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Research Article

PHARMACOGNOSTICAL, PHYSICO AND PHYTOCHEMICAL EVALUTION OF THE LEAVES OF *JASMINUM SAMBAC* LINN. (OLEACEAE)

SWATI SABHARWAL, MANISHA VATS*, SATISH SARDANA, SUSHMA AGGARWAL

Department of Pharmacognosy and Phytochemistry, Hindu College of Pharmacy, Sonepat 131001, Haryana India. Email: ms.vats@yahoo.com

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ABSTRACT

Jasminum sambac Linn. belonging to family *Oleaceae* and commonly known as Motia is widely used in traditional system of medicines for treatment of fever, ulcer, diarrhea, diabetes and skin diseases like itching, leprosy etc. The present study is aimed at evaluation of fresh, powdered and anatomical sections of the leaves to determine morphological, microscopical characters, quantitative microscopy, physicochemical and phytochemical profiles. Microscopy revealed the presence of covering and glandular trichomes, stomata, palisade cells, vascular bundles, starch grains and calcium oxalate crystals. Total ash, acid insoluble ash, water soluble ash, ethanol soluble extractive and water soluble extractive were 14%, 7%, 8.5%, 32% and 12.8% respectively. Phytochemical screening showed the presence of fats, glycosides, carbohydrates, flavanoids, steroids, saponins, proteins and amino acids, tannins and phenolic compounds.

Keywords: *Jasminum sambac* Linn. Quantitative Microscopy, Physicochemical, Phytochemical, Fluorescence analysis.

INTRODUCTION

Jasminum sambac Linn. (Family-*Oleaceae*) commonly known as Motia or lily jasmine is a scandent or sub-erect shrub with young pubescent branches, broadly ovate or elliptic, opposite leaves, white, very fragrant flowers cultivated nearly throughout the tropical and sub-tropical parts of the world. The plant is much valued for its exquisitely fragrant flowers and it is estimated that nearly 400md. of flowers are annually used for the extraction of perfumed oils and 250md for the preparation of attar [1].The plant is considered cool and sweet used as a remedy in case of insanity, in weakness of sight and affections of the mouth. The flowers are bitter, pungent, cooling, tonic to brain, purgative, cure tridosha, biliousness, itching sensation, allays fever, stop vomiting, useful in the diseases of eye, ear, mouth, good for skin diseases, leprosy and ulcers [2]. Traditionally leaves are used in fever , cough, indolent ulcer, abdominal distention, diarrhoea, lowering the blood glucose level, regulating menstrual flow, to clean kidney waste, inflammed and blood shot eyes. Root, flowers, leaves are galactogogues therefore act as lactifuge[2, 3]. The plant is reported to have to have antidiabetic[4], antitumor[5], antimicrobial[6], antioxidant[7], anti-acne [8], suppression of puerperal lactation[9], A.N.S stimulating effect[10].The plant contains friedelin, lupeol, betulin, α-amyrin, ursolic acid[11], sambacin, jasminin, sambacoside A, sambacolignoside, quercitin, isoquercitin, rutin, kaempferol, luteolin[4], phenylmethanol, linalool, α-terpineol[12] and Secoirridoid glucoside- sambacoside A-G along with oleoside 11- methylester[13]. In spite of the numerous medicinal uses attributed to this plant, pharmacognosy information about this plant has not been published. Hence, the present investigation involves the establishment of pharmacognostic profile and phytochemical screening of the different extracts of the leaves that will assist in standardization for quality, purity and sample identification.

MATERIALS AND METHODS

Plant Material Collection and Authentication

The plant material *Jasminum sambac* was collected from the Herbal Garden, Ambala Cantt, The plant was authenticated by Dr. H.B Singh, Scientist F and Head, Raw Materials Herbarium and Museum, NISCAIR, New Delhi under the voucher specimen no: NISCAIR/RHMD/Consult/-2010-11/1696/294 and a specimen was submitted to the Department of Pharmacognosy and Phytochemistry, Hindu College of Pharmacy, Sonipat, Haryana (India)

Chemicals and Instruments:

Solvents viz. petroleum ether, chloroform, ethyl acetate, ethanol, n-butanol, acetone and reagents, viz. phloroglucinol, glycerin, chloral hydrate, iodine and sodium hydroxide were procured from RFCL, Mumbai, India. Compound microscope, Camera Lucida, Stage and eyepiece micrometer, glass slides, cover slips, watch glass and other common glassware were the basic apparatus and instruments used for the study. Microphotographs were taken using Labomed ATC-200 microscope attached with Sony digital camera.

Preparation of Extracts

The collected sample was washed thoroughly dried, powdered and successively extracted with different solvents like petroleum ether, chloroform, ethyl acetate, ethanol and water so as to get the respective extracts. All the extracts were filtered individually, evaporated to dryness using the rotatory evaporator, weighed and %yields were calculated. Color and consistency of the extracts were observed.

Macroscopic and Microscopic Evaluation

Morphological studies were done by using simple microscope to determine the shape, apex, base, margins, taste and odor of the leaves. Microscopy was done by taking the thin hand sections of the midrib and lamina region of the leaves. The thin sections were cleared with chloral hydrate solution and stained with phloroglucinol and hydrochloric acid, then mounted in glycerin for the identification of various regions. Powder of the dried leaves was separately treated with phloroglucinol, hydrochloric acid and glycerin to study various characteristics. Similarly, the powder was also stained in iodine solution, ruthenium red solution for the identification of starch grains, calcium oxalate crystals etc. As a part of quantitative microscopy stomata number, stomata index, vein-islets number and vein termination number were determined by using fresh leaves of the plant [14, 15, 16].

Fluorescence Analysis

The powdered material and different extracts were exposed to visible and ultraviolet light (U.V. short and U.V. long) to study their fluorescence behavior[17, 18].

Physicochemical Parameters and Phytochemical Evaluation

The moisture content, total ash, water soluble ash, acid insoluble ash, alcohol and water soluble extractive values were determined as a part of its physicochemical parameters [19, 20]. Petroleum ether, chloroform, ethanol and aqueous extracts were subjected to phytochemical analysis for the presence of various secondary phytoconstituents using standard procedures[16, 21, 22].

RESULTS AND DISCUSSION

Macroscopic Evaluation

The leaf has prominent midrib, uniformly smooth and even lamina. Morphologically the leaf appeared simple in composition, opposite in arrangement, variable in shape usually ovate or elliptic, glabrous or nearly so, with acute apex, entire margin, petiolated (3-6mm), 4-12cm (length) by 2.4-6.5cm (breadth). The fresh leaf was green in color with characteristic odor and slightly bitter taste (Fig. 1)

Microscopical Evaluation

In transverse section the leaf appeared dorsiventral in nature showing three layers (Fig 2.1). It showed the presence of single layered epidermis composed of flat rectangular cells covered by thin cuticle while lower epidermis covered by thick cuticle (Fig 2.2). The uniseriate, unicellular and multicellular covering trichomes were present in the upper and lower epidermis. The glandular trichomes were multicellular with single stalk (Fig 2.3). Stomata were present only on the lower epidermis (Fig 2.4). Below the epidermis layer in the lamina the next region was mesophyll which consisted of single layered long elongated palisade cells followed by spongy parenchymatous cells. The midrib region consisted of closely packed multilayered collenchymatous cells present below the upper epidermis and above the lower epidermis. Below and above the collenchymatous cells loosely packed with intracellular spaces parenchymatous cells were present. In the centre (midrib region) 'C' shaped or half moon shaped vascular bundles were present composed of xylem and phloem cells (Fig 2.2)

Fig. 1: Morphplogy of *Jasminum sambac* Linn. (Whole Plant) and Leaf

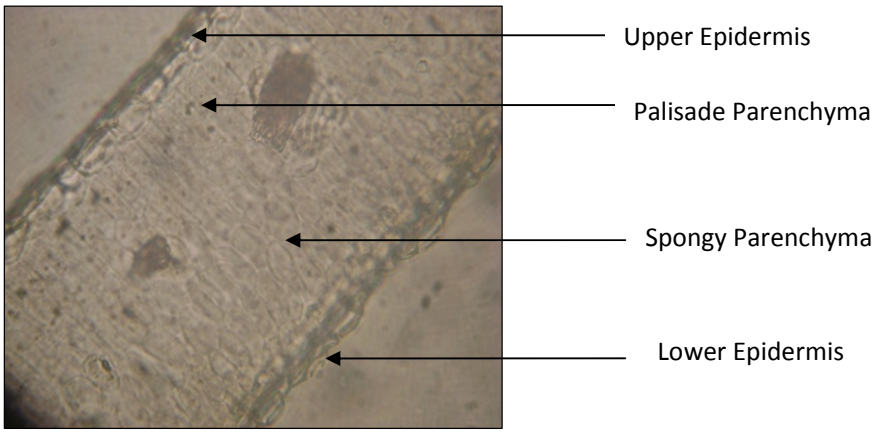

Fig. 2.1: T.S of *Jasminum sambac* Linn. Leaf

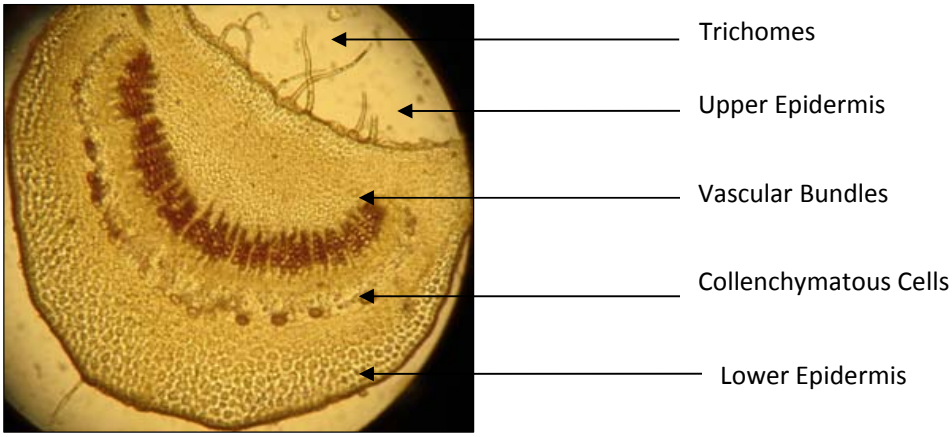

Fig. 2.2: T.S of *Jasminum sambac* Linn. Leaf

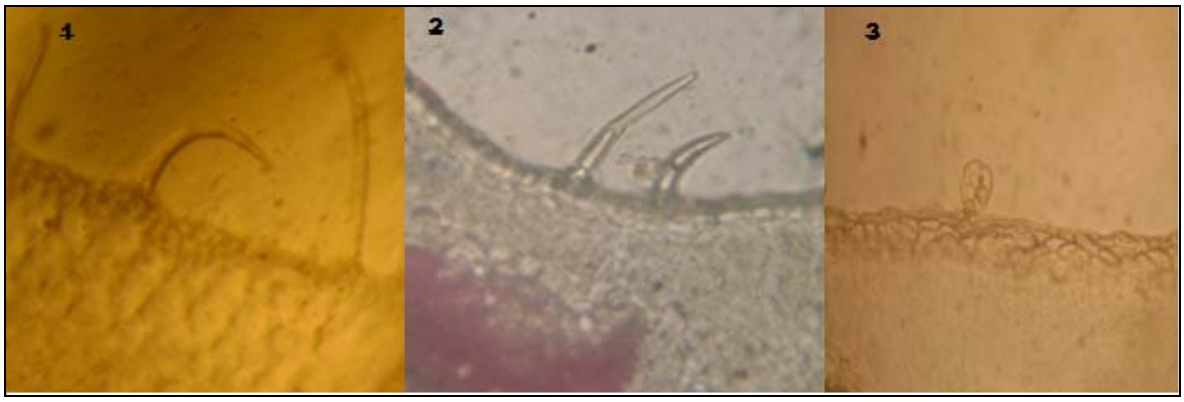

Fig. 2.3: T.S. of *Jasminum sambac* Linn. Leaf showing trichomes; 1: Unicellular trichomes; 2: Multicellular trichomes; 3: Glandular trichome

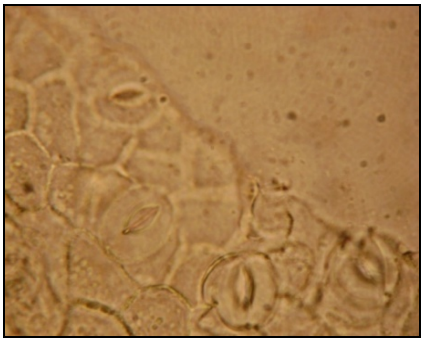

Fig. 2.4: T.S showing stomatas

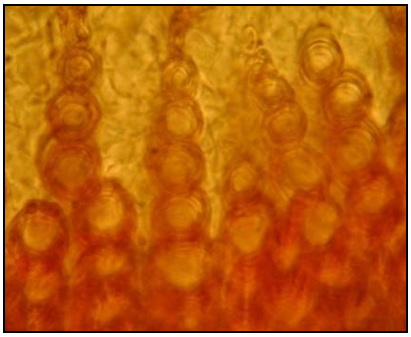

Fig. 2.4: T.S. showing vascular bundles

Powder Characteristics

The dried leaf powder was green in color with characteristic odor and slightly bitter taste. Microscopy of the powder revealed the presence of fragments of unicellular and multicellular covering trichomes, stomatas, pitted xylem vessels, fibres, reticulated vessels and abundant parenchymatous cells (Fig.2.5).

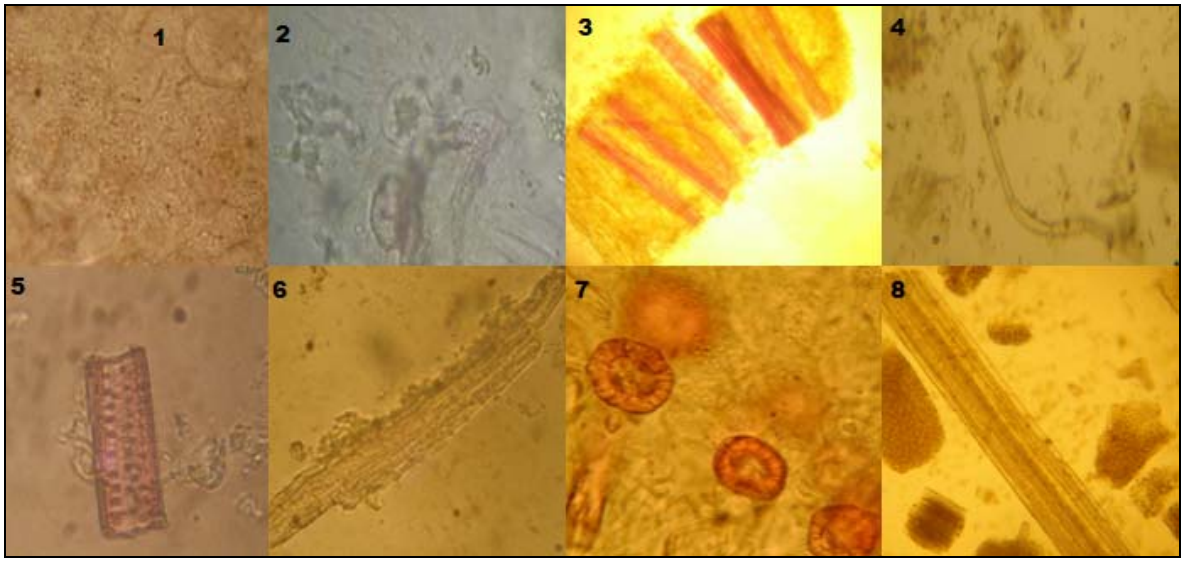

Fig. 2.5: Powder microscopy of *Jasminum sambac* Linn. leaf (1: Starch grains; 2: Calcium oxalate crystals; 3, 6, 8: Fibres; 4: Trichome; 5: Pitted vessel; 7: Stone cells

Quantitative Microscopy

Pertaining to the stomatal index, stomatal number, vein-islet number and veinlet termination number features are given in (Table 1).

Fluorescence Analysis

Fluorescence analysis of the various solvent extracts and powdered drug after treatment with different reagents like 1N NaOH, 1N HCl, acetic acid, picric acid, 5% ferric chloride and 5% iodine solution was observed in the day light and UV light and colors were observed. The results are shown in Table 2 and Table 3.

Physicochemical Evaluation

Physicochemical parameters are important parameters in detecting adulteration and are adopted to confirm the purity and quality of drug. Ash values are particularly important parameter as it shows the presence and absence of foreign matters like metallic salts or silica etc. The percentage of total ash, acid insoluble ash, and water soluble ash were carried out. Extractive values are primarily useful for the determination of exhausted or adulterated drugs.

The water soluble, alcohol soluble extractive values were calculated. The results are tabulated in Table 4.

Preliminary Phytochemical Evaluation

Phytochemical screening showed the presence of fats, glycosides, carbohydrates, flavanoids, steroids, saponins, proteins and amino acids, tannins and phenolic compounds (Table 5).

Table 1: Quantitative microscopy

Stomatal number	Lower surface: 160-180 Upper surface: NIL
Stomatal index	Lower surface: 12.26 Upper surface: NIL
Vein-islet number	Lower surface: 13.5-14.5 Upper surface: 10.5-11.5
Vein-termination number	Lower surface: 17.5-18.5 Upper surface: 26.5-27.5

Table 2: Percentage yield, consistency, fluorescence analysis of leaves extracts of *Jasminum sambac* Linn.

Solvent used	% yield (% w/w)	Consistency of extracts	Color of extract Under Visible Light	Under Short Wavelength	Under Long Wavelength
Pet ether	Semisolid	2.88%	Dark green	Dark green	Black
Chloroform	Semisolid	1.34%	Black	Black	Black
Ethyl acetate	Semisolid	3.4%	Dark green	Dark green	Orange
Ethanol	Semisolid	20%	Greenish yellow	Orange brown	Dark green
Water	Semisolid	22.96%	Dark green	Dark green	Dark green

Table 3: Fluoroscence nature of powdered leaves of *Jasminum sambac* Linn.

Powder + Reagent	Visible light	U.V light	
		Short Wavelength	Long wavelength
Powder+1N HCL	Light green	Yellowish green	Light yellow
Powder+50%H_2S0_4	Greenish yellow	Light brown	Dark brown
Powder+50%HCL	Greenish yellow	Light brown	Dark brown
Powder+50%$HN0_3$	Greenish yellow	Light brown	Dark brown
Powder+1N NaOH in water	Yellowish green	Yellow	Dark brown
Powder+1N NaOH in methanol	Yellowish green	Light brown	Light green
Powder + 50% H_2SO_4	Brown	Dark Brown	Black

Table 4: Physiochemical parameters of leaves *Jasminum sambac* Linn.

Parameters	Values
Total ash	14%
Water soluble ash	7%
Acid insoluble ash	8.5%
Alcohol soluble extractive	32%
Water soluble extractive	12.8%
Moisture content	6.11%
Crude fiber content	15%
Swelling index	1
Foaming index	Less than 100

Table 5: Preliminary phytochemical screening of leaves extracts of *Jasminum sambac* Linn.

Tests for constituents	Petroleum-ether extract	Chloroform extract	Ethanol extract	Aqueous Extract
Alkaloids	-ve	-ve	-ve	-ve
Carbohydrates	-ve	-ve	+ve	+ve
Flavanoids	-ve	-ve	+ve	-ve
Tannins and Phenolic compounds	-ve	-ve	+ve	+ve
Proteins and Amino-acids	-ve	-ve	-ve	+ve
Mucilages	-ve	-ve	-ve	-ve
Steroids	-ve	+ve	+ve	-ve
Glycosides	-ve	+ve	+ve	-ve
Saponins	-ve	-ve	+ve	+ve
Fats and fixed oils	+ve	-ve	-ve	-ve

+ve Present, -ve Absent

REFERENCES

1. The wealth of India, Raw Material, vol 5th: H-K: 289-290.
2. Kiritikar KR, Basu BD. Indian medicinal plants with Illustrations. 2nd Edition, Vol 7: 2003. p. 2093-2096.
3. Nadkarni KM. Indian Matreria Medica, Indian plants and drugs with their medicinal properties and uses. 2nd Edition, vol 1: Asiatic Publishing House: 2007.p. 704.
4. Upaganlawar AB, Bhagat A, Tenpe CR and Yeole PG. Effect of *Jasminum sambac* leaves extracts on serum glucose and lipid profile rats treated with alloxan. Pharmacologyonline 2003; 1: 1-6.
5. Radu S , Kqueen CY. Preliminary screening of endophytic fungi from medicinal plants in Malaysia for antimicrobial and antitumour activity. Malaysian Journal of Medical Sciences 2002; 9(2): 23-33.
6. Hussaini RA, Mahasneh AM. Microbial growth and quorum sensing antagonist activities of herbal plants extracts**.** Molecules 2009; 14: 3425-3435.
7. Latif FA, Edou P, Eba F, Mohamed N, Ali A, Djama S, Obame LC, Bassolé I, Dicko M. Antimicrobial and antioxidant activities of essential oil and methanol extract of *Jasminum sambac* from Djibouti. African Journal of Plant Science 2010; 4 (3): 038-043.
8. Harisaranraj RS, Babu S, Suresh K. Antimicrobial properties of selected Indian medicinal plants against acne-inducing bacteria. Ethnobotanical Leaflets 2010; 14: 84- 94.
9. Shrivastav P, George K, Balasubramaniam N, Padmini Jasper M, Thomas A, Kanagasabhapathy A S. Suppression of puerperal lactation using jasmine flowers (*Jasminum Sambac*). Australian and New Zeland Journal of Obstetrics and Gynaecology 1988; 28(1): 68–71.
10. Hongratanaworakit T. Stimulating effect of aromatherapy massage with jasmine Oil. Natural Product Communications 2010; 5(1): 157-162.
11. Rastogi RP, Mehrotra BN. Compendium of Indian Medicinal Plants.; Ist ed. vol 4; 2002: p. 407-408.
12. Rastogi RP, Mehrotra BN. Compendium of Indian Medicinal Plants. 2006; Ist ed,vol 2: p. 395-396.
13. Tanahashi T, Nagakura N, Nishi T. Sambacosides A, E and F novel tetrameric iridoid glycosides from *Jasminum sambac*. Tetrahedron Letters 1988; 29(15): 1793-1796.
14. Evans WC: Trease and Evans. Pharmacognosy. International ed., WB Saunders, 2005:456.
15. Khandelwal KR. Practical Pharmacognosy. 16th ed. Nirali Prakashan, Pune, 2006: p. 149-153.
16. Kokate CK and Gokhale SB. Practical Pharmacognosy. 12th ed. Nirali Prakashan, 2008: p. 129.
17. Chase CR, Pratt RS. Fluorescence of powdered vegetable drugs with particular reference to development of a system of identification. Journal of American Pharmacology Association 1949; 38: 324-33.
18. Kokoshi CJ, Kokoshi RJ, Sharma FT. Fluorescence of powdered vegetable drugs under ultraviolet radiation. Journal of Pharmaceutical Asses 1958; 47: 715-717.
19. WHO, Quality Control Methods for Medicinal Plant Materials. APTBS Publisher and Distributor, Geneva, New-Delhi, 1998: p. 22-34.
20. Indian Pharmacopoeia, Government of India, Ministry of Health and Family Welfare, Controller of Publication, 4th ed. Vol I. New-Delhi, 2007: p.78.
21. Harborne JB. Phytochemical methods. A Guide to modern techniques of plant analysis. 3rd ed. New Delhi, Springer, 1988: p. 42-43.
22. Brain KR, Turner TD: The Practical evaluation of phytopharmaceuticals. Wright-Scientechnica, Bristol, 1975b: p. 36-45.