IJPPR
INTERNATIONAL JOURNAL OF PHARMACY & PHARMACEUTICAL RESEARCH
An official Publication of Human Journals
ISSN 2349-7203
HUMAN

Human Journals
Research Article
February 2022 Vol.:23, Issue:3
© All rights are reserved by Pratik Maske et al.

Pharmacognostic Profiling of *Spermadicyton suaveolens* Root

IJPPR
INTERNATIONAL JOURNAL OF PHARMACY & PHARMACEUTICAL RESEARCH
An official Publication of Human Journals
ISSN 2349-7203
HUMAN

Pratik Maske[1,2*], Popat Kumbhar[3], Ashok Wali[4], John Disouza[3*], Maya Sharma[1, 5]

1. *Pacific Academy of Higher Education and Research, Udaipur, Rajasthan, India.*
2. *Department of Pharmaceutical Chemistry, Genesis Institute of Pharmacy, Sonyachi Shiroli, Tal: Radhanagari, Dist: Kolhapur Maharashtra 416212, India.*
3. *Tatyasaheb Kore College of Pharmacy, Warananagar, Tal: Panhala, Dist: Kolhapur Maharashtra, 416113, India.*
4. *Hon. Shri Annasaheb Dange Ayurved Medical College, Ashta Tal: Walawa, Dist: Sangli Maharashtra, 416301, India.*
5. *Pacific College of Pharmacy, Pacific University, Udaipur Rajsthan, India.*

Submitted: 25 January 2022
Accepted: 30 January 2022
Published: 28 February 2022

Keywords: *Spermadicyton suaveolens,* Standardization, Pharmacognostic, Root.

ABSTRACT

Nowadays, medicinal plants existing on Earth have renowned therapeutic importance, and their use in our everyday lives is rising day by day. Various studies are being conducted to investigate the medicinal, pharmacological, and therapeutic aspects of herbal medications. Modern research techniques for evaluating plant medications are sophisticated, but the microscopic approach is one of the easiest and cheapest, to begin with for proving the right identity of the source materials. Roots of *Spermadicyton suaveolens* (SS) are used by local healers for the management of various ailments, however, the pharmacognostic standardization of the roots has yet to be proven. The current study focuses on pharmacognostical criteria for the root of *Spermadicyton suaveolens*, which include microscopical characteristics, physio-chemical constants. This data will be utilized for future pharmacological and therapeutic investigation of the species, as well as for standardization of quality, purity, and specimen recognition.

INTRODUCTION:

Throughout the last decade, there has been growing attention to medications derived from plants as opposed to synthetics, which are seen as dangerous to humans and the environment.[1] People have begun to explore traditional healing systems such as Ayurveda, Siddha, and Unani since medicinal plants have a long history in many indigenous populations and continue to provide important tools for healing numerous ailments.[2]

Herbal preparations often make use of fresh or dried plant materials. Proper information of such crude medications is crucial in the manufacture, safety, and efficacy of herbal products. Pharmacognosy is a straightforward and dependable approach for obtaining detailed information on a crude medicine.[3]

There seems to be a requirement for documentation of traditional medicine research. With this context, it is critical to make an effort toward standardization of plant material to be utilized as a medication.[4]

Adulteration can be avoided using different assessment parameters such as microscopic examination. Microscopy is a significant instrument for the authentication of crude medications as well as the investigation of powdered drugs. It is critical to comprehend morphological and anatomical descriptions of crude pharmaceuticals, as well as drug and adulterant characteristics of economic significance.[5,6]

The *Spermadicyton suaveolens (SS)* commonly called *Forest Champa, VanChampa, Gidesa, Jitsaya,* still waiting for diversified therapeutic application. The methanolic, chloroform and petroleum ether extract of bark and leaves exhibit potent antioxidant and antimicrobial action. The roots have been evaluated for their wound healing property in Wistar rats.[7] The stem and leaf contain Azulene, Tetratetracontane, n-hexadecanoic acid, Ergost-5-en-3-ol,22,23-dimethyl-,acetate,(3β), Phenol,2-methoxy-4-(1-propenyl)-,(E)(9) etc phytoconstituents which has been reported for antioxidant, anti-inflammatory, antibacterial, antiulcerogenic activity.[8] The flower and leaf contain 3,7,11,15-tetramethyl-2-hexadecen-1-ol, Phytol, 3,4-dihydro-2-deoxy-. Beta-d-lyxo-hexo-pyranose, 3,7,11,15-tetramethyl-2-hexadecen-1-ol etc has been shown analgesic, antimicrobial, anticancer, anti-diuretic, anti-inflammatory and antipyretic activities.[9]

As a result, in this paper, we present some pharmacognostical and physicochemical properties. The primary goal of this research is to complement some information on the identification, characterization, and standardization of SS.

MATERIALS AND METHODS:

Plant Material

The root of SS was collected in the hilly vicinity of Panhala fort, Dist. Kolhapur, Maharashtra, in November. The roots were chopped into small pieces and dried before being used as raw material. To acquire powder, the roots were pulverized on a Rising Automatic DP Pulverizer. The ensuing powder was then surpassed through a 40 # sieve and stored in an airtight container.

Organoleptic evaluation

Various sensory parameters of the plant material (such as color, odor, size, shape, and taste) were studied by organoleptic evaluation. These characteristics are thought to be extremely useful in basic medication quality control and were assessed by normal WHO recommendations.[10,11,12]

Powder microscopy

The pulverized root powder was subjected to microscopical studies. The various reagents are used for staining purposes namely phloroglucinol, Iodine, etc. A small amount of powdered drug was taken on the slide. Add 1-2 drops of phloroglucinol solution and one drop of conc. Hydrochloric acid and covered by a coverslip. The prepared slide was mounted in glycerol and observed under the microscope. The addition of 0.01 M iodine solution gives blue coloration to starch grains and calcium oxalate crystals. Photomicrograph of the characteristics structure and cell components was taken on SAGLO DIGITAL microscope with SAGLOSOFT version 2.0.[13,14]

Proximate Analysis/Physical Evaluation

Determination of Total ash-

The total ash method is intended to measure the total amount of material remaining after incineration. This includes both "physiological ash", which is derived from the plant tissue

itself, and "non-physiological" ash, which is the residue of the extraneous matter (e.g. sand and soil) adhering to the plant surface.

Accurately weighed 3 g of the powdered drug in a silica crucible. Ignite the powdered drug by increasing the temperature gradually until the sample was free from carbon and cool it keep in the desiccators. Weigh the ash & calculate the percentage of total ash in contrast to the air-dried sample.[15,16,17]

Formula

$$\% \text{ Total Ash Value} = \frac{\text{Weight of total ash}}{\text{Weight of crude drug taken}} \times 100$$

Determination of Acid insoluble ash-

To the crucible containing the total ash, add 25 mL of 2N hydrochloric acid, crucible was covered with a watch glass and boiled gently for 5 minutes. The watch glass was rinsed with 5 mL of hot water and this liquid was added to the crucible. Filter off that crucible liquid, collect on filter paper, and washed with hot water until it becomes neutral. Transfer this insoluble matter to the original crucible, dry on a hotplate, and ignite to constant weight. Allow the residue to cool in a suitable desiccator for 30 minutes and then weigh. Calculate the content of acid-insoluble ash in mg per gm of air-dried material.[15,16,17]

Formula

$$\% \text{ Total Acid insoluble Ash} = \frac{\text{Weight of acid insoluble ash}}{\text{Weight of crude drug taken}} \times 100$$

- **Determination of Water-soluble ash-**

To the crucible containing the total ash, add 25 mL of water and boiled for 5 minutes. Filter off that crucible liquid, collect on filter paper, and washed with hot water until it becomes neutral. Transfer this insoluble matter to the original crucible, dry it on a hotplate and ignite in a crucible for 15 minutes at a temperature not exceeding 450°C. Allow the residue to cool in a suitable desiccator for 30 min. and then weigh.[15,16,17]

Formula

$$\% \text{ Total Water soluble Ash} = \frac{\text{Weight of total ash} - \text{weight of water soluble ash}}{\text{Weight of crude drug taken}} \times 100$$

- **Determination of alcohol soluble extractive value-**

Place about 4.0g of coarsely powdered air-dried material was weighed accurately in a glass-stoppered conical flask. Macerate with 100 ml of the 90% alcohol for 6 hours, shaking frequently, then allow to stand for 18 hours. The macerate was filtered immediately; care should be taken during filtration to avoid loss of alcohol. The 25 mL of filtrate was transferred to a flat bottom dish (which was already tared) and evaporated to dryness on a water bath. Dried the extract at 105°C for 6 hours, cooled in a desiccator for 30 minutes, and weighed without delay. Then the percentage of alcohol-soluble extractive value regarding the air-dried drug was calculated.[15,16,17]

- **Determination of Water-soluble extractive value-**

About 5 g. of the air-dried drug was macerated with 100 mL of chloroform water in a closed flask for 24 hours shaken frequently for 6 hours and allowed to stand for 18 hours. The solution was filtered rapidly, 25 mL of filtrate was transferred to the tarred flat bottom dish and evaporated to dryness on a water bath. The extract was dried at 105 C for 6 hours, cooled in a desiccator for 30 minutes, and weighed without delay. Then the percentage of alcohol-soluble extractive value with reference to the air-dried drug was calculated. [15,16,17]

Determination of moisture content-

- **Loss of drying-**

Loss on drying is the loss of mass expressed as percent w/w. The test for loss on drying determines both water and volatile matter in the crude drug. Moisture is an inevitable component of crude drugs, which must be eliminated as far as possible.

An accurately weighed quantity (1.5 g) of the powdered drug was taken in a porcelain dish. The sample was kept in the oven at a temperature of 105°C for 2 hrs. Then it was cooled in a desiccator to room temperature, the procedure was repeated till constant weight is observed. % Loss on drying was calculated using the following formula. [15,16,17]

Formula

$$\% \text{ Loss on drying} = \frac{\text{Loss in weight of sample}}{\text{Weight of sample}} \times 100$$

Determination of Swelling Index-

Many medicinal plant materials are of specific therapeutic or pharmaceutical utility because of their swelling properties, especially gums and those containing an appreciable amount of mucilage, pectin, or hemicelluloses. The swelling index is the volume in mL taken up by the swelling of 1 g of plant material under specified conditions.

One 1 g of plant root material was accurately weighed, placed into a 25 mL glass stopper measuring cylinder. 25 mL water was added and shaken the mixture thoroughly every 10 min for one hr and allowed stand for 3 hrs at room temperature. Measured the volume in mL occupied by plant material and calculated the mean value of individual determination, related to one gm of crude plant material.[15,16,17]

Foaming Index-

Many medicinal plant materials contain saponins that can cause persistent foam when an aqueous decoction is shaken. The foaming ability of an aqueous decoction of plant materials and their extracts is measured in terms of a foaming index.

1 g of powdered root material was weighed accurately and transferred to a 500-mL conical flask containing 100 mL of boiling water. Maintain a moderate boiling for 30 minutes. Cool and filter into a 100-mL volumetric flask and add sufficient water through the filter to dilute to volume.

Pour the decoction into 10 stoppered test tubes in successive portions of 1 mL, 2 mL, 3 mL, etc. up to 10 mL, and adjust the volume in each tube with water to 10mL. Stopper the tubes; shake for 15 seconds, two shakes per second. Allow to stand for 15 minutes and measure the height of the foam.[15,16,17]

Formula-

$$\text{Foaming Index} = \frac{1000}{a}$$

Where a= the volume in mL of the decoction used for preparing the dilution in the tube where foaming to a height of 1 cm is observed.

RESULT AND DISCUSSION

Organoleptic evaluation

The root of the plant was white in color. The powder of the root bark was grey in color. The odor was a noxious and slightly astringent taste. The surface was smooth.

Table 1. Macroscopic characters of roots of *Spermadicyton suaveolens*

Characteristics	Observation
Colour	White
Odour	Noxious
Taste	Slight astringent
Surface	Smooth

Powder microscopy

The microscopic examination of *S. suaveolens* root showed Epiblema, Xylem, Cortex, Pholem, Ca Oxalate, Pericyclic cells (Figure 1, 2, and 3). Calcium oxalate crystals are the calcium salts of oxalic acid produced during the biosynthesis of primary and secondary metabolites.

I. Calcium oxalate crystals –

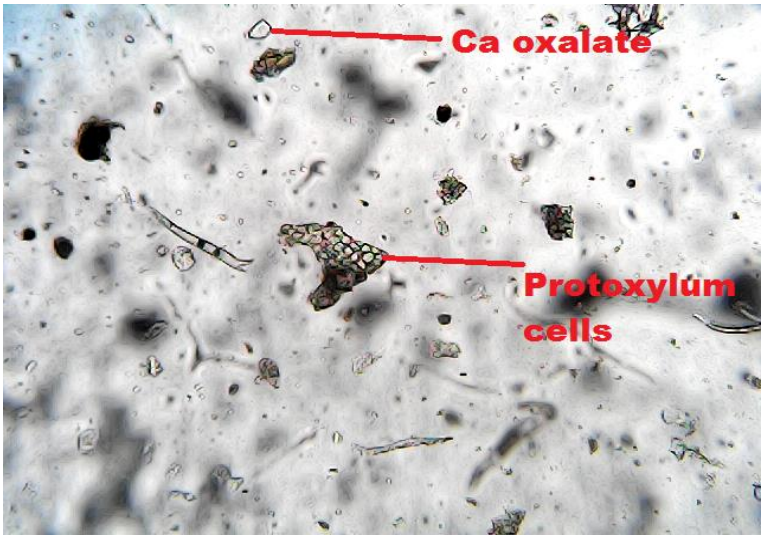
The crystals were tetragonal prism type having 10-15 µ in size.

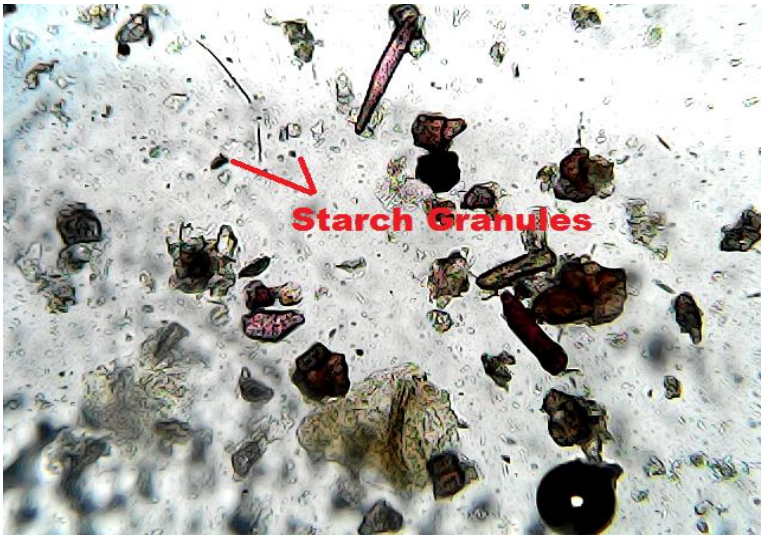
II. Starch grains-

Starch grains were very few, simple, up to 5 µ in diameter.

III. Pericycle cells-

These cells were rectangular to polygonal in shape.


Ca oxalate
Protoxylum cells


Starch Granules

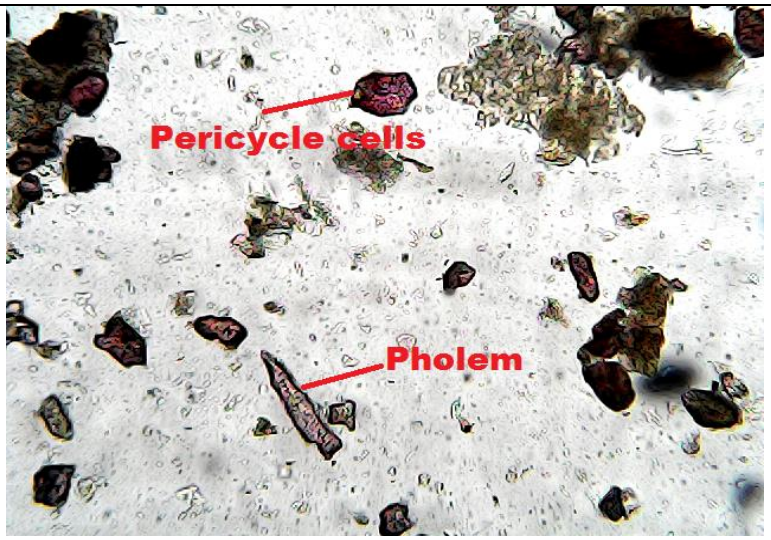


Fig.1. Powder Characteristics of *S. suaveolens* root

Physicochemical analysis

The table shows the findings of the physicochemical constants of raw materials that are within the limit; this indicates that the quality and purity of the raw materials were adequate.

Inorganic factors such as calcium oxalate, silica, and carbonate composition of raw medicine can sometimes alter "total ash" results; such variables are then eliminated by treatment with acid (since they are soluble in hydrochloric acid) and the acid-insoluble ash value is calculated. The total ash value result showed the quality of the drug, that is, the presence or absence of foreign matter in the crude drug, such as metallic salt or silica; the findings were revealed to be 11.96 $\%^{w}/_{w}$.[17,18]

Acid insoluble ash, in particular, shows interference with silicious elements such as dirt and sand; comparisons with the total ash value of the same sample will distinguish between contaminating materials and variations in the drug's natural ash, which was found to be 1.5%$^{w}/_{w}$.[17,18]

The water-soluble ash was determined to be 6.47 $\%^{w}/_{w}$; this parameter is used to detect the existence of material consumed by water, whereas the ash values of the crude pharmaceuticals are within the acceptable range, indicating its quality and purity and providing an indication of the total inorganic content.

Extractive values are used to determine the number of bioactive components in a specified amount of medicinal plants, which is a qualitative as well as quantitative estimation of phytoconstituents that act as preliminary information about the drug; the water-soluble extractive value was found to be 6.9%$^{w}/_{w}$. While the alcohol-soluble extractive value was determined to be 13.6%$^{w}/_{w}$, this indicates the nature of the phytoconstituents present in the plant.

The amount of water in the formulation affects the drug's degradation time. The formulation can readily degrade owing to fungus if the water content is high, and the medicine's moisture level was discovered to be 10.25 %$^{w}/_{w}$, indicating that the drug was appropriately dried and kept. The presence of saponins in the crude drug extract is determined by the foaming index. It was determined to be 107.5, indicating the existence of saponin-like glycosides, as shown in Table 2.[17,18]

Table 2. Physicochemical parameters of *S. suaveolens* root

Parameter	Values
Total Ash (%$^{w}/_{w}$)	11.96
Acid Insoluble Ash (%$^{w}/_{w}$)	1.5
Water Soluble Ash (%$^{w}/_{w}$)	6.47
Water Soluble Extractive Value (%$^{w}/_{w}$)	6.9
Alcohol Soluble Extractive (%$^{w}/_{w}$)	13.6
Moisture Content (%$^{w}/_{w}$)	10.25
Swelling Index	Absent
Foaming Index	107.5

CONCLUSION

Standardization is a necessary measure for determining quality, purity, and specimen identification. The current study on the Pharmacognostical and Phytochemical assessment of *Spermadicyton suaveolens* roots may give important information for its identification. The generated data may be utilized to determine the proper identification and purity of plant parts, as well as to detect adulteration. As a result, comprehensive screening may be performed to isolate the bioactive components so that they can be scientifically shown to access the pharmacological reactions of the plant to determine its traditional applications.

ACKNOWLEDGMENTS

The authors wish to thank Tatyasaheb Kore College of Pharmacy and Genesis Institute of Pharmacy for their support throughout the work. The authors are thankful to *SAGLO Research Equipments for providing facilities to carry out work.*

REFERENCES

1. Joy PP, Thomas J, Mathew S, Skaria BP. Medicinal plants. Calcutta: Naya Prokash; 2001.
2. Thomas S, Patil DA, Patil AG, Chandra N. Pharmacognostic evaluation and physicochemical analysis of *Averrhoa carambola*. fruit. J. Herb. Med. Toxicol. 2008; 2(2): 51-54.
3. Modi D, Patel J, Shah B, Nayak B. Pharmacognostic studies of the seed of *Syzygiumcumini*linn. Pharma Science Monitor. Int. J. Pharm. Sci.2010;1(1): 20-26.
4. Kadam P, Deoda R, Shivatare R, Yadav K, Patil M. Pharmacognostic, phytochemical and physicochemical studies of *MimusopsElengi*Linn stem bark (Sapotaceae). Sch. Res. L. 2012; 4 (2): 607-613.
5. Rangari VD. Pharmacognosy and phytochemistry. 1st ed. New Delhi: Career Publications; 2006, 103-115.
6. Evans WC. Trease and Evans pharmacognosy. 16th ed. Edingburgh: Saunders Elsevier; 2009, 541-570.
7. Ajaib M, Khalid S, Hanif U. *Spermadicyton suaveolens*. A potential natural and antioxidant source. Int J Phytomedicine.2016;6 (2): 256-267.
8. Kulkarni MG, Sathe PS. Phytochemical and GC-MS analysis of *Hamiltoniasuaveolens* (Roxb). Int. J. Chemtech Res.2013;5(1): 212-219.
9. Papitha R, Ravi L, Selvaraj CI. Phytochemical Studies and Gc-Ms Analysis of *Spermadicyton suaveolens*Rox. Int. J. Pharm. Pharm. Sci. 2017;9(3): 143-149.
10. Kokate CK. Practical Pharmacognosy. 4th ed. New Delhi: Vallabh Prakashan; 1997,107 -111.
11. Khandelwal KR. Practical Pharmacognosy Techniques and Experiments. 15th ed. Pune: Nirali Prakashan; 2006, 15 – 163.
12. Wallis TE. Text Book of Pharmacognosy. 5th ed. New Delhi: CBS Publishers and Distributors; 2005,104 – 158.
13. Iyengar MA, Nayak SK. Anatomy of Crude Drugs. 11th ed. Manipal: Manipal Press Limited; 2008, 1-8.
14. Iyengar MA. Pharmacognosy of Powdered Crude Drugs. 5th ed.Manipal: Manipal Press Limited; 1997, 21-31.
15. Anonymous. Indian Pharmacopoeia. Vol II. Ministry of Health and Family welfare. Govt of India, Controller of Publications, New Delhi, 1996, A-53–54, A-95, A-97, A-109, 191.
16. Kaur K, Gupta AK, Sayeed A, Perwez A. Pharmacognostic studies on the bark of *Murrayakoenigii*Spreng. Int. J. Pharm. Biomed. Res. 2011; 2(4).
17. World Health Organization. Quality control methods for medicinal plant materials. WHO/PHARM/92.559, 1998, 4-46.
18. Kumar D, Kumar K, Kumar S, Kumar T, Kumar A, Prakash O. Pharmacognostic evaluation of leaf and root bark of *Holoptelea integrifolia* Roxb. Asian Pac. J. Trop. Biomed.2012; 169-175.