PHARMACOGNOSTIC AND PHYSICOCHEMICAL STUDIES OF THE ROOTS OF *Stereospermum suaveolens*



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Introduction





- Pharmacognosy is a simple and reliable tool, by which complete information of crude drug can be obtained.

- Today with the present surge for interest in the phytotherapeutics, the availability of genuine plant material is becoming scarce.

- Misuse of herbal medicine starts with wrong identification. It becomes extremely important to make an effort towards standardization of plant material as medicine.





- The process of standardization can be achieved by stepwise pharmacognostic studies.

- Pharmacognostic studies ensures plant identity, lays down standardization parameters which will help and prevents adulteration.

- These studies will help in authentication of the plants and ensures reproducible quality of herbal products which will lead to safety and efficacy of natural products.



Plant profile

- **Kingdom:** Plantae
- **Phylum:** Magnoliophyta
- **Class:** Magnoliopsida
- **Order:** Lamiales
- **Family:** Bignoniaceae
- **Genus:** *Stereospermum*
- **Species:** *suaveolens*



- Deciduous trees, to 25 m high indigenous to Southern and Central India.
- Leaves compound, imparipinnate, opposite, rachis 150-450 mm long, pubescent, slender, swollen at base.
- Flowers bisexual, in drooping panicles, pubescent, 18 mm long.
- Fruit a capsule, 30-60 x 0.5 cm, grey, lenticellate.



Uses

- According to Ayurveda, root is used in the remedies of diseases like “kapha”, and “amlapitta”, inflammations, heating, dyspnoea, body ache, vomiting, eructation, piles, acidity, diarrhoea, gonorrhoea, loss of taste, malaria and other fevers [1,2].

- It is reputed for its antipyretic property and is also useful in excessive thirst, cough and asthma.

- Root bark is a constituent of an Ayurvedic compound, Dasamoola.



Chemical constituents

The roots of *Stereospermum suaveolens* were reported to contain p-coumaric acid, triacontanol,3-cetyl alcohol, oleic, palmitic, stearic acid, lapachol, dehydroalpha-lapachone and dehydrotectol in root heartwood; β-sitosterol and n-triacontal in root bark.





- Being a plant having many therapeutic uses, standardization is the first essential step to undergo further evaluations.

- Hence it found to be essential to undergo a detailed pharmacognostic study including the microscopic characters and fluorescence analysis of roots of *Stereospermum suaveolens.*



Aim &Objectives



- To evaluate various pharmacognostical parameters such as macroscopy, microscopy, physicochemical and fluorescence studies of roots of *Stereospermum suaveolens* .

- To perform preliminary phytochemical studies of ethanol extract of *Stereospermum suaveolens*.



Materials and methods



Collection and authentification



- The fresh roots of *Stereospermum suaveolens* were collected from Tirumala hills, chittore Dt. and authenticated by Dr. Madhava chetti, Botanist and a specimen (No. 1587) was stored in the Department of botany, S.V University, Tirupati.
- The fresh root was used for the study of macromorphological and microscopical characters.
- The shade dried roots were powdered in Wiley mill.

Macroscopic studies

The fresh root was subjected to macroscopic studies which comprised of organoleptic characters viz., color, odour, appearance, taste, texture etc.



Microscopic studies

Root T.S

Powder microscopy



Root T.S

Root was fixed in FAA (Formalin+ Acetic acid + 70% Ethanol) solution for 24 hrs

→ Dehydrated with graded series of tertiary –Butyl alcohol

↓

Castled in paraffin blocks

→ Paraffin embedded specimens sectioned with help of rotary microtome

↓

Stained with safranin and observed under a compound microscope. [3]



Powder microscopy

Coarsely powdered root cleared with NaOH

Stained and mounted in glycerine medium

Photomicrographs of different cellular structures were taken. [4]



Physicochemical parameters

- Foreign organic matter
- Moisture content
- pH
- Total ash value
- Acid insoluble ash
- Water soluble ash
- Alcohol soluble extractive value
- Water soluble extractive value

Fluorescence analysis

- Crude drugs show their own characteristic fluorescence when exposed to ultraviolet radiation.

- The fluorescence character of plant powder was studied by taking one gram of crude drug in a watch glass and subjected to fluorescent analysis as such and after treatment with different reagents in daylight and UV light.



Preliminary phytochemical studies

- The dried powder was defatted with petroleum ether and subjected to extraction with ethanol by hot extraction method.
- Ethanol extract was subjected to preliminary phytochemical studies to identify the presence of various phytoconstituents.[5]



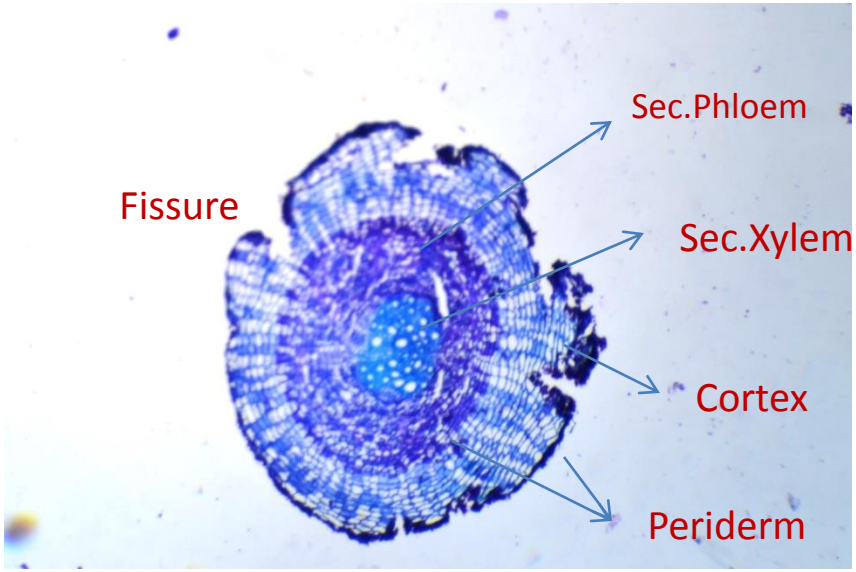
Results



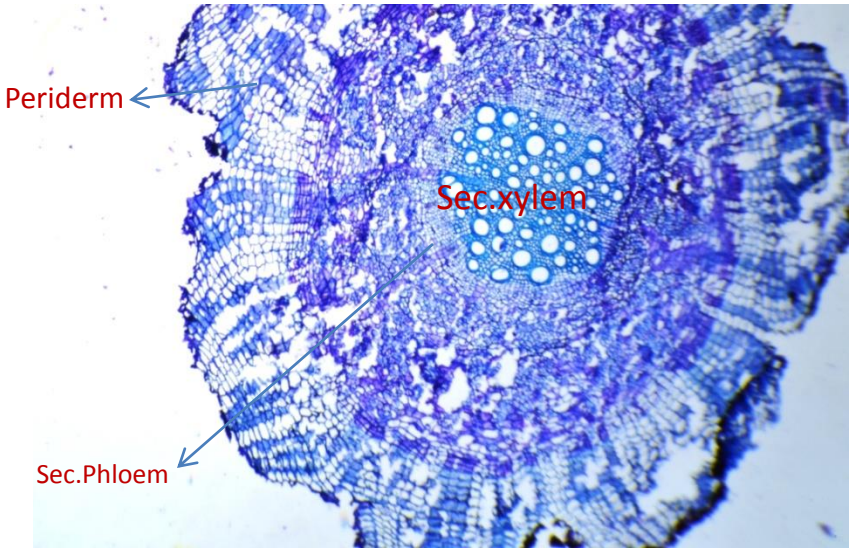
Morphological characters

- Colour: Outer dark brown and inner pale yellow to cream.
- Texture: The root surface is rough and firm due to scaling off of longitudinal striation. Inner side of root is soft.
- Odour: Characteristic odour
- Taste: Bitter

Microscopic studies- Root T.S

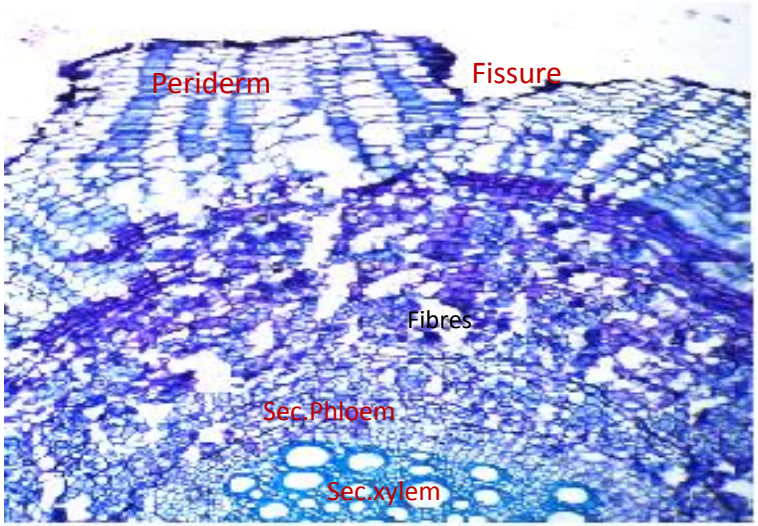


TS of thin root entire view(4X)

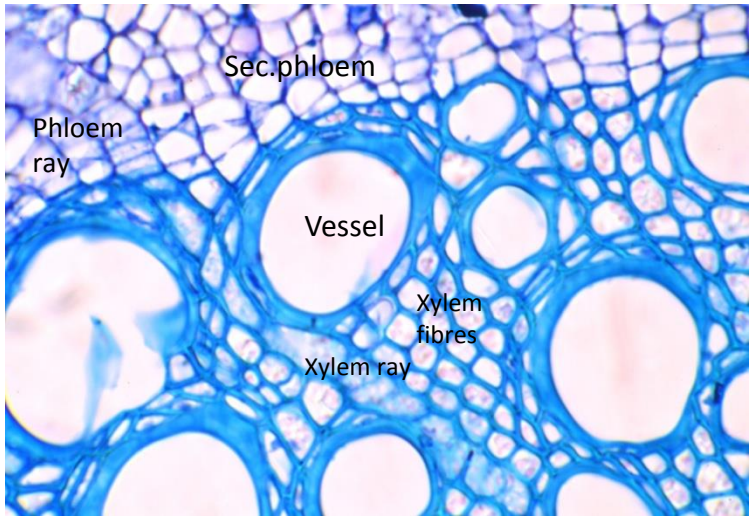


TS of thick root entire view (4X)

Root T.S.

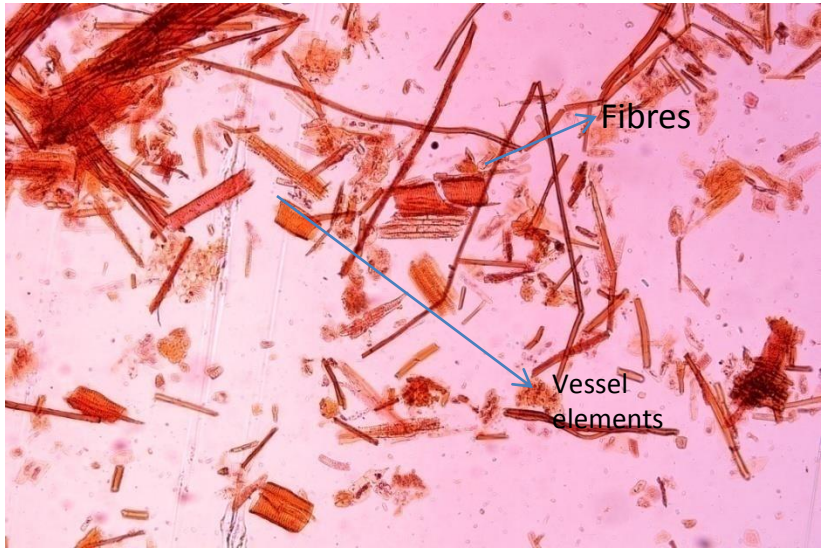


T.S of thick root showing thick periderm with clusters of fibres and wide vascular cylinders (20X)

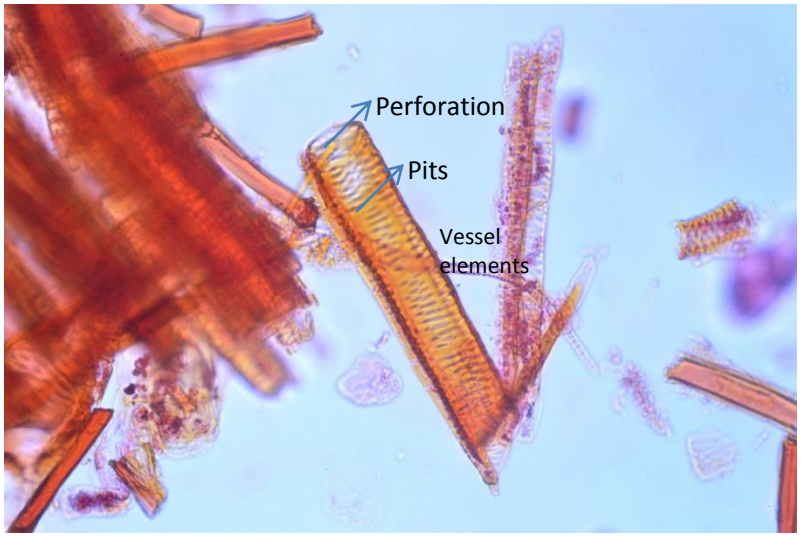


T.S showing secondary xylem and secondary phloem (40X)

Powder microscopy



Powder showing fibres and vessel elements



Vessel elemnts (40X)

Physicochemical parameters

S.No	Physicochemical parameter	% W/W
1.	Foreign organic matter	_
2.	Total ash	4.5%
3.	Acid insoluble ash	1%
4.	Water soluble ash	3.2%
5.	Moisture content	16.5%
6.	PH 1% 10%	6.84 6.33
6.	Alcohol soluble extractive	8.8%
7.	Water soluble extractive	7.4%

Fluorescence analysis

S.No	Reagent	Day light	UV
1.	Drug powder as such	pale brown	yellow
2.	Drug + Conc. H_2SO_4	Brownish black	Dark violet colour
3.	Drug + Dil. H_2SO_4	Pale yellow	Yellow
4.	Drug + Conc. HCl	Muddish brown	yellow
5.	Drug + Dil. HCl	Pale brown	yellow
6.	Drug + Conc. HNO_3	Muddy brown	Light brown
7.	Drug + Dil. HNO3	Light brown	yellow
8.	Drug + Methanol	Light orangish brown	yellow
9.	Drug + Chloroform	colourless	yellow
10.	Drug + Pet. Ether	colourless	yellow
11.	Drug + Ferric chloride (10%)	Light reddish brown	Greenish yellow
12.	Drug + 10% Sodium hydroxide	Orangish brown	Yellow
13.	Drug + Ammonia solution	Pale brown	yellow
14.	Drug + glacial acetic acid	Light reddish brown	yellow
15.	Drug + Distilled water	pale brown	yellow

Preliminary phytochemical studies

Phytochemical	Test	Result
Alkaloids	Dragandroff's test	-ve
Carbohydrates	Molisch test	-ve
Proteins	Biuret test	-ve
Flavonoids	Shinoda test	+ve
Phenols	Ferric chloride test	-ve
Steroids	Liebermann burchards test	-ve
Saponins	Foam test	+ve
Tannins	Lead acetate test	-ve

Discussion



- Pharmacognostical and physicochemical studies, being reliable and inexpensive, play an important role in quality control issues of the crude drug samples [6].
- The macro and microscopic characters observed serve as basis for the identification of right sample of the plant. T.S. of the young and thick root confirmed the presence of periderm with cortex and Secondary phloem, and secondary xylem.



- Studies of physicochemical constants can serve as valuable source of information and are usually used in judging the purity and quality of the crude drug.
- The ash value determines the earthy matter or inorganic matter and other impurities present along with the drug.
- The extractive values give an idea about chemical composition of drug.



- Fluorescence analysis is useful to identify adulterants during crude drug evaluation.
- Preliminary phytochemical studies revealed the presence of flavonoids and saponins which is helpful to establish the nature of chemical composition.



Conclusion



- The present study on Pharmacognostical & Physicochemical evaluation of roots of *Stereospermum suaveolens* will be helpful as a diagnostic tool for standardization and in characterization of crude drug.

- Physicochemical and phytochemical properties confirm the quality and efficacy of the crude drug.



References



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Thank
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