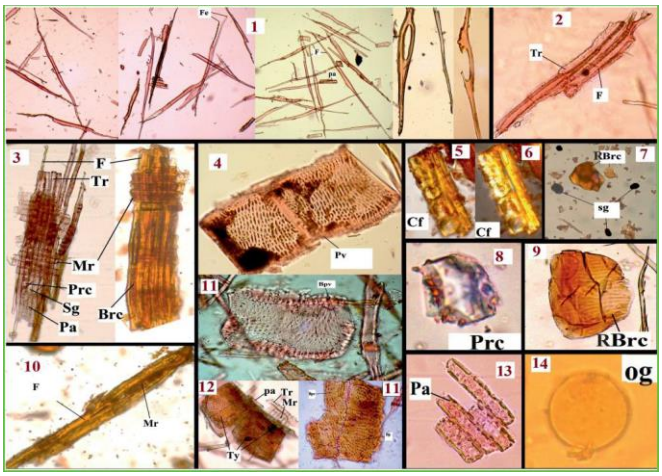


Fig: 2

POWDER MICROSCOPY:

Prismmatic calcium oxalate crystals, oil globules, simple starch grains, barrel-shaped pitted and border-pitted vessels with tylosis, thick-walled, broad lumens with long sharp ends, and a few forked and needle-eye end fibres are all visible in the powder (Fig. 2).

QUALITATIVE PHYTOCHEMICAL ANALYSIS

The methods of Harborne [17] and Ram et al. [18] were followed in order to detect alkaloids,

flavonoids, tannins, phlobatanins, saponins, steroids, cardiac glycosides, triterpenes, and anthocyanins. The (+) sign denoted the existence of the particular phytochemicals, whereas the (-) sign denoted the group's absence.

According to WHO criteria, the physicochemical parameters, including extractive value, total ash, acid-insoluble ash, water-soluble ash, sulphated ash, and loss on drying, were measured [19]. The steps taken are as previously mentioned [20].

Physicochemical analysis

Table: 2 Qualitative phytochemical analysis of leaf stem and bark[16]

NO	Phytochemical test	leaf	stem	bark
1	Alkaloid			
	Mayer's reagent	-	-	-
	Dragondroff's Reagent	+	-	-
	Wagner's Reagent	-	-	+
2	Flavonoids	+	++	++++
3	Tannins	++	++	+
4	Phlobatannis	-	-	-
5	Saponins	+++	+++	-
6	Steroids	+	-	++++
7	Cardiac glycosides	+	-	-
8	Triterpenes	++	+++	++
9	Anthocyanin	+	-	-

Note: (++++)-High amount,(+++)-Moderate amount,(++)-Less amount,(+)-Very less amount,(-)-Absent

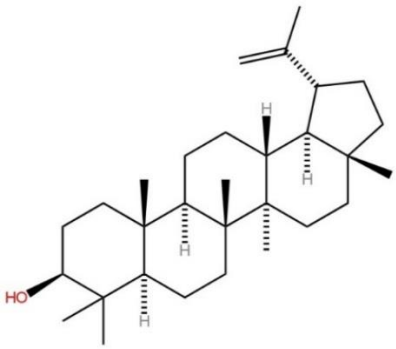
PHYTOCHEMISTRY OF P.SANTALINUS

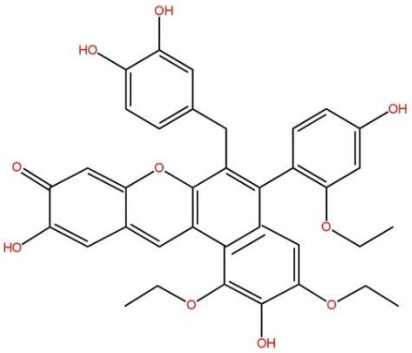
Phytochemical examination of the plant showed that it included alkaloids, glycosides, flavonoids, terpenoids, phenolic compounds, carbohydrates, saponins, and tannins. [21, 22] Pterocarpol, santalin A, B, and Y, pterocarptriol, isopterocarpalone, pterocarpodiolones with β-eudesmol, and cryptomeridiol are among the substances that have been reported to be present in heartwood powder. [23] Isoflavones, isoflavonoid glucosides, triterpenes, sesquiterpenes, and related phenolic compounds such as β-sitosterol, lupeol, epicatechin, lignans, and pterostilbenes are among the nonspecific chemicals described in the book. [Table 3] [24–28]

Table: 3 Phytochemistry of P. santalinus

Part	Chemical class of phytocomponent	Names of phytocomponent
Bark	Terpenoids, steroid	β-amyrone, betulin, lupenone, β-sitosterol
Leaves	Triterpenes, steroids	Lupenone, lupeol, β-amyrone, epilupeol, β-amyrin, stigmasterol, β-sitosterol
Stem and heartwood	Carbohydrates, flavonoids, terpenoids, alkaloids, saponins, tannins, glycosides stilbene, lignin and lignans, isoflavones, sesquiterpenes, coumarins, aurone glycosides	Santalin A, santalin B, santalin C, cryptomeridiol, oleanolic acid, pterocarpol, pterocarptriol, pterocarpdiolone, pterostilbene savinin, eudesmin, neoflavones I and II, isoliquiritigenin, liquiritigenin, eudesmol: α,β,γ isomers, β-santalol, pterocarpol, isopterocarpolone, pterocarptriol, cryptomeridiol, canusesnol K, canusesnol L

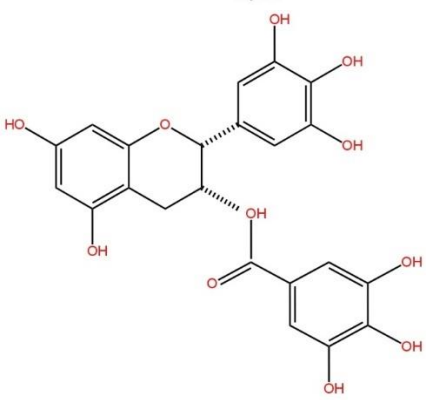
		12,15-Dihydroxy-Curcumene, 5-Hydroxy-7-O-(3-methyl)-but-2-enylcoumarin, 3-aryl coumarin, 6-Hydroxy-7-methoxy-2H-chromen-2-one, 6-Hydroxy-5-methyl-3',4',5'-trimethoxy aurone-4-O-α-L-rhamnopyranoside, 6,4'-dihydroxy aurone-4-O-rutinoside
Various parts	Phenolic acids	Syringic acid, 2,4-Dihydroxy-benzoic acid ferulic acid, 2H-1-Benzopyran-2-one



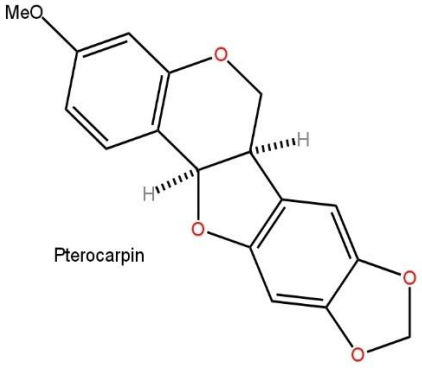


Santalin

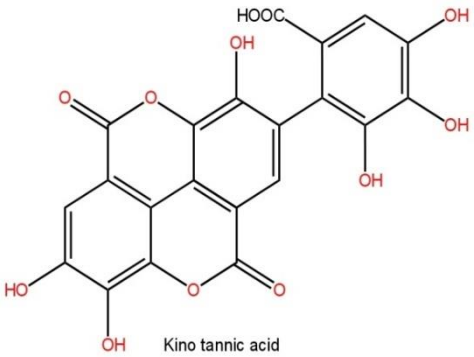
Lupeol



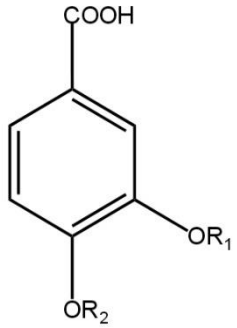
Epicatechin gallet



Pterocarpin



Kino tannic acid



Vanillic acid R1=CH3,R2=H

USES

Fever, pain, and parasite infections may be lessened by Pterocarpus santalinus's antipyretic, anti-inflammatory, analgesic, anthelmintic, cooling, blood-sugar-lowering, anti-cancer, and antibacterial qualities. A natural cure for animal bites from spiders, snakes, or scorpions is red sandalwood, which can be applied as an antiseptic ointment. While Dal Chandan, when rubbed with honey, water, ghee, and oil, can help with visual abnormalities, Red Sandalwood paste can help with headaches.

As a chemotherapeutic agent, red sandalwood may be able to stop the growth of malignant cells and encourage apoptosis, which is the death of those cells. [29] Rakthachandan is a medicinal herb used in Ayurveda to treat ailments like diabetes, headaches, jaundice, skin disorders, inflammation, and wound healing. It has anti-inflammatory, hepatoprotective, antipyretic, and anti-hyperglycemic qualities. [30]

Table: 4 Pharmacology Of P. Santalinus [30 ,31]

Pharmacological actions	Part used	Active phytoconstituent	Extract	Mechanism of action
Anticholinesterase	Bark	Terpenoids, steroid	Methanol	Inhibition of brain acetylcholinesterase and enhancement in memory in mice
Antifungal	Leaves	Triterpenes, steroids	Ethyl acetate	Disruption of the fungal cell wall by flavonoids
Hypoglycemic effect	Bark	Terpenoids, steroid	Aqueous, ethanol, hexane	Activation of the remnant beta cells and improvement in insulin response at cellular level
Antipyretic	Heartwood	Carbohydrates, flavonoids, terpenoids, alkaloids, saponins, tannins, glycosides stilbene, lignin and lignans, isoflavones, sesquiterpenes, coumarins, aurone glycosides	Aqueous	Prevention of activation of cyclooxygenase and prostaglandin formation
Antibacterial	Bark and leaves	Triterpenes, steroids Terpenoids, steroid	Methanol	Inactivation of microbial enzymes, transport proteins and adhesins, loss of cell membrane integrity
Hepatoprotective effect	Heartwood	Carbohydrates, flavonoids, terpenoids, alkaloids, saponins, tannins, glycosides stilbene, lignin and lignans, isoflavones, sesquiterpenes, coumarins, aurone glycosides	Methanol	Enhancement of antioxidant enzymes in the liver in rats
Nephroprotective	Heartwood	Carbohydrates, flavonoids, terpenoids, alkaloids, saponins, tannins, glycosides	Methanol	Enhancement of antioxidant enzymes SOD, CAT, GPx, GR and GST in the kidney in rats

		stilbene, lignin and lignans, isoflavones, sesquiterpenes, coumarins, aurone glycosides		
Antityrosinase	Heartwood	Carbohydrates, flavonoids, terpenoids, alkaloids, saponins, tannins, glycosides stilbene, lignin and lignans, isoflavones, sesquiterpenes, coumarins, aurone glycosides	Acetone extract	Down regulation of tyrosinase, TRP-1TRP-2 and MITF (precursors for melanogenesis)
Wound healing	Stem powder	Carbohydrates, flavonoids, terpenoids, alkaloids, saponins, tannins, glycosides stilbene, lignin and lignans, isoflavones, sesquiterpenes, aurone glycosides	-	Stimulation of generation of proteins and factors which regenerated the extracellular matrix
Anti-ulcer	Heartwood	Carbohydrates, flavonoids, terpenoids, alkaloids, saponins, tannins, glycosides stilbene, lignin and lignans, isoflavones, sesquiterpenes, coumarins, aurone glycosides	Ethanol	Anti -*Helicobacter pylori*
Anti-tumor activity	Seed, stem, leaves and bark	Carbohydrates, flavonoids, terpenoids, alkaloids, saponins, tannins, glycosides stilbene, lignin and lignans, isoflavones, sesquiterpenes, coumarins, aurone glycosides, steroids, phenol.	Ethanolic seed extract and other methanolic extract	Proved cytotoxic against cervical and breast cancer cell lines by MTT (3-[4,5-dimethylthiazol-2-yl]-2,5-diphenyltetrazolium bromide) assay
Atopic dermatitis	Stem and heartwood	Carbohydrates, flavonoids, terpenoids, alkaloids, saponins, tannins, glycosides stilbene, lignin and lignans, isoflavones, sesquiterpenes, coumarins, aurone glycosides	Ethanolic extract	Inhibition of thymic stromal lymphopoietin and interleukin (IL)-4/polyinosinic-polycytidylic acid. reduction in inflammation

SOD: Superoxide dismutase, CAT: Catalase, GPx: Glutathione peroxidase, GR: Glutathione reductase, GST: Glutathione S-transferase

ADVERSE EFFECT

Red sandalwood might be safe if used sparingly. According to a 1996 case study by Sandra et al., red sandalwood powder can result in minor facial oedema, irritating erythema, and allergic contact dermatitis. It's critical to speak with your doctor right away and get the right care if you have any negative effects from using red sandalwood. Pregnant or nursing women should not apply the extracts to their skin, and they should be avoided if they cause irritation. [29]

MARKETED FORMULATION:

The following are the traditional dosage forms of Pterocarpus santalinus that are developed based on Ayurveda:

Dosage form	Brand name	Company name	dose	Price	Use	Reference

Soap	KAMA Ayurveda	KAMA Ayurveda Private Limited	125 g	795	Cure skin related issues	[32]
cream	Bipha Ayurveda	BIPHA Ayurveda	75 g	1436	Act as moisturizer	[33]
Powder	Dr Jain' s Raktachandan powder		45 g	265	Act as anti-inflammatory	[34]
syrup	Baidyanath	Shree Baidyanath Ayurved bhawan (p) limited (Jhansi)	200 ml	120	Blood purifier	[35]
Cream	Aroma	Aroma herbs and Ayurvedic IND pvt.ltd	70 g	265	All skin purpose	[36]
Tablet	Sai store sandalwood tablets	Sai store	200 g	139	fragrance	[37]
Asavas	Sandu Chandanasav	SANDU PHARMACEUTICAL LTD	450 ml	320	Cooling effect, urinary infection	[38]
Essential oil	Derma cure	Derma cure	30 ml	610	Anti pigmentation and toner	[39]

NOVEL APPROACH OF P. Santalinus:

With sizes ranging from 1 to 100 nm, nanoparticles are crucial in many different technological domains. The new formulation provides tailored drug distribution above traditional dose forms. If the preparation is constructed of biodegradable components, it can provide long-term, continuous medication release. Thus, nanotechnology incorporates green chemistry. All components of the medicinal plant Pterocarpus santalinus, including the stem, bark, leaves, and seeds, have therapeutic benefits. Accordingly, the study shows that at high concentrations, red sandal-mediated silver nanoparticles have moderate cytotoxic and antioxidant effect. [40–45]

HOME REMEDIES

several writings and traditions make reference to the red sandalwood tree and its several Ayurvedic indications, which include:

- Powdered red sandalwood and coconut oil Apply a paste made from red sandalwood powder and coconut oil to dry areas for 15 minutes, then rinse and pat dry. It is well known that red sandalwood powder nourishes skin cells.
- Red sandal wood powder and lemon juice In a bowl, combine the red sandalwood powder and lemon juice to make a paste. Apply the paste to your face, let it sit for ten minutes, then rinse and pat dry. It tightens the pores and aids in controlling sebum production.
- Red sandalwood powder and rose water are combined to make a paste, which is then applied to the face for 15 minutes, rinsed, and patted dry. This pack efficiently reduces acne, scars, and inflammation; for even better results, add honey and turmeric.
- Red sandalwood powder and papaya In a bowl, combine red sandalwood powder and mashed papaya to make a paste. Apply to the face, let it sit for ten minutes, then rinse and pat dry to exfoliate. Your skin will feel renewed and fresh after using this face pack to help you remove dead skin cells.

- Milk, curd, and powdered red sandalwood In a bowl, combine curd, milk, turmeric, and red sandalwood powder. For a glowing complexion, apply the paste to your face, allow it to dry, and then wash it off with lukewarm water.
- Red sandalwood powder and milk In a bowl, combine milk and red sandalwood powder to make a paste, apply to the face, let it sit for ten minutes, rinse, and then pat dry. This pack lessens pigmentation and aids in the removal of dark spots. See the beneficial effects by doing this daily.
- Powdered red sandalwood with cucumber juice In a bowl, combine the red sandalwood powder and cucumber juice. Apply to the face, let it sit for ten minutes, then rinse and pat dry. Use this pack every day to observe immediate effects in erasing sun tan.
- Red sandalwood powder, coconut oil, and almond oil In a bowl, combine coconut oil, almond oil, and red sandalwood powder. Put the paste on your face, let it sit for ten minutes, then rinse and pat it dry. Regular use will result in soft, radiant skin. [46]

CONCLUSION

P. santalinus contains phytoconstituents such as terpenoids, flavonoids, and pterostilbene, which have a variety of health benefits, including neuroprotection, antimicrobial, hypoglycemic, antipyretic, anti-inflammatory, hepatoprotective, antidiabetic, hypolipidemic, anticancer, gastroprotective, and wound-healing properties. This review includes a brief description of the phytoconstituents and pharmacological activities of P. santalinus. The review offers proof that P. santalinus is a useful natural medication for other studies. Given that P. santalinus is regarded as a valuable health resource, more preclinical and clinical research is advised to assess its safety and therapeutic effectiveness.

REFERENCES

1. Stuffness M and Douros J. Current status of the NCI plant and animal product Program Nat Prod, 1998; 45(1): 1-14
2. Okigbo RN, Eme UE and Ogbogu S. Biodiversity and conservation of medicinal and plants in Africa. Biotechnol. Mol Biol Rev, 2008; 3: 127-34
3. Olayiowola A. WHO‟s traditional medicine programme: progress and perspective. WHO Chron, 1984; 38(2):76-81.
4. Smith JR, Karunaratne NS and Mahindapala R. Rapid inventory of wild medicinal plant Populations in Sri Lanka. Biol Concerv, 2006; 132: 22-32.
5. Arunakumara KKIU, Walpola BC, Subasinghe S, Yoon MH. Pterocarpus santalinus Linn. F. (Rath handun): a review of its botany, uses, photochemistry and pharmacology. J Korean Soc Appl Biol Chem 2011; 54(4):495-500
6. Lavin M, Pennington RT, Klitgaard BB, Sprent JI, de Lima HC & Gasson PE. "The dalbergioid legumes (Fabaceae): delimitation of a pantropical monophyletic clade". Am J Bot, 2001; 88(3): 503– 33.
7. International Legume Database & Information Service (ILDIS). Genus Pterocarpus. Version, Nov 2005; 10: 01.
8. World Agroforestry Centre (WAC). AgroForestryTree Database-Pterocarpus soyauxii, 2008
9. Billore KV, Yelne MB, Dennis TJ, Chaudhari BG. et al. Database on Medicinal Plants Used in Ayurveda. Vol.7, CCRAS, Dept. of AYUSH, Ministry of Health and Family Welfare, Govt. of India, New Delhi. 2005; 361-374.

10. Ministry of Environment, Forest and Climate Change, Government of India. Red Sander. Available from: http://www.moef.nic.in/ downloads/public-information/Chap-8-new.pdf
11. Selvam AB. Pharmacognosy of Negative Listed Plants, 2012;171-82
12. Gupta A, Tandon N, Sharma M. Quality Standards of Indian Medicinal Plants. Vol. 6. New Delhi: ICMR; 2008
13. Latheef SA, Prasad B, Bavaji M, Subramanyam G. A database on endemic plants at Tirumala hills in India. Bioinformation 2008
14. Jain SK & Sastry AR K. Threatened Plants of India. A State-of-the Art Report, 1980;42.
15. Jaime A, Teixeira S, Mafatlal MK, Deepak S, Nataraj M. Red sandalwood (Pterocarpus santalinus L. F.): Biology, importance, propagation and micropropagation. J For Res 2018; 30:745-54.
16. Donga S, Moteriya P, Pande J, Chanda S. A database on Development of quality control parameters for the standardization of pterocarpous santalinus linn.F. Leaf and stem.J of pharmacognosy and Phytochemistry 2017:6(4):242-252
17. WHO. Quality control methods for medicinal plants. Geneva, 2002, 28-31
18. Pandavadra M, Chanda S. Development of quality control parameters for the standardization of Limonia acidissima L. leaf and stem. Asian Pac J Trop Med. 2014; 7:S244-S248.
19. Harborne AJ. Phytochemical methods a guide to modern techniques of plant analysis, Springer Science Business Media, 1998
20. Ram J, Moteriya P, Chanda S. Phytochemical screening and reported biological activities of some medicinal plants of Gujarat region. J Phacog Phytochem. 2015; 4(2):192-198.
21. Kondeti VK, Rao BK, Maddirala DR, Thur SK, Fatima SS, Kasetti RB, et al. Effect ofPterocarpus santalinus bark, on blood glucose, serum lipids, plasma insulin and hepatic Carbohydrate metabolic enzymes in streptozotocin-induced diabetic rats. Food Chem. Toxicol 2010; 48:1281-7.
22. Narayan S, Devi RS, Srinivasan P, Shyamala Devi CS. Pterocarpus santalinus: A traditional Herbal drug as a protectant against ibuprofen induced gastric ulcers. Phytother Res 2005; 19:958-62.
23. Yoganarasimhan SN. Medicinal Plants of India, Tamil Nadu. Bangalore; Cyber Media: 2000. Kumar N, Seshadri TR. Triterpenoids of Pterocarpus santalinus constitution of a new Leupenediol. Phytochem 1975; 14:521-3
24. Krishnaveni KS, Srinivasa Rao JV. A new isoflavone glucoside from Pterocarpus santalinus. Asian Nat Prod Res 2000; 2:219-23
25. Krishnaveni KS, Srinivasa Rao JV. A new triterpene from callus of Pterocarpus santalinus. Fitoter 2000b; 24:167-71.
26. Krishnaveni KS, Srinivasa Rao JV. An isoflavone from Pterocarpus santalinus. Phytochem 2000c; 53:605-6
27. Cho JY, Park J, Kim PS, Yoo ES, Baik KU, Park MH. Savinin, a lignin from Pterocarpus Santalinus inhibits tumor necrosis factor alpha production and T-cell proliferation. Biol Pharm Bull 2001; 24:167-74.
28. Kesari AN, Gupta RK, Watal G. Two aurone glycosides from heartwood of Pterocarpus Santalinus. Phytochemistry 2004; 65:3125-9. p. 63.
29. Sharma P.19 July 2022.Red sandalwood uses, health benefits , formulation and side effects.httpswww.netmeds.comhealth-librarypostred-sandalwood-uses-health-benefits-formulation-and-side-effects
30. Kuchekar M,et al A database on phytochemistry and pharmacology of

pterocarpus santalinus and its role in dermatology. Asian J Pharm and Clinical Research, 2022,vol 15,18-24

31. Kim M, Lee KE, Nam JJ, Kim Y. Inhibitory effect of Pterocarpus santalinus and Buddleia officinalis on mediator of skin inflammation, especially atopic dermatitis. J Am Acad Dermatol 2016;80:911-9.
32. https://www.kamaayurveda.in/red-sandalwood-soap.html?utm_source=google&utm_medium=cpc&utm_campaign=KA_PerformanceMax_NewUsers&gad_source=4&gclid=CjwKCAiAuYuvBhApEiwAzq_YiRrCXR9TElycos9P6JgJvEs5z_5ZhFkWo3kohqWi4_Ys02E1EQxG_xoCoKAQAvD_BwE
33. https://www.amazon.in/Bipha-Ayurveda-Sandalwood-Cream-75gm/dp/B00HZDDQX8/ref=asc_df_B00HZDDQX8/?tag=googleshopmob-21&linkCode=df0&hvadid=397079929168&hvpos=&hvnetw=g&hvrand=5748695944147400341&hvpone=&hvptwo=&hvqmt=&hvdev=m&hvdvcmdl=&hvlocint=&hvlocphy=1007783&hvtargid=pla-404766821959&psc=1&mcid=7ed3e31fee723641b87e15a2599eb3f5&ext_vrnc=hi&gclid=CjwKCAiAuYuvBhApEiwAzq_YiT7oP1gelR80GDGd70ZsggBB9QHe-pZZS0NBi6m5qZ-BizZQV1LiohoC_agQAvD_BwE
34. https://dl.flipkart.com/dl/dr-jain-s-raktachandan-powder-45grams/p/itm31f5be0c39e1e?pid=BSTGCBDUVHDPEKK4&cmpid=product.share.pp&_refId=PP.d3f8312d-04a3-4632-8eb7-c741058030eb.BSTGCBDUVHDPEKK4&_appId=WA
35. https://www.1mg.com/otc/baidyanath-jhansi-raktashodhak-syrup-otc614094
36. https://amzn.eu/d/iBltuiK
37. https://www.jiomart.com/p/groceries/saiostore-sandalwood-tablets-santhanam-tablets-chandanam-chandan-tablets-200g/601106488
38. https://sandu.in/product/sandu-chandanasav-450-ml/
39. https://www.herbkart.com/daily-glowboosting-red-sandalwood-oil-raktha-chandan-from-kerala-30-ml/?wmc-currency=INR&srsltid=AfmBOopL7W7_V_RhemF1B5Xo-6jnvXxHNjkg_6akhJM2bY2LebvMl1lcRrA
40. Danda AK. Comparison of a single noncompression miniplate versus 2 noncompression miniplates in the treatment of mandibular angle fractures: a prospective, randomized clinical trial. J Oral Maxillofac Surg. 2010 Jul; 68(7):1565– 7.
41. Robert R, Justin Raj C, Krishnan S, Jerome Das S. Growth, theoretical and optical studies on potassium dihydrogen phosphate (KDP) single crystals by modified Sankaranarayanan– Ramasamy (mSR) method [Internet]. Physica B: Condensed Matter. 2010;405:20– 4. Available:http://dx.doi.org/10.1016/j.physb.2009.08.015
42. Krishnan V, Lakshmi T. Bioglass: A novel biocompatible innovation. J Adv Pharm Technol Res. 2013 Apr;4(2):78– 83
43. Soh CL, Narayanan V. Quality of life assessment in patients with dentofacial deformity undergoing orthognathic surgery—A systematic review [Internet]. International Journal of Oral and Maxillofacial Surgery. 2013;42:974– 80. Available:http://dx.doi.org/10.1016/j.ijom.2013.03.023
44. Lekha L, Kanmani Raja K, Rajagopal G, Easwaramoorthy D. Schiff base complexes of rare earth metal ions: Synthesis, characterization and catalytic activity for the oxidation of aniline and substituted

anilines [Internet]. Journal of Organometallic Chemistry. 2014;753:72– 80. Available:http://dx.doi.org/10.1016/j.jorganchem.2013.12.014

45. Dhinesh B, Isaac JoshuaRamesh Lalvani J, Parthasarathy M, Annamalai K. An assessment on performance, emission and combustion characteristics of single cylinder diesel engine powered by Cymbopogon flexuosus biofuel [Internet]. Energy Conversion and Management. 2016;117:466– 74. Available:http://dx.doi.org/10.1016/j.enconman.2016.03.049
46. Narureloc.12 December 2021.8 Easy home remedies to use red sandalwood for skin health. https://healthyliving.natureloc.com/8-easy-home-remedies-red-sandalwood-skin/.

HOW TO CITE: Manisha Mendke, Varsha Sanap, Priyanka Mohite, A Comphrensive Overview on Pterocarpus Santalinus, Int. J. of Pharm. Sci., 2025, Vol 3, Issue 6, 1822-1835. https://doi.org/10.5281/zenodo.15624776