e - ISSN - 2249-7722
Print ISSN - 2249-7730

International Journal of Phytotherapy

www.phytotherapyjournal.com

A REVIEW ON RED SANDAL WOOD - *Pterocarpus santalinus*

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ABSTRACT

Eastern Ghats of Indian tree species is *Pterocarpus santalinus*. Its flowers are large, yellow, bisexual and papilionaceous. It has been introduced and planted as a garden and avenue tree in the Andamans, West Bengal, Tamil Nadu and Maharashtra, Uttar Pradesh, Madhya Pradesh, Orissa and Bihar.*P. santalinus* is restricted to Kurnool and Cuddapah districts in Andhra Pradesh and Arcot and Chingelpet districts in Tamil Nadu up to 500 m. *Pterocarpus santalinus* commonly known as Red Sandalwood belongs to the family Fabaceae. It is also called as Red Sandalwood has natural dye i.e santalin, and it is used as coloring agent in pharmaceutical preparations and foodstuffs. Santalinus is also having the pharmacological property like anti hyperglycaemic activity, antipyretic, antiinflammatory, anthelmintic, tonic, dysentery, aphrodisiac, diaphoretic, hemorrhage. In ancient time red sandal wood is used for preparing the ornaments.

Key words: Red Sandal, Alexiteric, Santalin, Cultivation and collection.

INTRODUCTION

Pterocarpus is a pantropical genus of trees in the family Fabaceae,the scientific name is Latin Ancient Greek and means "wing fruit" referring to the unusual shape of the seed pods in this genus. Padauk wood is obtained from several species of *Pterocarpus*. *Pterocarpus* woods contain either water or alcohol-soluble substances and can be used as dyes [1]. The flowers are pedicellate, bright yellow, 16 mm long, typically zygomorphic, papilionaceous, bisexual and mildly odoriferous. The calyx is tubular at the base and free towards the apex. The corolla consists of one standard petal, two winged petals and two keel petals [2]. The ovary consists of two ovules only. In bud stage, the standard petal encloses the wing and keel petals which in turn enclose the sex organs. The hand-pollination tests for breeding systems indicated 24% fruit set and 50% seed set through autogamy, 68% fruit set and 50% seed set through geitonogamy, and 84% fruit set and 57% seed set through xenogamy [3]. The natural fruit set was 6%. A sample of 100 inflorescences consisting of 2646 flowers with 5292 ovules selected at random on different trees at flower age was used for estimating fruit set, seed set and fecundity.

Among these, 170 flowers with 340 ovules set fruits with 178 seeds. Seed set was 52%. Fecundity was 3%, which was expressed in terms of total number of seeds produced against the total number of ovules in sampled inflorescences [4].

Red Sandal Seeds (Pterocarpus santalinus)[5]

- Scientific Name:- Pterocarpus santalinus
- Size:- variable
- Shape:- leaf like
- Color:- Brown
- Usage:- Germination
- Age: -Fresh (less than a year)
- Origin:-India
- Packing: -5, 10,20,25,50 (P/P)
- Availability:- Throughout the year
- Category:- Tree / Forestry Seeds

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Details :

- Common name: Red Sandal
- Hindi Name: Lal Chandan
- Botanical name: Pterocarpus santalinus
- Family: Pterocarpus

SPECIES

*Pterocarpus santalinus*Linn. belongs to the family Fabaceae. i.e *Pterocarpus dalbergioides, Pterocarpus indicus, Pterocarpus marsupium*and *Pterocarpus santalinus,* especially [6] India and china. It is a medium sized deciduous tree endemic to India with a very restricted range in the southern Eastern Ghats where it grows in dry, rocky ground at 150-900m. Recent records in the wild are all from Andhra Pradesh state.

Uses

1. Red Sanders wood has demand both in domestic and international markets one is wavy or ripple grained and the other is straight grained.[7] The wavy grained wood has a huge demand in the international market and is primarily exported to Japan for manufacturing a special musical instrument called as '*Shamisen*' a three stringed lute used in classical music as the wavy grained wood is supposed to have superior acoustic qualities.
2. The musical instruments and other objects made out of this wood have been considered as an essential dowry given in a traditional Japanese wedding.[8]
3. In China it is categorised under group of hardwood species designated as rosewood. The rosewood furniture was used by Ming and early Qing dynasties and had special cultural significance.
4. Red Sanders wood has an important insoluble or sparingly soluble red wood dye. It contains 16% of the pigment santalin (santalic acid) a major colouring matter which was first isolated.

PHYTOCHEMISTRY

The phytochemical analysis of *Pterocarpus santalinus* it contains components, like as carbohydrates, anthocyanins, phenols, triterpenoids, saponins, tannins, steroids, flavonoids, glycosidesand glycerides. Chemical structure of santalin (R=OH, santalin A; R=OCH3, santalin B). *Pterocarpus*species also contains isoflavonoids, terpenoids and phenolic compounds,β-sitosterol, lupeol, (-)epicatechin.[9] In addition auron glycosides viz., 6-OH-1-methyl-3',4',5'-trimethoxyaurone-4-O-rhamnoside and 6,4'-dihyroxyaurone-4-O-neohesperidoside,and isoflavone glycoside 4',5-dihydroxy 7-methyl isoflavone 3'-O-beta-D-glucoside are present in Pterocarpus santalinus.

PHARMACOLOGICAL ACTIVITY

Pterocarpus santalinus woods have traditionally been used for drinking water as a treatment of diabetes. *Pterocarpus santalinus*is useful in treating bilious affections, skin diseases such as aphrodisiac, antihelmintic and alexiteric as well as vomiting, thirst, eye diseases, ulcers and diseases of the blood.[10] Stem bark powder with soft porridge has been used in treating diarrhea and the paste of the wood has been considered as a cooling agent for external application treating inflammations and headache, mental aberrations, and ulcers.

ANTI-IMPLANTATION ACTIVITY

The no of implants in the female rats were also found to be highly significantly reduced in the ethanol extract (both low & high doses) of laprotomised group when compared to control and showed anti implantation activity.[11] Hence high dose of ethanol extract is more effective as anti-fertility activity then chloroform extract.

MEDICINAL VALUES

Pterocarpus santalinus is used in traditional herbal medicine as a anti-inflammatory, antipyretic,anthelmintic, tonic, hemorrhage, anti-hyperglycaemic and diaphoretic, dysentery, aphrodisiac. [12]

Grading of red sandalwood

Chess pieces in red sandalwood Red sandalwood grown on the shale subsoils, at altitudes around 750 metres (2,460 ft), and in semi-arid climatic conditions gives a distinctive wavy grain margin. Lumber pieces with the wavy grain margin are graded as "A" grade.

OBJECTIVES

The physiological and physiochemical parameters of Pterocarpus santalinus L and to prepare extracts of the plant parts for detection of the presence or absence of phytochemicals.[13]

MATERIALS AND METHODS [14]

Determination of Moisture Content

2 g of each sample were placed in pre-weighed flat porcelain dish, dry in the oven at 100^{o}C 5°C till the constant weight was obtained.[15] The loss of weight was calculated with reference to air dried material.

Determination of Total Ash Content [16]

2 gm of air dried powder was placed as a uniform layer in crucible silica and ignite gradually up to

500-600^{o}C. until it was white indicating the absence of carbon, allowed to cool and weighed to determine the percentage of ash with reference to air-dried respective samples [17].

Determination of Acid Insoluble Ash Content [18]

The ash was boiled with dilute HCL for 5 minutes and insoluble matter was collected in a sintered glass crucible washed, ignited, and cooled finally it was weighed to calculate the percentage of acid-insoluble ash with reference to the bone dried material.

Determination of Water Soluble Ash Content [19]

Total ash was boiled with water for 5 minutes and insoluble ash was collected in a sintered glass crucible washed ignited at a temperature not exceeding 45^{0}C. Cool and weighed for the determination of water soluble ash with reference to the bone dried drug.[20] Determination of Solvent Extractive Values 5gm of the air dried, powdered macerated with 100 ml of solvent for 24 hours, shaken frequently and allowed to stand for 24 hours. Thereafter, filtered, evaporated the filtrate to dried and weight was taken.[21] The percentage of solvent soluble extractive with reference to bone dried sample has to be calculated.

Extraction Method [22]

The filtrate of aquous extract was shade dried and with this filtrate the aqueous extract is prepared in distilled water. Preliminary Phytochemical Screening of Extracts of Pterocarpus santalinus L., Plants contain different compounds like alkaloid, glycoside, volatile oils, tannins, saponins, flavonoids etc. To check the presence or absence of primary and secondary metabolites, all the extract were subjected to chemical tests.

Test for Saponins [23]

Test-Samples were dissolved in distill water and shaken vigorously. A layer of foam on top layer was formed which is stable, indicates the presence of saponins in the sample.

Test for Flavonoids [24]

NaOH Test- Taken 1ml of the sample with 10ml of 1% NaOH solution and gently shaken the sample, yellow colour was observed denoting the presence of flavonoids.

Test for Glycosides [25]

Hansch Test- In aqueous extract conc. H2SO4 was added from the side walls and formation of a brown ring suggested the presence of carbohydrates.

Test for Proteins [26]

Xanthoprotein Test- Mix 3 ml extracts solution with 1 ml conc. H2SO4 and boiled it by which yellow precipitate was obtained indicating the presence of proteins in it.

Test solution for HPTLC [27]

2 gm of coarsely powered drug of each batch taken in 100 ml of distilled water & alcohol respectively. Extracted for 24 hours by cold extraction technique with occasional shaking. The extract was decanted and makes up to 100 ml in a volumetric flask. It was concentrated to 5-10 ml in a water bath & subjected to Chromatography.

Physio-Chemical Parameters of Pterocarpus santalinus L.

In physio-chemical parameters moisture content, total ash content, acid soluble ash content, water soluble ash content and solvent extractive value was observed and the result are shown in Figure.

Future of Red Sanders [28]

P. santalinus growing in the forest area, it is paramount to educate the tree growers to consider the gestation of the crop. Usually, it is a tendency among growers to compare tree growing with agricultural crops, but on a long term basis the yield and the monetary benefits accrued by growing such valuable trees are definitely high.

Figure 1. Santalinus Tree Leaves

Figure 2. Red sander flower buds

Figure 3. Santalin

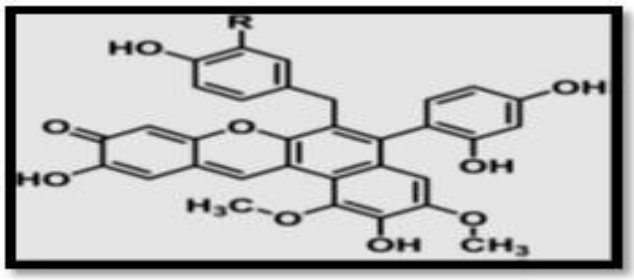


Figure 4. red sander bark and powder

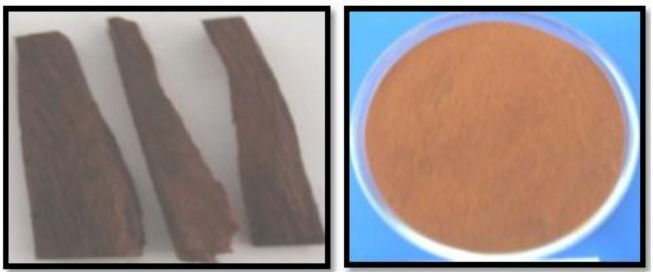
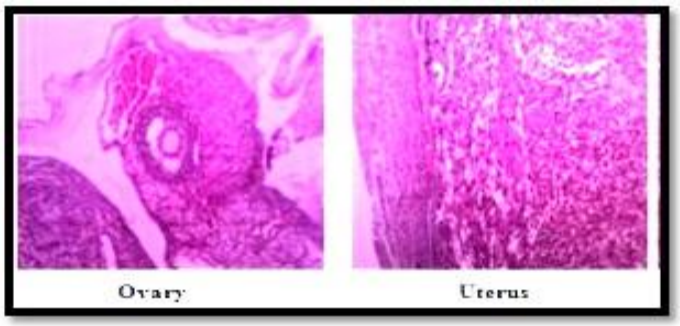


Figure 5. Microscopic picture of red sander bark



CONCLUSION

*Pterocarpus santalinus*Linn. has been used as folklore remedy for various ailments afflicting people in various parts of the world for a long time. It is obtain in West Bengal, Tamil Nadu, Maharashtra, Uttar Pradesh, Madhya Pradesh, Orissa and Bihar, Kurnool and Cuddapah districts in Andhra Pradesh it is also known as Red Sandalwood belongs to the family Fabaceae and used as a natural dye i.e santalin, used as coloring agent in pharmaceutical preparations it poses pharmacological property like anti hyperglycaemic activity, antipyretic, anti-inflammatory, anthelmintic, tonic, dysentery, aphrodisiac, diaphoretic, hemorrhage.

ACKNOWLEDGEMENT: None

CONFLICT OF INTEREST:
The authors declare that they have no conflict of interest.

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