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Pharmacognostical and phytochemical evaluation of heartwood of *Dalbergia sissoo*. Roxb.

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Abstract

The present work deals with the pharmacognostical and preliminary phytochemical studies on the heartwood of *Dalbergia sissoo*. Roxb. Pharmacognostical parameters for the heartwood of *Dalbergia sissoo*. was studied with the aim of drawing the pharmacopoeial standards for this species. Macroscopical and Microscopical Characters, physico-chemical constants, quantitative microscopy parameters, extractive values with different solvents, fluorescence analysis of dry powder, its reaction after treatment with chemical reagents under visible light and UV light at 254 nm and 366 nm. Preliminary phytochemical screening on heartwood of *Dalbergia sissoo*. Roxb. was studied. The determination of these characters will help future researchers in their Phytochemical as well as Pharmacological analyses of this species.

Keywords: *Dalbergia sissoo*. Roxb. Pharmacognosy, phytochemical, macroscopic, microscopic

Introduction

Since Vedic Kala and Samhita Kala even, our Acharya have emphasise on proper identification of drug before use. In Nighantu Kala Raja Nighantu has given 7 methods for identification of drug. Moreover today, in the age of globalization, raw drugs collection is done by unskilled persons causes doubt in the genuineness and possible adulteration. Unlike the traditional methods the participation of traders in the chain of procurement of drugs, adulteration is increasing day by day when the original genuine material is not available in sufficient quantity. In such instances effort should be made for a systematic identification by pharmacognostical methods. In order to make sure the safe use of these medicines, a necessary first step is the establishment of standards of quality, safety and efficacy. Keeping this fact in to consideration, the attempts were made to establish physicochemical standards of the plant *Dalbergia sissoo*. Roxb. (Hindi- ; simsapa; sinsapa; sinsupa; sisam)

Material & Method

Wood of *Dalbergia sissoo* Roxb. was collected from forests of Mirzapur near Varanasi. Heartwood was obtained after removing most of the bark. Drug identified by the teacher of Dravyaguna department in Faculty of Ayurveda B.H.U Varanasi. Macroscopic and microscopic evaluation was carried out with coarse powder of heartwood. Heartwood was pulverized in the mechanical grinder to a moderate fine powder to carry out microscopic studies and was stored in a well closed airtight vessel for further analysis. All reagent and chemicals used for the study were of analytical grade^[4,5].

Physico-chemical evaluation

Macroscopic and microscopic evaluation

Macroscopic characterstic of heartwood of *Dalbergia sissoo*. roxb.

In present study the coarse Powder of heartwood of *Dalbergia sissoo*. Roxb. Investigated for its macroscopic characteristics.

Materials

1. Coarse powder of *Dalbergia sissoo*. (Ht. wd.)
2. Petri dish.

Method

5 gm. coarse powder of sample was taken in a petri dish and examined with naked eye.

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Microscopic characteristic of drug

The coarse powder of Ht. wd. of *Dalbergia sissoo*. Roxb. was pulverized in to fine powder. The powder was investigated for their microscopic characteristics.

Materials

1. Fine powder of Ht. wd. of *Dalbergia sissoo*. Roxb.
2. Chloral hydrate
3. Plain water
4. Microscope
5. Slide and Coverslip
6. Watch glass

Method: 5 gm powder of heartwood of *Dalbergia sissoo*. Roxb. was boiled separately with chloral hydrate solution in small quantity. Cleaved powder was removed in three separate watch glasses respectively and stained with one drop each of Phloroglucinol and conc. HCl. A little of the treated powder was mounted in dil. Sulphuric Acid and the slides were observed under microscope at low power. This process was repeated with Acetic acid and Ruthenium red and after mounting, the slides were observed.

Standardization of heartwood of *Dalbergia sissoo*. Roxb.

In the present study, the heartwood of *Dalbergia sissoo*. Roxb. Collected from Varanasi region in UP. After authentication, heartwood dried at room temperature until they were free from the moisture and subjected to physical evaluation with different parameters. The parameters used for evaluation are nature, odour, colour, taste and texture, Determination of ethanol soluble extractive value, loss on drying, determination of total ash, acid insoluble ash, water soluble ash, fluorescence analysis of the drug, and determination of foreign matter by different procedure⁶.

Phytochemical Screening

Qualitative examination of inorganic matters & determination of heavy metals was done as per reported methods. The dried powdered heartwood was subjected to preliminary phytochemical screening for qualitative detection of phytoconstituents. 50g of coarsely powdered air-dried material was accurately weighed and placed in a glass-stoppered conical flask. Powder was then macerated with 300 ml of the solvent (Water/ethanol) concerned for 6 hours, shaking frequently, and then was allowed to stand for 18 hours. It was then filtered rapidly taking care not to lose any solvent; 25 ml of this filtrate was transferred to a tarred flat-bottomed dish and was evaporated to dryness on a water-bath. It was followed by drying at 105°C for 6 hours, cooled in a desiccator for 30 minutes and was weighed without delay. The content of extractable matter in mg per g of air-dried material was then calculated. This extract was used for subsequent experiments.

Qualitative chemical investigation of extract

Qualitative tests were conducted for all the extracts of heartwood of *Dalbergia sissoo*. Roxb. to identify the various phytoconstituents.

Results

Macroscopic evaluation

The Macroscopic characters found are discussed in Table 1.

Microscopic characteristics of powdered drug

Powder microscopy of heartwood of *Dalbergia sissoo*. Roxb. Showed the presence of Lignified cells, Phloem fibres, cork cells, calcium oxalate crystals, and mucilage.

Physico-chemical evaluation

The physicochemical studies and hydroalcoholic extractive values of heartwood of *Dalbergia sissoo*. Roxb. Summarized in Table 2 and Table 3.

Phytochemical screening

The results demonstrated presence of Saponins Glycosides, Volatile oils, Proteins, Amino Acid, Fat & Oils, Steroids, flavonoids, Tannins and Phenolic Compounds, mainly in the heartwood of *Dalbergia sissoo*. Roxb. The presences of various phytoconstituents in various extracts are summarized in Table 3.

Table 1: Macroscopic Characteristic of heartwood powder of *Dalbergia sissoo*. Roxb.

S.N.	Parameters	Observation of heartwood powder
1	Nature	Coarse powder
2	Colour	Dark Brown
3	Odour	Distinct smell
4	Taste	Pungent, Bitter and Astringent
5	Texture	Rough & fibrous
6	Size	Uneven sized coarse particles

Table 2: Physico-Chemical Properties of heartwood powder of *Dalbergia sissoo*. Roxb.

S.N.	Parameters	Observations Heartwood
I	Physical tests	Coarse powder
	Nature	Brown
	Colour	Distinct smell
	Odour	Pungent, Bitter and
	Taste	Astringent
II	Extractive value(% w/w) Hydro -alcohol	8.41%
III	Loss on drying (% w/w)	8.98%
IV	Foreign matter	.02g
V	Fluorescence	Blue Fluorescence 254nm-366nm
VI	Ash value (% w/w) Total ash	5.2%
VII	Acid insoluble ash	0.15
VIII	Water soluble ash	5.05%

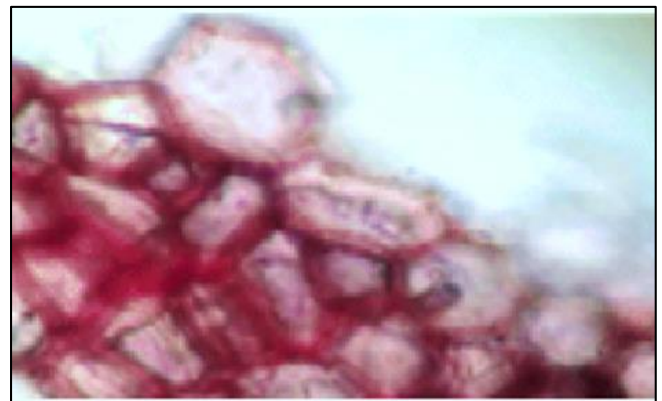
Table 3: Phytochemical Investigation of heartwood powder of *Dalbergia sissoo*. Roxb.

S.N.	Chemical Tests	Powder drug
1	Tests for Carbohydrates	
	I Molish's test	+ve
2	Test for Volatile Oils	
	I Odour	+ve
	II Filter paper Stain test	
3	III Solubility test	+ve
	Test for Proteins	
	I Biuret test	+ve

	II Xanthoproteic test	+ve
	III Precipitation test with:	+ve
	(i) Lead acetate solution 5%	+ve
	(ii) CuSO ₄ solution 5%	+ve
4	TEST for Amino acids	
	I Ninhydrin test	+ve
5	Test for Fat & Oils	+ve
	I Solubility test	
	II Filter paper satin test	
6	Test for Steroids	
	I Salkowaski test	
	II Liebermann-burchard test	+ve
	III Liebermann's reaction	
7	Test for Saponin Glycosides	+ve
	I Foam test	
	II Haemolytic test	
	Test for Tannins & Phenolic Compounds	
	I 5% Fecl ₃ solution	+ve
	II Lead acetate solution	+ve
	III Dilute iodine solution	+ve
	IV Dilute HNO ₃	
8	V Dilute KMnO ₄ solution	+ve
	VI Potassium dichromate solution	
	VII Bromine solution	+ve
	VIII Acetic acid solution	+ve
	IX Gelatine solution	+ve
	X NH ₄ OH + AgNO ₃	+ve
	XI NH ₄ OH + potassium ferricyanide	+ve
	Test for Vitamin C	-

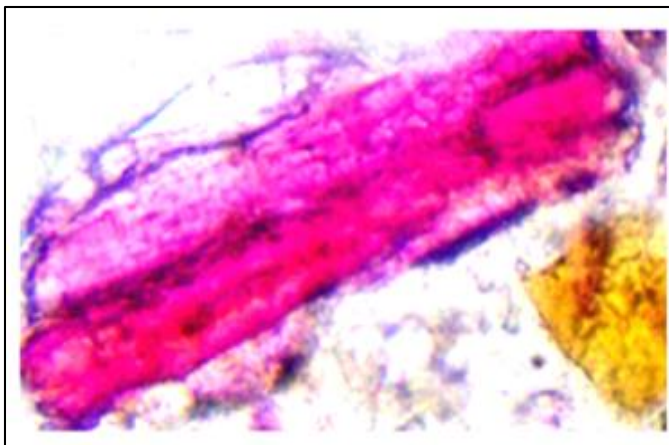


Fig 1: Heartwood of *Dalbergia sissoo*. Roxb.

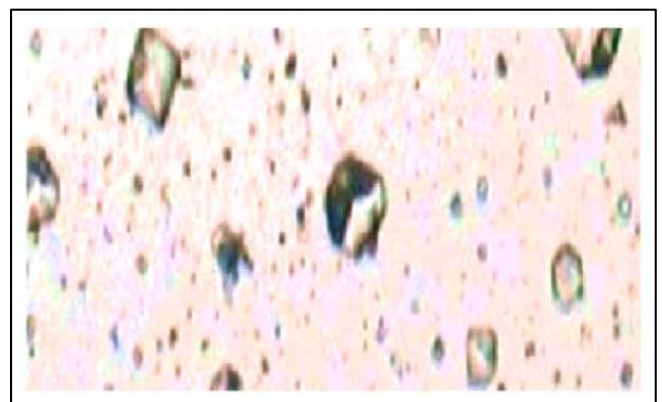


Cork cells tissues

Powder Microscopy



Lignified



Calcium oxalate crystals

Discussion and Conclusion

Pharmacognosy is the study of identification of drugs derived from natural sources. The American Society of Pharmacognosy defines Pharmacognosy as "the study of the

physical, chemical, biochemical and biological properties of drugs, drug substances or potential drugs or drug substances of natural origin as well as the search for new drugs from natural sources. The concept of standardization and quality control of drug can be found in ancient Ayurveda texts. In those days, the physician himself identified, checked the drugs based on habitat, morphology, taste, color, texture and uses as medicine. Powder microscopy of heartwood of *Dalbergia sissoo*. Roxb. Showed the presence of Lignified cells, Phloem fibres, cork cells, calcium oxalate crystals, and mucilage. The physical evaluation furnished different ash values, extractive values in different solvents. Total ash, acid insoluble ash and water soluble ash values were also determined. The phytochemical investigation shows the presence of Saponin glycosides, Volatile oils, Proteins, Amino Acid, Fat & Oils, Steroids, Flavonoids, Tannins and Phenolic Compounds in the heartwood of *Dalbergia sissoo*. Study was carried out in order to assess the quality of heartwood of *Dalbergia sissoo*. Roxb. And also to detect the adulteration and substitution etc., which may be helpful to researchers in future.

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