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Pharmacognostical studies on the medicinal plant - *Alangium salvifolium* (Linn. F) Wang. (Alangiaceae)

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ABSTRACT

Alangium salvifolium (Linn.f) Wang. is an important medicinal plant belonging to the family Alangiaceae. It is considered as one of the controversial drug in ayurveda since more than one botanical source is assigned to the drug. To facilitate correct and easy identification of the drug. Pharmacognostical studies covering morphology, macro and microscopic anatomical studies of leaf, stem and root, organoleptic evaluation, fluorescence analysis, physico chemical characters of plant powder, mineral constituents and preliminary phytochemical screening of the plant, along with diagnostic character of this plant is presented. The study helps in the formulation of the drug.

Key Words: *Alangium salvifolium* (Linn.f) Wang. Pharmacognosy, Physico- chemical analysis, Phytochemical screening,

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INTRODUCTION

Standardization of natural products is a complex task due to their heterogeneous composition, which is in the form of whole plant, plant parts or extracts obtained thereof. To ensure reproducible quality of herbal products, proper control of starting material is utmost essential. The first step towards ensuring quality of starting material is authentication. Thus, in recent years there has been a rapid increase in the standardization of selected medicinal plants of potential therapeutic significance [1,2] Despite the modern techniques, identification of plant drugs by pharmacognostic studies is more reliable. According to the World Health Organization [3] the macroscopic and microscopic description of a medicinal plant is the first step towards establishing the identity and the degree of purity of such materials and should be carried out before any tests are undertaken.

Eventhough the plant is rich in bio-active richness of active constituents and potential therapeutic activities there is a lacuna in the pharmacognostical standardization on the plant parts of *Alangium salvifolium* (Linn.f) Wang. So the present study is undertaken to findout some pharmacognostical standards for the leaf, stem and roots.

MATERIALS AND METHODS

Collection and identification of *Alangium salvifolium* (Linn.f) Wang.
The experimental material selected for the present study is *Alangium salvifolium* (Linn.f) Wang. belongs to the family Alangiaceae. The plant species name was authenticated and deposited (Voucher specimen No: 8365) in the Survey of Medicinal Plant Unit (SMP), Govt. Siddha Medical College, Palayamkottai. The plant material was

collected from St.Xavier's College campus, Palayamkottai and it was subjected to the pharmacognostic. The taxonomic features collected from the species have been confirmed with the Flora of Presidency of Madras [4] and The Flora of Tamil Nadu Carnatic [5]. The morphological and taxonomical observations were made by using a student dissection microscope and the characters were described in technical terms. Fresh stem, leaf and root of *Alangium salvifolium* were fixed in FAA (formalin 40% - 5ml, acetic acid – 5ml, alcohol 70% - 90ml). Free hand sections of the stem and leaf were taken and kept in 70% ethanol. The sections were double stained with saffranin and methylene blue and mounted. The photomicrographs were taken using Pentax K1000 camera fitted with research microscope "Labo triumph" binocular and phase contrast optics, Japan.

Leaf Constant Studies

Stomatal index was determined using samples treated in 5% Potassium hydroxide solution. For determination of stomatal index, five epidermal peelings from lower surface of a fresh leaf were taken and counting was recorded from five different areas of each piece i.e. number of stomata as well as epidermal cells per 1 sq mm area. Stomatal index value is then calculated by using the S/(S+E) ×100. Where E and S for the number of epidermal and number of stomata of unit area respectively [6]. The vein islet number and vein termination number are calculated by counting the minute areas of photosynthetic tissue encircled by the ultimate division of the conducting strands per 1 sq mm of cleared leaf samples taken from five different areas. All these numerical values are considered as a diagnostic constant and will help for identifying the plant species.

Analysis of organoleptic, Fluorescence and physico chemical properties

The morphological characters such as color, odour, taste, texture and in powder histological features such as starch grains, calcium oxalate crystals and fibbers were studied. Fine powder and their extract in various solvents namely petroleum ether, benzene, chloroform, methanol were obtained. The aqueous extract was prepared from directly boiling the powder with distilled H_2O. These were examined under visible light and U.V light. This powdered material were also treated with various chemical reagents such as 50% HNO_3, acetone, ethyl alcohol, 50% H_2SO_4, 1N HCl and 1N aqueous NaOH and changes in colour were recorded. The percentage of loss and weight on drying, total ash, water soluble ash, acid insoluble ash, water extractive value, sulphated ash, and moisture content value were obtained by employing standard materials of analysis as described in Pharmacopeia of India [7].

Detection of elements and Preparation of ash extracts:-

Detection of various elements in plant ash *viz.* Fe, S, P, Cl etc., was also carry out by present study. One gram of ash material is dissolved in 25ml of 50% HCl (vlv) for 12 hours and then filtered through filter paper. The filtrate is treated with suitable reagents to identify the presence of elements qualitatively.

Phytochemical analysis

Mature and healthy plant was collected and dried at room temperature (25-30^{0}C), for about two weeks. About 30gms of plant powder of each plant species were taken in a digestion flask and fitted to the soxhlet apparatus and was separately extracted with petroleum ether, benzene, chloroform, and methanol. The aqueous extract was prepared from directly boiling the powder with distilled H_2O. These extracts were concentrated and kept in brown bottles used for the phytochemical screening [8]. The extracts were tested for steroids, alkaloids, triterpene, sugar, phenolic groups, flavone, catechin, saponin, tannin, anthroquinone, aminoacid and reducing sugars.

Biochemical analysis:

The protein, phenol and carbohydrates are found to be essential bio chemicals for any plants to regularize the activity of the plant. Hence, the present study was also carried out for the analysis of protein [9], phenol [10], and carbohydrate [11].

RESULTS AND DISCUSSION

Identification of *Alangium solvifolium*

The Macroscopic identification of the chosen plant species reveals that, *Alangium solvifolium*. Tree to 10 (15) m; branch lets apprised - tomentose, sometimes spin - tipped. Leaves variable, oblong - lanceolate, ovate or elliptic 5 - 14 ×2 -2.5 cm, chartaceous , 3 -5 nerved at base, prominent below, glabrous and glossy above, glabrescent or puberculous below, base oblique, obtuse - subacute, margin entire, apex attenuate or subacute, slightly retuse; petiole to 1cm, tomentose. Flowers to 2.5 cm long, 1.5 cm across in irregular axillary cymes or clusters; bract ovate, 1mm, deciduous; pedicel to 4mm, jointed; buds terete, velvety. Calyx-tube cupular, 2.5mm adnate to ovary, tomentose; lobes ca.10, triangular, ovate 0.5mm sub equal. Petals 10, white, linearly oblong, 2.5 × 0.2 cm, callose at base, tomentose and reflexed. Disc distinct. Stamens ca 20; filaments to 1cm, with a fleshy and villous base, sub connate; anthers linear, to 1cm, ovary turbinate to 2mm, 1celled; ovule 1per cell; style to 2cm, glabrous, stigma capitate, obscurely fimbriate. Berry globose, to 2 ×1cm, crowned by calyx – lobes; seed solitary, ovoid, 1 × 0.5cm.

Table: 1. Organoleptic evaluation of plant powder of *Alangium salvifolium*

S.No	Particulars	Plant part		
		leaf	Stem	Root
1.	Colour	Dark green	Brown	Pale yellow
2.	Odour	Characteristic smell	Oily	Oderless
3.	Taste	Tasteless	Tasteless	Tasteless
4.	Texture	Coarse	Coarse	Fibrous

Table: 2. Fluorescence Character of plant powders in different solvent of *Alangium salvifolium*

Reagent	Sample	UV light	Visible light
Petroleum ether Extract	Leaf	Pale yellow green	Yellowish green
	Stem	Pale yellow	Pale yellow
	Root	Yellowish green	Yellow
Benzene Extract	Leaf	Dark brown	Dark Green
	Stem	Dark brown	Dark green
	Root	Dark green	Dark brown
Chloroform Extract	Leaf	Dark green	Dark brown
	Stem	Dark black	Dark brown
	Root	Brownish yellow	Pale yellow
Methanol Extract	Stem	Dark brown	Dark brown
	Root	Yellowish green	Dark brown
	Leaf	Dark green	Pale green
Acetone Extract	Leaf	Dark green	Pale green
	Stem	Black	Brown
	Root	Dark brown	Dark brown
Powder+ HCL	Leaf	Pale yellow	Pale green
	Stem	Dark yellow	Pale yellow
	Root	Yellow	Pale yellow
Powder+1N H_2SO_4	Leaf	Dark green	Pale green
	Stem	Black	Brown
	Root	Brown	Dark brown
Powder+ Ethylalcohol	Leaf	Brown	Green
	Stem	Yellow	Pale yellow
	Root	Brown	Pale brown
Powder +Dis H_2O	Leaf	Brownish green	Pale green
	Stem	Dark yellow	Pale yellow
	Root	Black	Brown

Table: 3. Physico-Chmeical characters of plant powders in *Alangiuam solvifolium*

S. No	Parameter (%)	Percentage		
		Leaf	Stem	Root
5.	Total Ash	35.5	20.5	30.5
6.	Water – Soluble Ash	8.45	10.7	10.05
7.	Acid Insoluble Ash	58.5	24.9	50.5
8.	Sulphated Ash	13.8	37.0	34.9
9.	Moisture Content	29.7	29.5	22.5
10.	Water Soluble Extractive Value	78.9	69.7	76.6

Leaf Constant

Stomata are present on the lower surface of the leaf. The stomatal index is 52.63 and stomatal frequency is in the range of 65/sq.mm. The vein islets number is 11.4/sq.mm in different parts of the leaf. The vein termination is with an average of 13/sq.mm.

Organoleptic, fluorescence and physico – chemical analysis.

The organoleptic evaluation reveals that, the extracts from different plant parts are coarse powder; odourless and tasteless (Table 1). The behaviour of the powdered drug in different solution and their extracts towards ordinary light and U.V light were observed and the results were recorded (Table 2). It can be used as diagnostic tool for testing adulteration if any. Under fluorescent light leaf powder showed different colours in various extracts. The total ash value is useful to exclude drugs, which have been coated with chalk, lime or calcium sulphate. The physical properties of the extracts like total ash, acid soluble ash, water soluble ash, moisture content, extractive values were determined by standard methods and presented (Table 3 and Fig.1). The ash extract of leaf, stem and root was subjected to quantitative ash analysis for mineral constitutes with different chemical reagent showed the presence of chlorine, sulphur and iron was observed in stem, root and leaf (Table 4). The leaf, stem and root powders with various extracts showed the presence of alkaloids, phenol, tannins and reducing sugar (Table.5)

Fig. 1 Comparative Analysis of physio-chmeical characters of plant powders in *Alangium solvifolium*

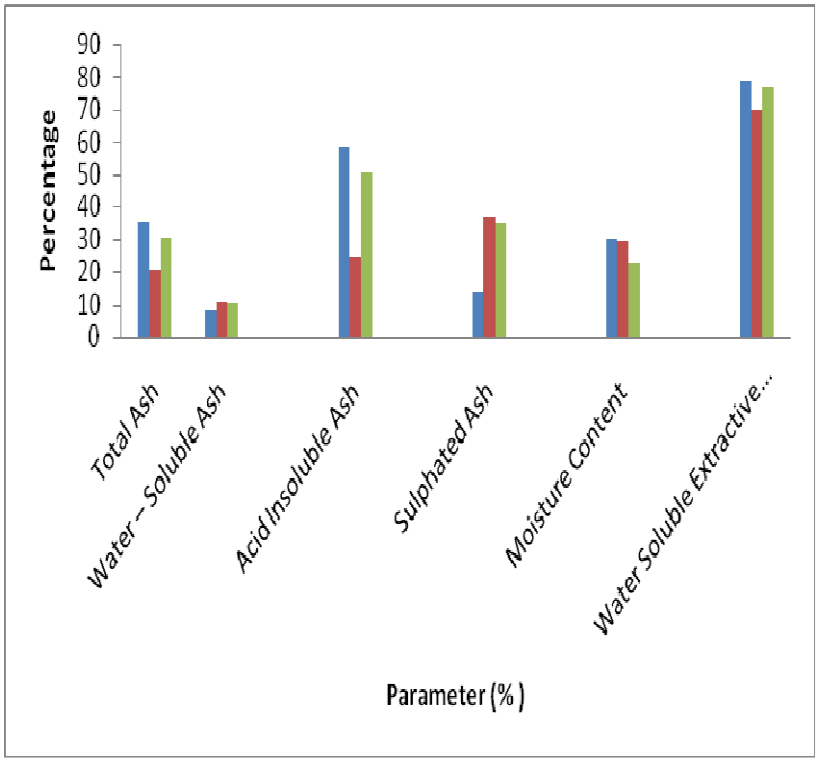

Table: 4 Quantitative Analysis Ash for Mineral Constituents in *Alangium salvifolium*

Samples	Sulphate	Calcium	Iron	Phosphate	Chlorine
Leaf	+	-	+	+	+
Stem	+	-	+	+	+
Root	+	+	+	+	+

present (+) absent(-)

Table: 5. Preliminary Pytochmeical analysis of powder extracts *Alangium solvifolium*

Solvent	Plant material	Reducing sugars	Amino acid	Protein	Phenol	Alkaloids	Steroids	Tri Terpenoids	Flavnoids	Catachin	Saponin	Tannin	Anthero quinine
Petroleum ether	Leaf	-	-	-	+	+	+	+	-	-	-	+	-
	Stem	+	-	-	-	+	-	-	-	-	-	-	-
	Root	-	-	-	+	+	-	+	-	-	-	-	-
Benzene	Leaf	-	-	-	+	+	+	-	-	-	-	-	-
	Stem	-	-	+	-	-	+	-	+	-	+	+	+
	Root	-	-	-	-	+	+	-	+	-	-	-	-
Chloroform	Leaf	+	-	+	+	+	+	-	-	-	-	-	-
	Stem	-	-	-	+	+	+	-	+	+	-	-	-
	Root	+	-	-	+	-	-	-	-	-	-	+	+
Methanol	Leaf	-	-	-	+	+	-	+	-	-	-	+	-
	Stem	-	-	-	+	+	-	-	+	-	-	-	-
	Root	-	-	-	+	-	-	-	-	-	-	-	-
Distilled water	Leaf	-	-	-	-	+	-	+	-	+	+	-	+
	Stem	-	-	-	+	-	+	+	-	+	+	+	+
	Root	-	-	+	-	+	+	-	-	+	+	-	+

present (+) absent(-)

Biochemical analysis:

Biochemical studies reveal that, the extract has carbohydrate, protein and phenol. It was found that the leaf contains maximum carbohydrates (10.5mg/g/fw), protein (20mg/g/fw), and protein (10mg/g/fw).

CONCLUSION

It is concluded from the presence study that, the macroscopic and microscopic characters, fluorescence analysis and phytochemical analysis can be used as diagnostic tool in identification of the plant. When *Alangium solvifolium* is adulterated with other plants of similar morphological characters the above mentioned anatomical, physico-chemical and phytochemical characters will help to distinguish the original drug.

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