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ISSN: 0975-7538  
Research Article

## Pharmacognostical studies on leaves of *Passiflora foetida* linn

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### ABSTRACT

Medicinal plants have more useful effects than their synthetic counterparts as being safer, acceptable, affordable, culturally compatible and suitable for chronic treatments such as HIV/AIDS, malaria, sickle-cell anemia, diabetes and Hypertension. The scope of herbal drugs and the increasing demand especially in the cases of diseases like diabetes, liver, hypertension, cancer, renal diseases, inflammation, infectious diseases, arthritis and skin diseases and keeping in mind the adverse effects of allopathic drugs, the standardization methods of medicinal plants and their extracts have a great importance in the fields of cosmetics and nutraceuticals, which are emerging as two most important segments prominently in the global markets, the Establishment of Pharmacognostical standards has been done for leaves of the plant *Passiflora foetida* Linn.

**Keywords:** Anomocytic; Glandular; Xylem; Pholem; Calcium Oxalate

### INTRODUCTION

Arrangement of plant into groups and subgroups is commonly spoken as classification. The formulation of Taxonomical is mainly laid down by International code of Botanical Nomenclature. It mainly indicates in designing a plant in terms of its genus name and species names. The plant selected for study belongs to family Passifloraceae by Taxonomical Nomenclature

Scientific Name : *Passiflora foetida* (linn.)

Synonyms : wild water lemon, stinking passion flower, Running pop

### Taxonomy

Kingdom : Plantae  
Subkingdom : Tracheobionta  
Super division : Spermatophyta  
Division : Magnoliophyta  
Class : Magnoliopsida  
Subclass : Dilleniidae  
Order : Violales  
Family : Passifloraceae  
Genus : Passiflora  
Species : Foetida

Botanical Name : *Passiflora foetida* (linn.)

### Vernacular Names

Assamese : Junuka phul  
English : Foul Passiflora, Stinking passion flower

Hindi : Gharibel, Gudsar, Phophni-Ki-bel  
Kannada : Kukkiballi, Kukke balli, Kukki balli-  
Manipuri : Lam radhikanachan  
Sanskrit : Mukkopeera  
Tamil : Mupparisavali, Sirupunakkali, Cirupunaikkali  
Telugu : Tellajumiki, Tella jumiki, Gaju tige, Adavi Motala, Thellajumiki.



Figure 1: View of *Passiflora foetida* (Linn)

### History

The leaves, stem, root and fruit of the plant has many advantages which has been in popular but not in use because of its low profile.

### Distribution

This species is native to tropical America, introduced and naturalized in tropical countries. Within India, it is found almost throughout.

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Received on: 24-12-2013

Revised on: 03-03-2014

Accepted on: 08-03-2014

## Description

A fetid, herbaceous, hairy, perennial **vine**, scrambling or climbing to 5 m or more by axillary, unbranched, coiling tendrils with soft to hard, yellow to brown hairs.

## Stems

These are slender, green, round, covered with yellowish fine hairs

## Leaves

These are alternate, thin, ovate to ovate-oblong, 4.5 to 14 cm long, 3.5 to 13 cm wide, 3-lobed with central lobe slightly longer than others, the lobing shallow to halfway to the mid vein, lobe-apices acute; both sides hispid-hirsute; blades 5-10 cm long, equally wide; base cordate, pale green or yellowish, soft but densely hairy, venation distinct; petiole 2 to 10 cm long;

## Flowers

They are solitary in leaf axils, on stalk 3.5 cm long, white to pale-purple or pinkish, about 3 cm across, within corolla is a collar or corona of 2 rows of purple filaments with white tips, spreading out flat and nearly as long as petals, flower subtended by prominent involucre of 3 pale green bracts that are 1- to 3-pinnately divided into numerous segments, the ultimate segments glandular; sepals 5, white, linear, 1.5 cm long, pale; petals 5, linear; stamens 5, anthers large; filaments united in a tube; carpels 3, syncarpous; pistils 3, each with 2- or 3-lobed stigma; ovary intermediate, 1-locular with many ovules.

## Fruits

They have an indehiscent berry or capsule, yellow, red or orange, globular, dry inflated, 2 to 3 cm long, surrounded by the shaggy involucre bracts

## Seeds

They are numerous, wedge-shaped to ovate, about 4 mm long, with coarse reticulate pattern centrally each side, seeds covered with white, sweet pulp. The filamentous corona with purple base and white in upper half, the prominent and persistent involucre of bracts that are pinnately divided, and the disagreeable odor of all parts when crushed are distinguishing characteristics of this species" (Holm *et al.*, 1997; p. 572).

## Ethnomedical Uses

*Passiflora foetida* leaf infusion has been used to treat hysteria and insomnia (Nwosu, 1999). The leaves are applied on the head for giddiness and headache; a decoction is given in biliousness and asthma. The fruit is used as an emetic Acidulant, Aldose-Reductase-Inhibitor, Allergenic, Analgesic, Androgenic, Angiotensin-Receptor-Blocker, and AntiAGE.

## Chemical Constituents

It consists of various chemical compounds such as Alkaloids, Carbohydrates, Glycosides, Tannins & Phenolic compounds, Flavonoids & Lignins.

## MATERIALS AND METHODS

### Anatomical Studies

The Plant Care was taken to select healthy plants and for normal organs. The required samples of different organs were cut and removed from the plant and fixed in FAA (Formalin – 5ml + Acetic acid – 5ml + 70% Ethyl alcohol – 90ml). After 24 hrs of fixing, the specimens were dehydrated with graded series of tertiary-Butyl alcohol as per the schedule given by Sass, 1940. Infiltration of the specimens was carried by gradual addition of paraffin wax (melting point 58-60 C) until TBA solution attained super saturation. The specimens were cast into paraffin blocks.

### Sectioning

The paraffin embedded specimens were sectioned with the help of Rotary Microtome. The thickness of the section was 10-12  $\mu\text{m}$ . Dew axing of the sections was by customary procedure (Johansen, 1940). The sections were stained with Toluidine blue as per the method published by O'Brien *et al.* (1964). Since Toluidine blue is a polychromatic stain, the staining results were remarkably good; and some cytochemical reactions were also 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 bodies etc., wherever necessary sections were also stained with safranin and Fast-green and IKI (for Starch).

For studying the stomatal morphology, venation pattern and trichomes distribution, paradermal sections (sections taken parallel to the surface of leaf) as well as clearing of leaf with 5% sodium hydroxide or epidermal peeling by partial maceration employing Jeffrey's maceration fluid (Sass, 1940) were prepared. Glycerin mounted temporary preparations were made for macerated/cleared materials. Powdered materials of different parts were cleared with NaOH and mounted in glycerin medium after staining. Different cell component were studied and measured.

### Photomicrographs

Microscopic descriptions of tissues are supplemented with micrographs wherever necessary. Photographs of different magnifications were taken with Nikon Labphot 2 Microscopic Unit. For normal observations bright field was used. For the study of crystals, 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. Descriptive terms of the anatomical

features are as given in the standard Anatomy books (Esau, 1964).

## RESULTS AND DISCUSSIONS

### Microscopic characteristics of Leaf

The leaf consists of fairly prominent midrib with thin winglike lamina (Figure 2). The midrib has wide, pyramidal or latently conical adaxial part and wide, semi-circular abaxial part (Figure 3). It is 700 µm thick; the adaxial cone is 250 µm wide and the abaxial part is 600 µm wide. The adaxial conical part consists of narrow epidermal layer and thick mass of collenchyma cells within the cone. The abaxial midrib includes homogeneous thin trolled compact parenchyma cells (Figure 3). The vascular system includes a basal, broadly conical a basal, broadly conical main strand and small, less conspicuous adaxial strand. The adaxial strands consist of two or three isolated xylem elements and a small nest of phloem element. The adaxial strand is surrounding on the lateral and apical portions leg wide hyaline parenchymatous sheath. The abaxial part of vascular strand consists of about 10, short, parallel files of wide angular xylem elements; Phloem occurs in small discrete masses placed beneath each Xylem strand.

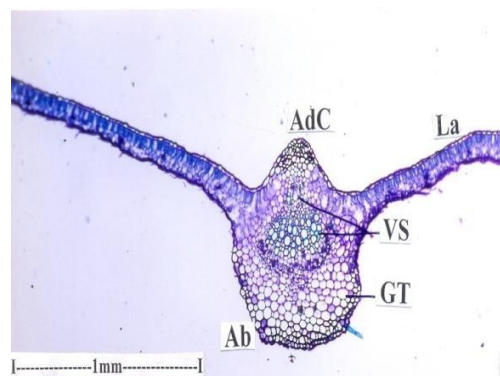
The Lamina (Figure 5) exhibits bilateral symmetry. The adaxial epidermis is thick with large elliptical or rectangular thick walled cells. The abaxial epidermis is comparatively thin with circular or squarish cells. The mesophyll consists of adaxial palisade layer of single row of thick cylindrical cells and abaxial spongy mesophyll tissues of lobed inter connected reticulate cells.

Calcium oxalate (Figure 4) druses are seen in the phloem tissue of the midrib. The druses occurs in normal parenchyma cells; they are solitary or in small groups of two or three crystals. The venation (Figure 6 & 7) pattern in the leaf have veins are thin and less prominent. The veins proliferate freely and do not form distinct vein-islets. The vein-terminations are long, slender branched once or twice. The stomata (Figure 8) occur on the abaxial side of the lamina. The stomata are anomocytic type; no specific subsidiary cells are evident associated with the stomata. The stomata are elliptical in outline with wide stomatal pores. The epidermal cells are large and are amoeboid in outline due to these wavy anti clinal walls.

The Petiole (Figure 9) is semi circular with adaxial flat side. It is 1.8 cm in diameter. It consists of thin continuous epidermal layer followed by two layer of collenchyma cell. The ground tissue is parenchyma tons and compact. The vascular system multi-stranded; of the 8 strands, 7 strands are arranged n a ring and 8<sup>th</sup> strand is the largest one which is placed in adaxial median position (Figure 9). The vascular strands are collateral and radially stretched. The smaller strands have 3 or 4 radial rows of circular, wide xylem elements and rectangular phloem segments situated at the centre

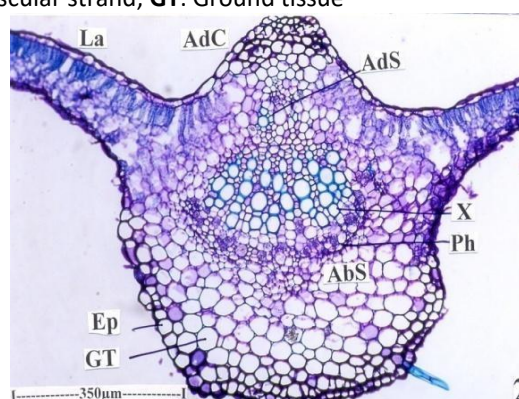
ends of the strands. The large adaxial median strand ha about seven row of longer chains of xylem elements and four masses of phloem (Figure 9).

The leaf powder is seen small fragments of epidermis, trichomes and parenchyma cells. The epidermal cells are small, polygonal and thick thin walled (Figure 11). The anticlinal walls are straight. The epidermal trichomes of glandular and non glandular type are common in the powder. The non glandular trichomes are unicellular, unbranched and needle like (Figure 10). Glandular trichomes are large multicellular, multiseri-ate and elevate in shape. They have thick cylindrical stalk and conical body (Figure 10).



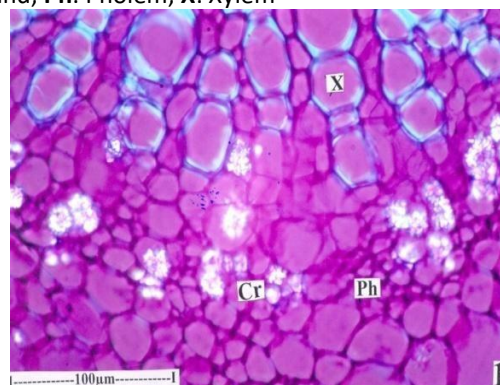
**Figure 2: T.S of Leaf through Midrib**

**Ab:** Abaxial part; **Adc:** Adaxial cone; **La:** Lamina **Vs:** Vascular strand; **GT:** Ground tissue



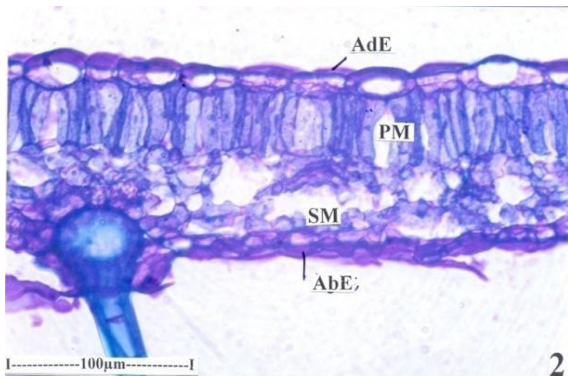
**Figure 3: T.S of Midrib**

**Adc:** Adaxial cone; **AbS:** Abaxial vascular strand; **Ep:** Epidermis; **GT:** Ground tissue; **LA:** Lamina **AdS:** Adaxial strand; **Ph:** Phloem; **X:** Xylem



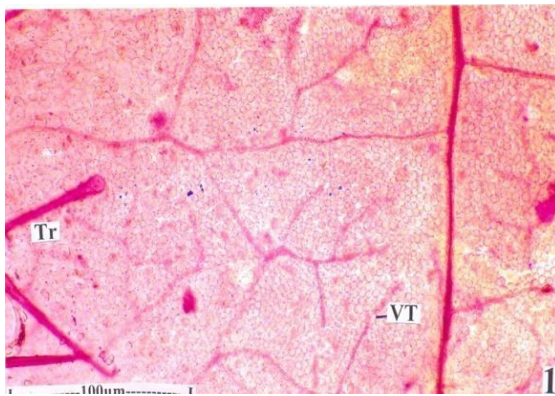
**Figure 4: Crystal Distribution in Midrib**

**X:** Xylem; **Cr:** Crystals; **Ph:** Phloem



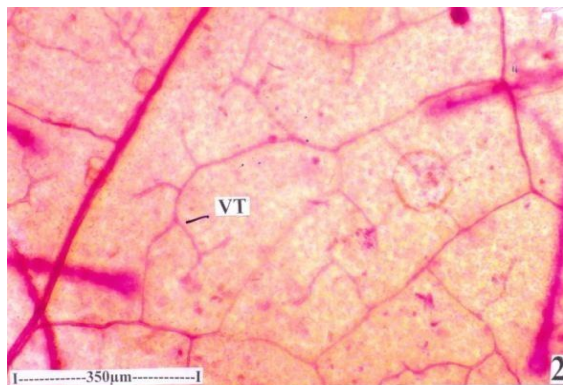
**Figure 5: T.S of Lamina**

**AbE:** Abaxial Epidermis; **SM:** Spongy mesophyll; **AdE:** Adaxial Epidermis; **PM:** Palisade mesophyll



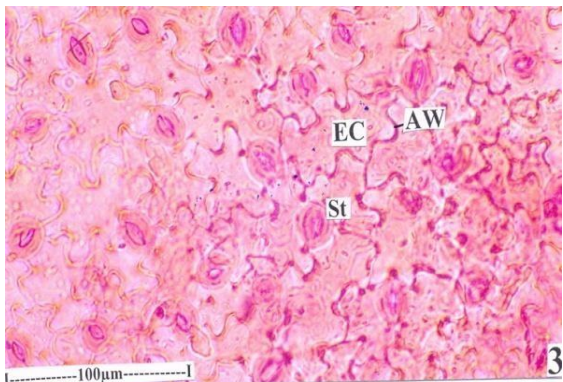
**Figure 6: Venation of Lamina**

**Tr:** Trichomes; **VT:** Vein termination



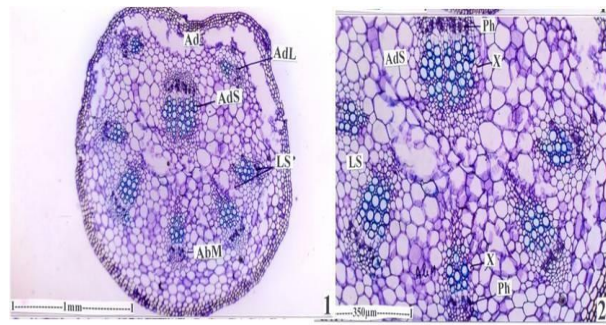
**Figure 7: Venation of Lamina**

**VT:** Vein termination



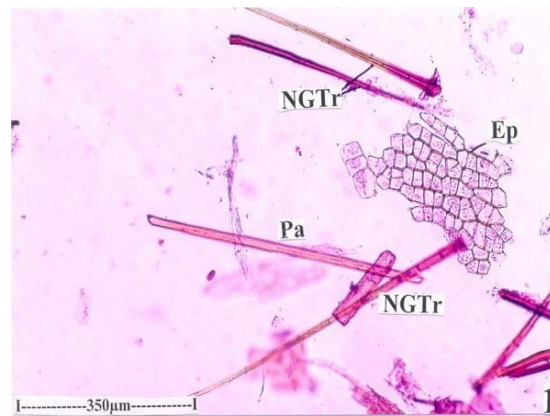
**Figure 8: Abaxial Epidermis showing Stomata**

**EC:** Epidermal Cells; **St:** Stomata; **AW:** Anticlinal Wall



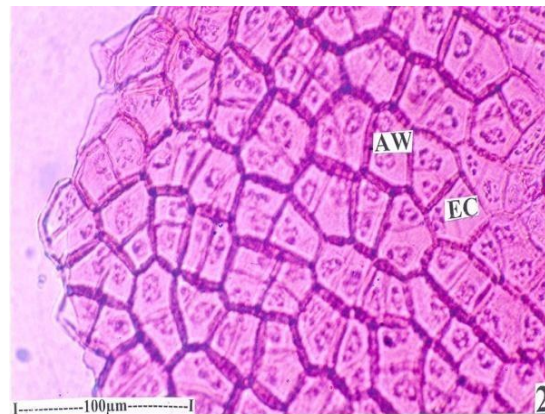
**Figure 9: T.S and Vascular Strands of Petiole**

**AbM:** Abaxial Median strand; **Ad:** Adaxial Part; **AdS:** Adaxial Strand; **LS:** Lateral Strand; **AdL:** Adaxial lateral strand; **Ph:** Phloem **X:** Xylem



**Figure 10: Non Glandular Trichomes of Leaf Powder**

**NGTr:** Non glandular Trichomes; **Pa:** Parenchyma



**Figure 11: Epidermal Fragment**

**AW:** Anti clinical Walls; **EC:** Epidermal Cells

## CONCLUSION

The Pharmacognostical study was carried out with a focus on bringing out diagnostic characters will be of immense help in the proper identification and standardization of *Passiflora foetida*. It will also help in carrying out further research and revalidation of its use in Ayurveda.

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