



Pharmacognostical and phytochemical investigation on leaves of *Ipomoea sagittifolia* burm.f.

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Abstract

The drug assessment and bioassay of conventional herbs of several herbal systems is currently acquiring more impetus overall the world. It is the high time now to evaluate methodologically the information stored in different phytotherapy of the world in terms is called as Pharmacognostic and Phytochemical depiction. So, the pharmacognosy of individual medicinal plant is very important manner for herbal based drug invention. Therefore in this study, an attempt has been made to estimate the ethnomedicinally important plant, pharmacognostical and phytochemical analyses which are still unexplored. In this study different pharmacognostical parameters of *Ipomoea sagittifolia* Burm.fil. Belonging to the Convolvulaceae family, ethnobotanically significant medicinal herbs have been explored. WHO recommended physico-chemical and photochemical screening was resolved. The Pharmacognostical, phytochemical and physico- chemical parameters were studied and presented in it. These parameters are aid to establish the authentic medicinal plant leaf of *I. sagittifolia* and may possibly help to transform the drug from its further classes. In the leaves extract, the identified chemical compounds are alkaloids, flavonoids, steroids and triterpenoids, reducing sugars, tannins, gums and saponins, etc. This study will be more helpful to herbalists and pharmacognostical and phytochemical for proper determination and exhibition of natural medicine ⁽¹⁾.

Keywords: *Ipomoea sagittifolia*, pharmacognostical studies, phytochemical analysis

Introduction

Herbal drugs play a major role in wellness program mostly in economically enlarged nations. Earliest Indian literature include a remarkably broad definition of medicinal plants and considers all plant parts to be inherent sources of medicinal compounds. Medicinal plants have a great focusing on worldwide by the scientist because of their safe benefit.

Different parts of the plant having different pharmacological activities. Therefore it's very essential and important to execute Pharmacognostic studies of medicinal plants ^[2].

Ipomoea sagittifolia (Burn.f.) is valuable medicinal plant which belongs to Convolvulaceae family commonly seen on bushes. It's also called as *Ipomoea marginata*. It is commonly known as Purple Heart glory.

The plant species contain the more biological activities such as anticancer, anti-inflammatory, antioxidant, anti-asthmatic activity, anti-sterility activity, antiarrhythmic activity, anticoagulant activity, antimicrobial activity and anti-diabetic. Various phytoconstituents present in the plant such as alkaloids like indole alkaloids, ipobscurine A and B, phenolic glycolipids, flavonoids and tannins. Hence this work will demonstrate the complete pharmacognostical details and phytochemical analysis of *Ipomoea sagittifolia* leaves ^[10].

Materials and Methods

Plant Collection and Authentication

Ipomoea sagittifolia were collected in the month of February 2021, from Thanjavur (DT), Tamilnadu. The plant material was identified by Dr. R. Jayaraman Ph.D., Director, Institute of Herbal Botany Plant Anatomy Research Centre, Chennai. It was identified as *Ipomoea sagittifolia* Burn.f. Family: Convolvaceae.

Pharmacognostical Study of Plant

Macroscopic Evaluation

Fresh leaves of *ipomoea sagittifolia* Burm.f. Were collected and different organoleptic characteristic such as shape, size, colour, type, odour, taste were detected. These various parameters are considered useful in the accurate standard of the crude drug and evaluated as per WHO guidelines.

Microscopic Evaluation

Collection of Specimens

The plant specimens for the present study were collected from Thanjavur. To the select the healthy plants and usual organs. The essential samples of different organs were cut and removed from the plant and fixed in FFA (Farmallin-5ml+ Acetic Acid-5ml+70% Ethyl alcohol-90ml). Wait for 24 hours of fixing, and then the specimens were dehydrated with appraised series of tertiary – Butyl alcohol.

Infiltration of the specimens was transferred by gradual addition of paraffin wax (melting point 58-60 C) until TBA mixture skilled super saturation. The specimens were cost into paraffin blocks [3].

Sectioning

The paraffin plant specimens were sectioned with the help of Rotary Microtome. The width of the sections was 10-12 μm . dewaxing of the sections was by usual procedure. The sections were stained with Toluidine blue as per the method. Since Toluidine blue is a polychromatic stain, staining results were really good, and some cytochemical responses were obtained. The dye rendered pink colour to the cellulose walls, blue to the lignified cells, dark green to suberin, violet to the mucilage; blue to the protein was obtained.

Whenever required section were also stained with safranin and Fast-green and IKI (for starch).

For analysing the stomatal morphology, venation pattern and trichome distribution, paradermal sections (sections taken parallel to the surface of leaf) too gladding of leaf with 5% sodium hydroxide or epidermal peeling by partial maceration employing Jeffrey's maceration fluid were prepared. Glycerin mounted limited periods of time preparations were made for macerated/cleared materials. Powered materials of different parts were cleared with Noah and mounted in glycerin medium after staining. Different cell part were studied and measured [4].

Photomicrographs

Microscopic description of tissues is augmented with micrographs wherever necessary. Photographs of different magnification were taken with Nikon labphoto 2 microscopic Unit. For normal monitoring bright field was used. For the study of crystal, starch grains and lignified cells, polarized light was employed. Since these structures have birefringent property, under polarized light they appear bright against dark background. Magnifications of the figures are indicated by the scale-bars. Illustrative terms of the anatomical features are as given in the standard anatomy books [5-7].

Powder Microscopy

The powder was stained with phloroglucinol: HCl (1:1). On slide, a drop of glycerine was placed and covered it with cover slip and observed under microscope.

Proximate analysis

Proximate analysis of powdered plant material of *Ipomoea sagittifolia* was carried out. Various parameters such as loss on drying, total ash value, water soluble ash, acid insoluble ash, Sulphated ash, Alcohol and water soluble extractive values were find out.

Preparation of extract

The leaves of *Ipomoea sagittifolia* were subjected to shade dry and ground into coarse powder. The coarse powder material (100g) was extracted in continuous hot percolation (Soxhlet extraction apparatus) using increasing polarity solvent. The solvent was removed the distillation by using simple distillation method.

Each extract was concentrated using rotary vacuum evaporator, which obtain a greenish sticky residue. The concentrated extracts was stored and used for the further study.

Preliminary phytochemical screening

The various extracts were subjected into phytochemical analysis to determine the presence of different chemical constituents like alkaloids, glycosides, carbohydrates, phenolic and tannins, proteins, amino acids, saponins, phytosterols using standards method [8,9].

Result and Discussion

Pharmacognostical investigation of Plant

Macroscopic Evaluation

The leaf of *Ipomoea sagittifolia* let out features as shown in Table 1 & Figure 1.

Table 1: Macroscopic Features of *Ipomoea sagittifolia* leaf

S. No.	Parameters	Evaluation
1.	Colour	Green and centre part contain purple colour
2.	Odour	Odourless
3.	Taste	Characteristic
4.	Shape	deeply heart-shaped or arrow-shaped
5.	Type	Oval
6.	Length	5cm
7.	Width	4.6 cm



Fig 1: Habitat of *Ipomoea sagittifolia*



Fig 2: Leaves of *I.sagittifolia*



Fig 3: Flower of *I.sagittifolia*



Fig 4: *Ipomoea sagittifolia* along with different sized Leaves

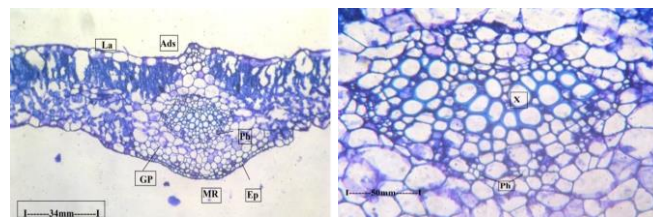


Fig 5: T.S of leaf through midrib and TS of midrib—enlarged [Ads - Adaxial Side, MR - Midrib, GP- Ground Parenchyma, La – Lamina Ep - Epidermis, Ph- Phloem, X- Xylem]

Lateral vein

The lateral vein is small circular and collateral, located in the median part of the lamina. A vascular strand consists of a few angle of xylem elements and phloem located on the

lower upper side of the vascular bundle. The vascular strand is surrounded by parenchymatous bundle sheath cells. (Fig: 6).

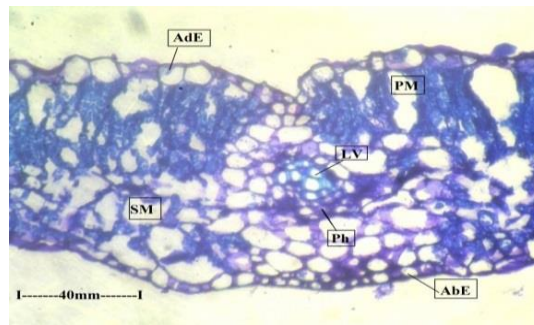


Fig 6: TS of Lateral Vein [LV- Lateral Vein, PM- Palisade Mesophyll, SM- Spongy Mesophyll]

Lamina

Lamina is 270µm broad. They contain the thick walled rectangular adaxial epidermal cells and thin walled straightly dilated abaxial epidermis. The palisade cells are single layer vertically elongated and cylindrical less

compact. The spongy mesophyll cells are lobed less compact with wide air chamber. Small vascular strands are seen the spongy mesophyll zone. Stomata are found mostly in the adaxial side of the lamina. Stomata occur on the abaxial side of the lamina. (Fig: 7).

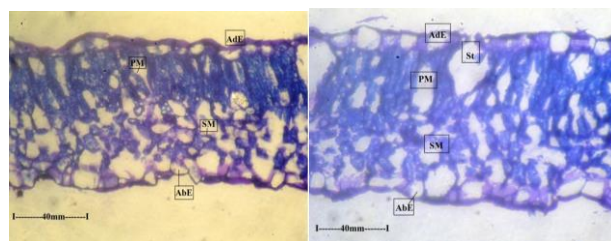


Fig 7: TS of Lamina and TS of Lamina with Adaxial Stomata [AdE- Adaxial Epidermis, AbE- Abaxial Epidermis, PM- Palisade Mesophyll, SM- Spongy Mesophyll, St- Stomata]

Calcium oxalate crystals

Calcium oxalate crystals are druses type. There spherical with spiny surface. The druses are located in the spongy parenchyma cells. (Fig: 8).

Leaf Margin

The leaf margin slightly thin and not much altered in structure. It consists of wide angular adaxial epidermis and smaller thin walled abaxial and adaxial side. The mesophyll tissue of slightly modified and consists of less distinct palisade and spongy mesophyll tissue. (Fig: 8)

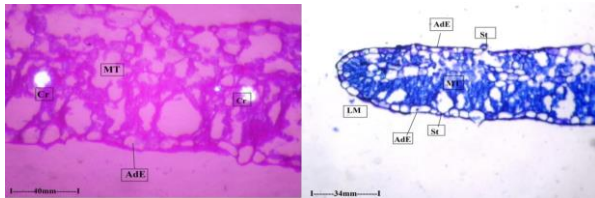


Fig 8: Lamina in Crystal and TS of Leaf margin [MT- Mesophyll tissues, Cr- Crystal, AdE-Adaxial Epidermis, St- Stomata, LM- Leaf Margin]

Petiole

The petiole is circular and outline with wide V shaped adaxial groove. There are two small circular adaxial vascular strands and wide thick main vascular strands. The petiole is 13mm in vertical plane and 12 mm in horizontal plane. (Fig: 9).

Epidermal cells

The epidermal cells are either elliptical or vertically oblong and thin walled. The ground tissue is circular or angular less compact. The main vascular system is broadly U shaped bicollateral. Protoxylem elements are character towards upper side. Phloem elements are occur in small isolated clusters along the lower and upper sides of the vascular arc. (Fig 9)

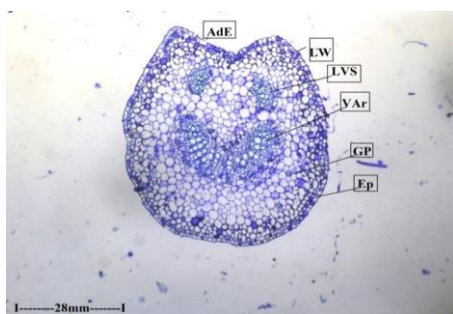


Fig 9: TS of Petiole entire view [LW- Lateral Wall, LVS- Lateral Vascular strand, VAr- Vascular Arc, GP- Ground Parenchyma, Ep- Epidermis, AdE- Adaxial Epidermis]

Adaxial lateral vascular

The adaxial lateral vascular strands are bicollateral with central wide circular or elliptical thick walled vessel elements. The protoxylem towards lateral side (Fig: 10).

Vascular arc

The main vascular arc consists of wide arc shaped vascular system. It consists of central horizontal rows of vessel elements with xylem sclerenchyma. Phloem occur both along the inner concavity and outer convex part. (Fig: 10).

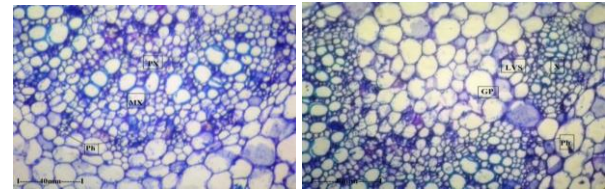


Fig 10: Adaxial lateral vascular bundle and Abaxial lateral vascular bundle [Ph- Phloem, PX- Proto xylem, MX- Meta xylem, LVS- Lateral Vascular Strand, GP- Ground Parenchyma, Ph- Phloem, X- Xylem]

Calcium oxalate crystal

Calcium oxalate crystals are sparsely distributed in the ground parenchyma. The crystals are druses type spherical with spiny surface. The crystals are randomly distributed. (Fig: 11).

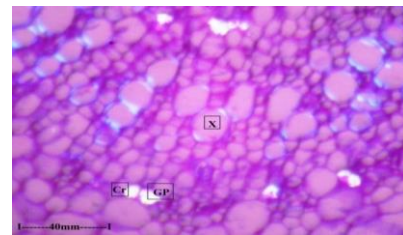


Fig 11: Druses of calcium oxalate crystal [GP- Ground Parenchyma, X- Xyloem, Cr- crystal]

Powder Microscopy

Powder microscopy of the raw drug point out the presence of separated tissues including group of fibres, trichome, epidermal cells, xylem, crystals etc.

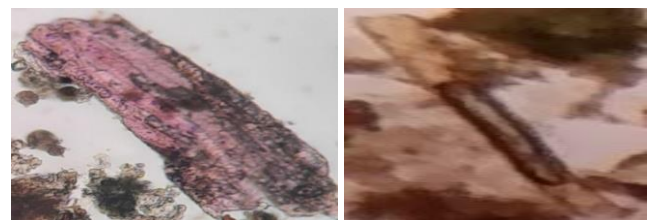


Fig 12: Sclerenchyma Fig 12 Xylem

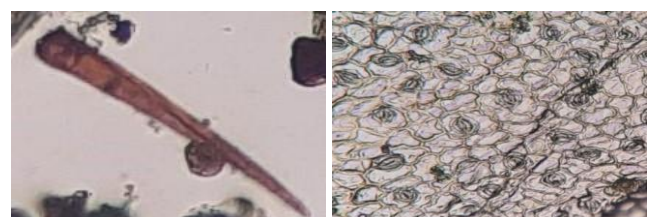


Fig 13: Uniseriate multicellular and Anomocytic Stomata Blunt tip trichome

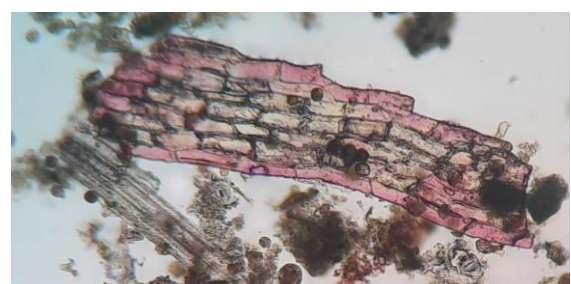


Fig 14: Vascular Strand

Extraction of Plant Material

The yields of various successive solvent extracts of

dried powdered leaves are given in Table 2.

Table 2: Successive solvent extracts of leaves of *Ipomoea sagittifolia*

S. No	Extract	Yield (%w/w)
1.	Hexane	1.6
2.	Ethyl Acetate	2
3.	Chloroform	1.9
4.	Ethanol	3
5.	Aqueous	2.5

Preliminary Phytochemical Screening

The phytochemical evaluation of the various solvent extractions exhibited the presence of alkaloids,

Carbohydrates, glycoside, steroids, flavonoids, phenols and saponins etc.

Table 3: Preliminary Phytochemical Screening of Crude extracts of *Ipomoea sagittifolia* (+) – Presence (–) - Absence

S. No.	TEST	Petroleum Extract	Ethyl Acetate Extract	Chloroform Extract	Ethanol Extract	Aqueous Extract
1.	Carbohydrate	-	-	+	+	+
2.	Protein	+	+	+	-	-
3.	Amino Acid	-	-	-	-	-
4.	Fat and Oil	-	-	-	-	-
5.	Steroids	+	+	+	+	-
6.	Glycosides	+	+	+	+	-
7.	Flavonoids	+	+	+	+	-
8.	Alkaloids	+	+	+	+	+
9.	Tannins	+	+	+	+	-
10.	Gum and Mucilage	-	-	-	-	-
11.	Saponins	-	-	-	-	-

Physico Chemical Evaluation

Table 4: Physico-chemical characters of leaves of *Ipomoea sagittifolia*

S. No	Physico - Chemical Parameters	Values in Percentage (%w/w)
1.	Total Ash	6.45
2.	Acid in Soluble Ash	9.4
3.	Water Soluble Ash	2.05
4.	Sulphated Ash	4.05
5.	Loss on Drying	1.60
6.	Water soluble Extractive Value	3.14
7.	Alcohol Soluble Extractive Value	7.08
8.	Ether Soluble Extractive Value	7.50

Discussion

Herbal drug which are used in different conventional medicine necessarily the detail exploration with ethno medicinal approach. The present paper issues knowledge in estimation of their identification, standardization of herbal drugs of mortal's medicinal practice of present and improvement of Ayurvedic Pharmacopoeia. In this investigation, the detailed pharmacognostical description of *Ipomoea sagittifolia* is given in terms of macroscopic and microscopic characters of the selected plant species which is helpful for the botanical identification of the leaves of *Ipomoea sagittifolia* Burn.f. The macroscopic examination of the leaf exhibited the color, shape and size etc., and also microscopic perusal of the leaf revealed epidermis, lamina, midrib, both mesophylls, stomata, calcium oxalate crystal. The preliminary phytochemical screening was done by leaves various extracts and the results shows the presence of alkaloids, carbohydrate, fats and oils, terpenoids, flavonoids, amino acids, tannins and phenolic compounds, glycosides and steroids. The extreme amount of chemical constituents was presented in the chloroform extract of the leaves using

preliminary phytochemical studies. Also physico-chemical constants such as Ash value, Extractive value etc., were determined.

Conclusion

To conclude, the present research could be used as an identifying tool for the standardization of this medicinal plant and it will be more helpful for the characterization of natural plant drugs. Pharmacognostic and phytochemical evaluation was more helps to make sure the actual identification, purity and quality of medicinal plant. The pharmacognostic, physicochemical and phytochemical analyses of *Ipomoea sagittifolia* have been performed. From the studies, the above data's can be employed in the preparation of official monographs and standardization of the plant.

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