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PHARMACOGNOSTIC EVALUATION OF LEAVES OF *ALANGIUM SALVIIFOLIUM LINN*

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ABSTRACT

The leaves of *Alangium salviifolium* Linn (Family: Alangiaceae) was a reputed drug mentioned in the ancient books of Ayurveda and Siddha for the treatment of epilepsy, jaundice and hepatitis. The investigation was carried out to study the pharmacognostical characteristics of the plant material. The various parameters like macro-morphology, micro-morphology, quantitative microscopy, physicochemical profile, TLC profile, preliminary phytochemical screening and the salient diagnostic features are documented. The characteristic fluorescence analysis was also carried out. The microscopical studies revealed the presence of unicellular trichomes, siphonostele vascular bundle, calcium oxalate crystals, anamocytic stomata. In the phytochemical screening, the extracts were found to have important constituents like carbohydrates, saponins, reducing sugar, alkaloids, phytosterol, fixed oil, tannins and flavanones. The above study would be useful as a diagnostic tool in the identification and authentication of the crude drug.

KEYWORDS: *Alangium salviifolium* Linn., fluorescence analysis, macro-morphology, micro-morphology, anamocytic stomata.

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INTRODUCTION

Alangium salviifolium Linn (Family: Alangiaceae) commonly known as Shoedhanam in Sanskrit and *Akola* in Hindi[1] was found distributed in South India, Tropical forest, Burma, Karnataka and widely spread over Tamil Nadu[2]. It is a deciduous, rambling shrub or tree, which grows up to a height of ten meters. The plant flowers during February to April and bears fruits during May to August[3,4]. Bark is pale brown in colour with shallow cracks exfoliating in sub corky scales and trunk with numerous holes[5,6]. Leaves are oblong or ovate-lanceolate, more or less acuminate. Flowers are white sub-silky, ebracteate, shortly pedicelled, articulated with the pedicel. Fruits are ellipsoidal when young and become purplish red, globular when ripen. Fruits are edible, enclosed in white mucilaginous sweet rather astringent pulp[7]. Seeds are single ovoid (1x0.5 cm) with bony foliaceous endocarp.

The leaves of *Alangium salviifolium* Linn are used as astringent, laxative, refrigerant and used to treat rheumatism, leprosy, syphilis and asthma[8]. The root bark is used as purgative, astringent, anthelmintic, antipyretic, expectorant, anti-inflammatory, emetic, diaphoretic, anticancer, antimicrobial and antitumor agents[9,10,11]. The root is used as hypotensive agent, anthelmintic and used in the treatment of biliousness, inflammation and snakebite. The bark shows antitubercular activity. The fruits are used as laxative, refrigerant, emetic and antiphlegmatic agent. The presence of alkaloids like alangiside, alangidiol, alangicine, alangimarckine, alamaridines, dimethyl aptaline, iso alamarin, alangimarinone, ankorine, tubulosine, cephaeline, dimethyl phycotrine has been reported earlier[12,13]. As there is no detailed pharmacognostical data reported on the leaves, the present study was carried out to develop pharmacognostical data on the leaves which is essential for its standardization and authentication.

MATERIALS AND METHODS

Collection

The leaves of *Alangium salviifolium* Linn were collected from Malaipattu near Sriperumbudur, Tamil Nadu, India during the month of September and was identified by CSRI, Arumbakkam, Chennai. Drug material was powdered and stored at 25°C in an air tight container. The chemicals used in the experiments were of analytical grade. Fresh material was shade dried, powdered and passed through 60 mesh sieve. Fresh leaves were preserved in formaldehyde:acetic acid:ethanol (1:1:1) solution.

Chemicals and instruments

Compound microscope, camera lucida (prism type), glass slides, cover slips, watch glass and other common glassware's were the basic apparatus and instruments used for the study. Solvents viz. ethanol (95%) and reagents viz. saffranin, glycerin, HCl, chloral hydrate and sodium hydroxide were procured from Ranbaxy Fine Chemicals Ltd., Mumbai, India.

Macroscopic and microscopic analysis

The macroscopy and microscopy of the leaf were studied according to the method of Brain and Turner (1975)[14]. For the microscopical studies, cross sections were prepared and stained as per the procedure of Johansen (1940)[15]. Free hand section of leaf materials (midrib, lamina and petiole) was taken and stained with saffranin followed by concentrated hydrochloric acid. The figures of section were drawn with the help of Camera Lucida.

Physicochemical analysis

Physicochemical analysis i.e. percentage of ash values and extractive values were performed according to the methods prescribed (Indian Pharmacopoeia, 1966; WHO/QCMMPM, 1992)[16,17]. Fluorescence analysis was carried out according to the method of Chase, Pratt (1949) and Kokoski et al. (1958)[18,19]. The colour and consistency of extracts was also noted.

Preliminary phytochemical screening

Preliminary phytochemical screening was carried out by using standard procedures described by Kokate (1986) and Harborne (1998)[20,21].

RESULTS AND DISCUSSION

Macroscopical analysis of the leaves

Leaves are simple, partly opposite, penne nerved, leaves variable 7.5-12.5 by 2.5-5.7cm, narrowly oblong or ovate-lanceolate more or less acuminate, sub ovate, entire, glabrous above pubescent on the leaves and prominently reticulately veined beneath 4-6 pairs of lateral veins base rounded or acute as shown in **(Fig 1)**. It is a deciduous, rambling shrub or tree, which grows up to a height of 10 meters and is distributed in South India, Tropical forest, Burma, Karnataka and widely spread over Tamil Nadu.

Microscopical analysis of the leaves

Transverse section of the leaf shows the dorsiventral nature.

Transverse section of petiole

Transverse section of petiole shows oval circular outline as shown in **(Fig-2)**. Epidermis is made up of small rectangular cells and covered by cuticle. Some of the epidermal cells elongate to form unicellular trichomes, cortex are differentiated into outer 3-5 layers of collenchyma cells and inner 5-8 rows of oval shaped parenchyma cells as shown in **(Fig-3)**. Vascular bundle is seen at the centre with parenchyma cells. It is represented by a siphonostele. Vessels are circular and arranged in a row as multiples of 2-4. Unlignified fibers are present surrounding the vascular bundle. Ground tissue is made up of parenchyma cells and most of the cells nearer to the bundles contain traces of calcium oxalate crystals as shown in **(Fig-4)**.

Transverse section of lamina

Transverse section of lamina shows single layered epidermis, slightly vertically elongated cells, followed by 3 rows of columnar, closely arranged palisade tissue. The spongy tissue is made up of 4-6 rows of rounded closely packed cells as shown in **(Fig-5)**. Vascular bundle of the larger veins is accompanied by thick walled parenchyma cells as shown in **(Fig-5).**

Epidermis in surface view

Adaxial foliar epidermis is imperforate and is composed of penta-hexagonal thick walled cells straight margin as shown in **(Fig-6)**. The adaxial foliar epidermis is composed of cells with straight to very slightly wavy margins as shown in **(Fig-7)**. It is profusely perforated by anamocytic stomata.

Quantitative measurement

Quantitative measurement of leaves of *Alangium salviifolium* Linn showed the presence of epidermal cells, palisade tissue, parenchyma cells, spongy tissue with anamocytic stomata and unicellular trichome with blunt end. The results are shown in **(Table 1)**.

Physicochemical study

Physicochemical parameters like total ash, water soluble ash, acid insoluble ash, water soluble extractive and alcohol soluble extractive of the leaves of *Alangium salviifolium* Linn are shown in **(Table 2)**.

Fluorescence analysis of leaf powder and leaf extracts

The fluorescence analysis of the leaves of *Alangium salviifolium* Linn showed the presence of fluorescence compounds in both the powders and extracts as shown in **(Table 3).**

TLC analysis

The R_f values of various spots on TLC plate performed in the experiment is as shown in **(Table 4)**. The extracts were studied in different solvent systems over silica gel-G.

Preliminary phytochemical study

The results of preliminary phytochemical analysis of leaf extracts of *Alangium salviifolium* Linn.f. showed the presence of carbohydrates, saponins, reducing sugar, alkaloids, phytosterol, fixed oil, tannins and flavanones. All the extracts showed the absence of proteins and anthraquinone glycosides. Results are tabulated in **(Table 5)**.

CONCLUSION

The study of pharmacognostic and phytochemical profile of *Alangium salviifolium* Linn.f provided the valuable information and can be used for authentication and standardization of the crude drug. This study may also be useful for the complete preparation of monograph of this crude drug.

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Table 1: Quantitative microscopy of leaves of *Alangium salviifolium* Linn

Parameters	Measurement
Stomatal index lower epidermis	6 / Sq.mm
Stomatal number lower epidermis	15 / Sq.mm
Vein islet number	5.75 / Sq.mm
Vein let termination number	2.26 / Sq.mm
Palisade ratio upper epidermis	6 / Sq.mm

Table 2: Physicochemical constants and extractive values of leaves of A*langium salviifolium* Linn

Parts Used	Parameter	%w/w
Leaves	Total Ash	8.4
	Water Soluble Ash	4.99
	Acid Insoluble Ash	3.24
	Water Soluble Extractive	6.99
	Alcohol Soluble Extractive	4.7

Table 3: Fluorescence analysis of leaf powder and leaf extracts of *Alangium salviifolium* Linn

Treatment	Daylight	UV light
Leaf extracts		
Hexane	Yellow	Green
Benzene	Yellowish Green	Green
Chloroform	Dark Green	Dark Green
Alcohol	Green	Green
Water	Pale Brown	Green
Acetone	Dark Green	Dark Green
Leaf powder		
Drug powder	Pale Green	Yellowish
Drug powder in NaOH (Aqueous)	Orange	Yellowish Green
Drug powder in NaOH (alcoholic),	Green	Green
Drug powder in 50% HCl	Pale Brown	Pale Brown
Drug powder in 50% H2SO4	Dark Green	Green

Table 4: R_f values of various extracts of leaves of *Alangium salviifolium* Linn

Extracts	Solvent system	Spraying reagent	R_f values
Chloroform	Chloroform:Ethyl acetate(9:1)	Water : dil H_2SO_4	0.97, 0.91, 0.66, 0.33, 0.11, 0.06
Alcohol	Ethylacetate: Methanol(4:1)	Water : dil H_2SO_4	0.88, 0.74, 0.56, 0.12, 0.06

Table 5: Preliminary phytochemical screening of various extracts of the leaves of *Alangium salviifolium* Linn

	Extracts			
Type of Phytoconstituents	**Pet.ether**	**Chloroform**	**Ethanol**	**Aqueous**
Carbohydrates	-	+	+	+
Reducing Sugar	-	+	+	-
Proteins	-	-	-	-
Saponins	-	-	-	+
Anthroquinone	-	-	-	-
Alkaloids	-	+	+	+
Phytosterols	-	-	+	-
Fixed oils	+	-	-	-
Tannins	-	-	+	-
Flavanones	-	-	-	-

+ - Presence of phytochemical - - Absence of phytochemical

Fig. 1: *Alangium salviifolium* (Leaves)

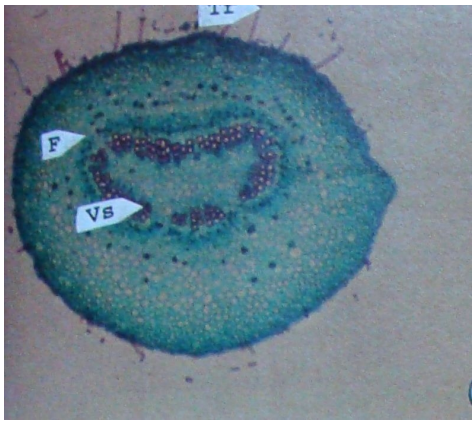

Fig. 2: T. S. of petiole
Tr – Trichome, F – fiber, Vs – Vascular strand.

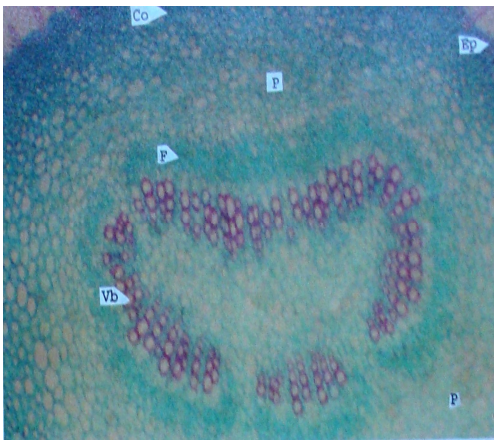

Fig. 3: T. S. of petiole – An enlarged portion
F – fiber, P – Parenchyma,
Co – collenchymas, Ep – epidermis,
Vb – Vascular bundle

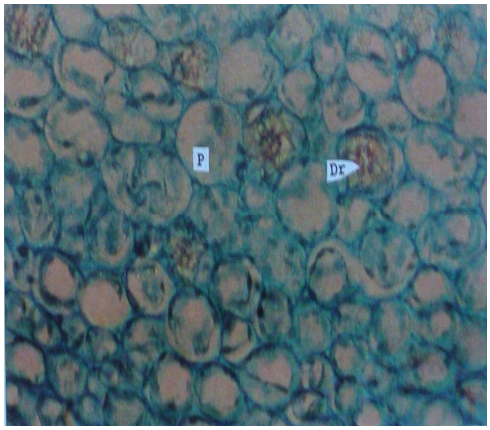

Fig. 4: T.S. of petiole – Parenchyma cells
Dr – Druses of calcium oxalate Crystal, P - parenchyma

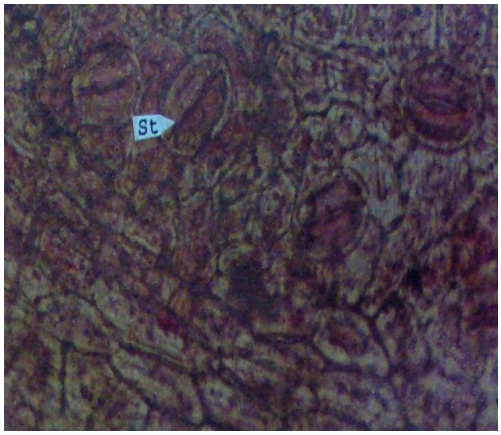

Fig. 7: Adaxial Foliar Epidermis showing stomata

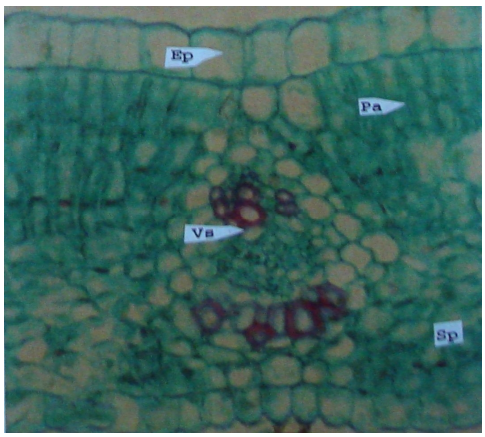

Fig. 5: T. S. of lamina.
Ep – Epidermis, Pa – palisade tissue,
Vs – Vascular strand, Sp – Spongy tissue

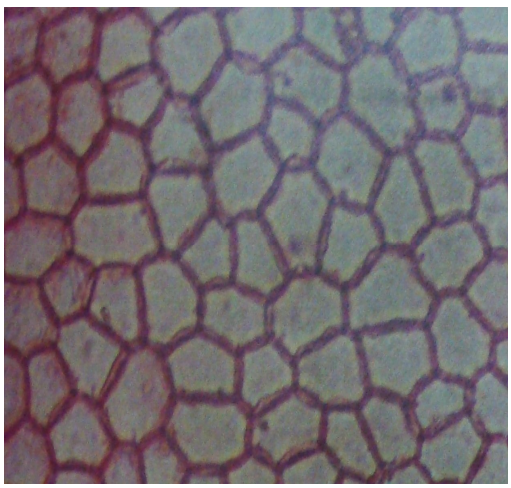

Fig. 6: Adaxial Foliar Epidermis

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