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PHARMACOBOTANICAL, PHYSICOCHEMICAL AND PHYTOCHEMICAL INVESTIGATION OF *CROTALARIA LONGIPES* WIGHT & ARN (FABACEAE): A COMPREHENSIVE PHARMACOGNOSTICAL STUDY

KOILPITCHAI PAULPRIYA[1], PIOUS SORIS TRESINA[2], VEERABAHU RAMASAMY MOHAN[2*]

1: Department of Botany, Seethalakshmi Achi College for Women, Pallathur-630107, Sivagangai District, Tamil Nadu, India

2: Ethnopharmacology unit, Research Department of Botany, V. O. Chidambaram College, Tuticorin-628 008, Tamil Nadu, India

***Corresponding Author: E Mail: Veerabahu Ramasamy Mohan: vrmohanvoc@gmail.com**

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ABSTRACT

Crotalaria longipes Wight & Arn (Family: Fabaceae) is an endemic herb. *Crotalaria* species have been reported to contain alkaloids, saponins and flavonoids having antileukemic, antitumour, antispasmodic, antineoplastic, cardio depressant and hypotensive properties. However, perusal of literature survey reveals that no published work is available till date on the pharmacognostic characterization and physico-phytochemical analysis of this conservation concern taxon. Thus the present study deals in detailed pharmacobotanical, physicochemical, fluorescence analysis and phytochemical properties of aerial part of *Crotalaria longipes*. Pharmacobotanical features were examined by macroscopic and microscopic analysis of fresh leaves and stem. Physicochemical analysis recorded more acid insoluble ash than water soluble ash. Powdered samples were treated with different reagents and subjected to fluorescence analysis under ordinary, short and long wavelength UV light. Phytochemical analysis revealed that the presence of alkaloid, anthraquinone, catachin, coumarin, flavonoid, phenol, quinone, saponin, steroid, tannin, terpenoid, sugar, glycoside and xanthoprotein. The above parameters are being accounted for the first time and would present

valuable pharmacognostical data of the unexplored endemic species and will also be important towards establishing right identification and quality standards.

Keywords: *Crotalaria longipes*, Phytochemical analysis, Endemic, Pharmacognostic studies

INTRODUCTION

Nature has provided a whole store-house of remedies to treat all ailments of mankind. The knowledge of drugs has accumulated over thousands of year as a result of man's inquisitive nature. So that today we possess many effective means of healthcare. In the past almost all the medicines used were from the plants being, man's only chemist for ages. Today a vast store of knowledge concerning therapeutic properties of different plants has accumulated **(Anandanayaki & Uma, 2014)**. Plants produce many chemical compounds. (phytochemicals) that have defensive properties for the protection against diseases **(Salna *et al*., 2011)**.

Nowadays, because of the development of modern and new sophisticated methods, scientists are taking more attention to explore new drugs from natural and biologically active compounds of the plants, which may provide as an endless source for pharmaceutical industries. It is therefore necessary to establish a worldwide documented guiding principle for the evaluation and standardization of the quality of plants **(Sarada *et al*., 2014 & Lalitharani *et al*., 2013)**.

The process of standardization of plants can be attained by stepwise pharmacognostic studies. Simple pharmacognostic techniques employed in standardization of plant material comprise its morphological, anatomical, physicochemical and biochemical kind **(Anonymous, 1998; Kalidass *et al*., 2009)**. Accurate identification of the plant and quality assurance is an integral part to ensure reproducible quality of crude drug before including in the pharmacopoeia **(Mansuri *et al*., 2014)**.

The genus *Crotalaria* Linn. (Fabaceae) has 300 species wide-reaching and about 18 species are accounted in India. *Crotalaria* species have been reported to contain alkaloids, saponins, and flavonoids as a notable chemical markers with basic N-oxides of the genera Fabaceae having antileukemic, antitumour, antispasmodic, antineoplastic, cardio depressant, hypotensive properties **(Nuhu *et al*., 2009 & Devendra *et al*., 2012)**. The leaves are the exceptional remedy for ptyalism, scabies, diarrhea and impetigo. The seeds were powdered and boiled in milk and were used for enhancing body strength, life span and also for curing skin diseases, leprosy, flatulence and fever **(Warrier, 1994)**.

The genus *Crotalaria* has the largest number of threatened species listed in the Red Data Book. *C. longipes* is one among the 15 species listed in the Red Data Book. It is a woody shrub growing up to 4m tall with bright yellow flowers endemic to Nilgiris and Kolli Hills. However, perusal of literature survey reveals that pharmacognostic and phytochemical investigation of *C.longipes* is totally lacking. The objective of the present study is to evaluate various pharmacognostic standards like macroscopic, qualitative microscopic, physicochemical constant, fluorescence analysis and qualitative preliminary phytochemical analysis of *C. longipes*. The current work will offer referential data for the correct recognition and standardization of the crude drug and will ensure the use of only authentic and uniform material in research of herbal formulation.

MATERIAL AND METHODS

The aerial parts of *C. longipes* Wight & Arn was collected from Kothagiri, Nilgiris Biosphere Reserve, Tamil Nadu. With the help of flora, voucher specimen (VOCB 4098) were identified and authenticated in Botanical Survey of India, Southern circle, Coimbatore, Tamil nadu, India. A voucher specimen was deposited in the Ethnopharmacology Unit, Research Department of Botany, V. O. Chidambaram College, Tuticorin, Tamil Nadu for further references.

Macroscopical studies: The macroscopic characters like surface, venation, shape, size, phyllotaxy, length of the petiole, length of the leaf etc were renowned.

Anatomical studies: For anatomical studies, the needed sections of leaf and stem were cut and eliminated from the plant and instantaneously fixed in FAA (acetic acid- 5 ml + formalin- 5 ml + 70% Ethyl alcohol- 90 ml). The specimens were left in the preservative for two days; then the materials were washed in water and processed further. Standard microtome techniques were followed for anatomical investigation (Johanson *et al*., 1940). Transverse sections of the materials were made. The microtome sections were stained with 0.25% queous Toluidine blue (Metachromatic stain) adjusted to pH 4.7 **(O'Brien *et al*., 1964)**.

Photomicrographs were taken with NIKON trinocular photomicrographic unit.

Physicochemical and fluorescence analysis: These studies were carried out as per the standard procedures **(Lala. *et al* 1993)**. In the present study, the powered whole plant was treated with various chemical reagents like aqueous 1N sodium hydroxide, alcoholic 1N sodium hydroxide, 1N hydrochloric acid, 50% sulphuric acid, acetic acid, ferric chloride concentrated

nitric acid, picric acid, and concentrated HNO_3+NH_3 These extracts were subjected to fluorescence examination in day light and UV light (254nm and365nm). Various ash types and extractive values were determined by following standard methods **(Anonymous, 1996)**.

Preliminary phytochemical analysis: Shade dried and powdered aerial part samples were successively extracted with petroleum ether, benzene, ethyl acetate, methanol and ethanol. The extracts were filtered and concentrated using vacuum distillation. The different extracts were subjected to qualitative tests for the identification of various phytochemical constituents as per the standard procedure **(Lala *et al*., 1993 & Brinda *et al*., 1981)**.

RESULTS

Morphological characteristics (Macroscopic)

Shrub upto 3 m height. Leaves simple, alternate, 1.7-7.5 x 1.0-3.1 cm (smaller in flowering branches, up to 1 cm long), obovate-oblong, elliptic-oblong, elliptic-ovate or oblanceolate, obtuse, subacute or cuneate at base, acute or subacute, obtuse, and mucronate or apiculate at apex, fairly and minutely adpressed silky pubescent on either sides, upper side shining and approximately silvery; distinct on both sides, lateral veins 6-8 pairs, joining intramarginally; petiole 1-3 mm long, hairy; stipules not present. Panicles terminal and lateral, branches 6-11, stiff, 12-22 cm long. Flowers 1.5-2.0 x 1.0-1.3 cm, 3-4 at the top of each branch, crowded; pedicels alternate, 0.2-1.2 cm long, hairy; bracts foliaceous, impulsed or spreading, one or more at the base of pedicels or occasionally many on the peduncle, acuminate, ovate or ovate-lanceolate, 4-8 x ca 2.5 mm, hairy above, blackish and glabrous beneath, margins involute and at times curved in lower portion; bracteoles 2, ovate, closely adpressed to calyx ca 3 mm long, or at about the middle of pedicel, reflexed or spreading, hairy above, glabrous beneath. Calyx-tube ca 3 mm long, sericeous, lobes 2-lipped, upper 2-fid, lower 3-fid, lanceolate, 7-9 mm long, acuminate, incurved upwards, not revolute on margins. Petals yellow, twice as long as calyx; vexillum broadly ovate, 1.7-2.0 x ca 1.5 cm, obtuse-acute at apex, densely ferruginous silky pubescent above on the whole surface; wing petals oblong, ca 1.5 x 0.4 cm, claw arcuate; keel petals ovate, ca 1.8 x 1.0 cm. Staminal sheath ca 6 mm long; free filaments 0.5-1.0 cm long; longer anthers oblong, ca 3 mm long; ca 0.5 mm long shorter anthers ovoid. Style ca 1.5 cm long, ovary ca 4 mm long; densely pubescent on sides at the apex; ovules ca 10. Pods stalked, linear-oblong or oblong, 2-3 x 1.0-1.2 cm, nearly glabrous, blackish-

brown; stalks 4-7 mm long; seeds 8-12 **(Image 1)**.

Qualitative microscopical characters

Transverse section of leaf:

The leaf consists of thick midrib which is broadly convex on the adaxial side and thick and broad semi circularabaxial side **(Figure 1a)**. The midrib is 3.4mm thick and 4.9mm wide. The epidermal layer of the midrib is thin comprises small, squarish, thick walled cells. The ground tissue towards the periphery includes small angular thick walled collenchyma cells. The remaining ground tissue is parenchymatous, the cells being larger, angular, thin walled and compact **(Figure 1b)**. The vascular strand is wide and arc shaped with collateral xylem and phloem. The vascular arc is 550 µm thick. It consists of several vertical rows of xylem elements with narrow gaps in between the lines **(Figure 1b)**. The xylem elements are angular, elliptical or circular. They are wide with very thick lignified cell walls **(Figure 1b)**. Phloem occurs along the abaxial surface of the xylem arc.

Lamina:

The lamina is thin with uneven surfaces. It is 600µm thick. The adaxial epidermis of the lamina is rectangular and thick walled. The abaxial epidermis is thin with small, circular epidermal cells. Wide, circular mucilage secreting cells are seen within the mesophyll tissue **(Figure 1.a, b,)**. The mesophyll tissue is not distinctly differentiated into palisade and spongy parenchyma cells.

Paradermal sections of the lamina:

In paradermal sectional view, large number of non- glandular epidermal trichomes are seen. These trichomes are attached to circular, thick walled epidermal cells surrounded by about 8 radiating epidermal cells. Some of the epidermal trichomes are short measuring 130-300µm long and 40µm thick. There are longer slightly narrow epidermal trichomes originating from circular epidermal cells. These trichomes are 550µm long and 30µm thick **(Figure 1c)**.

Epidermal cells and stomata:

In surface view of the lamina the epidermal cells appear polygonal in outline with thick and straight anticlinical walls. Stomata are seen in abundance and they are tetracytic type. Sometimes pentacytictype are also seen. The guard cells are wide and elliptical measuring 30×40 µm in size **(Figure 1d)**.

Venation pattern:

The venation system is densely reticulate. There are well defined polygonal vein islets with thick vein boundaries. Within the vein islets are seen thick straight and short vein terminations. The terminations either are simple (unbranched) or forked vein terminations. At the ultimate end of the

vein terminations there are clusters of short, wide and thick terminal tracheides **(Figure 1e)**.

Transverse section of petiole:

The petiole is about 6mm thick. It is slightly convex on the adaxial side and wide semicircular part on the abaxial side. The epidermis is thin and produces dense non- glandular epidermal trichomes. The ground tissue is homogeneous and paranchymatous. The cells are angular, thin walled and compact. The vascular strand is cup shaped and collateral. The xylem elements are in long, compact vertical lines. The xylem cells are wide, angular and thick walled. Mixed with xylem elements are thick walled and lignified xylem fibres. Phloem occurs in thick band along the abaxial part of the vascular strand. The phloem elements are in two layers of small discrete masses. The phloem elements are small, thick walled and darkly stained. Abutting the phloem band there is a thick arc of sclerenchyma elements **(Figure 1f)**.

Transverse section of stem:

The stem is rectangular with uneven outline in cross sectional view **(Figure 2a)**. The stem consists of thin epidermal layer which bears dense non- glandular epidermal trichomes. The cortical zone is wide comprising outer 2 or 3 layers of small thick walled cells and inner zone of large, angular, compact paranchyma cells **(Figure 2a)**. Inner to the cortex is the phloem zone where there are several discrete masses of sieve elements. The sieve elements are small thick walled and angular **(Figure 2 c, e, f)**. Mixed with the sieve elements are circular, wide parenchyma cells.

Following the phloem zone is seen the cambial zone which has produced several independent wedge shaped xylem bundles **(Figure 2, d)**. Each xylem strand includes short or long radial files of xylem elements. The xylem elements are wide, angular and thick walled. The xylem elements are mixed with alternating lines of xylem fibres. The metaxylem elements are about 50µm in diameter. In between the vascular bundles are seen wide paranchymatous medullary rays. The pith is wide and includes large, angular thick walled parenchyma cells.

Powder characteristics

The powder of the plants shows the following inclusion.

i) Epidermal trichomes **(Figure 3a,b,c,d)**

The epidermal trichomes are abundant. They are non glandular type. The trichome has short rectangular basal cell and long, narrow unicellular upper part. The trichomes have thin walls and wide lumen. They have printed ends. When the trichomes are viewed under polarized light they

appear bright under dark background. This indicates that the cell walls are lignified. The trichomes are 540µm long and 20µm wide.

ii) Parenchyma cells **(Figure 3 e, f)**

Parenchyma cells are abundant in the power. The ground parenchyma cells are spherical with thin walls **(Figure 3 e)**. Mixed with xylem strands are seen thick vertical bundles of elongated cells. These long parenchyma cells have thin walls, wide lumen and dense masses of protoplast. The spherical type of parenchyma cells 60µm in diameter. The elongated parenchyma cells are 200 µm long and 30µm wide.

iii) Vein Terminations **(Figurre 3 g)**

Small broken pieces of lamina are seen in the powder which exhibit vein islets and vein termination. The vein terminations are short, thick and straight.

iv) Lipid **(Figure 3h)**

Large circular masses of lipids are abundant in the mesophyll tissue. These masses appear bright brown and they seem to be lipid bodies.

Powder analysis of the drug

The results of the ash and extractive values of *C.longipes* aerial part drug powder are depicted in **Table 1**. The total ash content of the powdered aerial part is 8.94% and extractive value in water is more than in other solvent investigated. The results of fluorescent analysis of aerial part of *C.longipes* are shown in **Table 2**. The aerial part powder shows the characteristic fluorescent green colour treated with 1N hydrochloric acid, concentrated sulphuric acid, 50% sulphuric acid, concentrated hydrochloric acid, 50% nitric acid and acetone under short UV light. The results of preliminary phytochemical screening of aerial part extract of *C.longipes* are presented in **Table 3**. The methanol and ethanol extracts of aerial part shows the presence of alkaloid, anthraquinone, catechin, coumarin, flavonoid, phenol, quinone, saponin, steroid, tannin, terpenoid, sugar, glycoside and xanthoprotein.

Image 1: Habit of *Crotalaria longipes* Wight & Arn

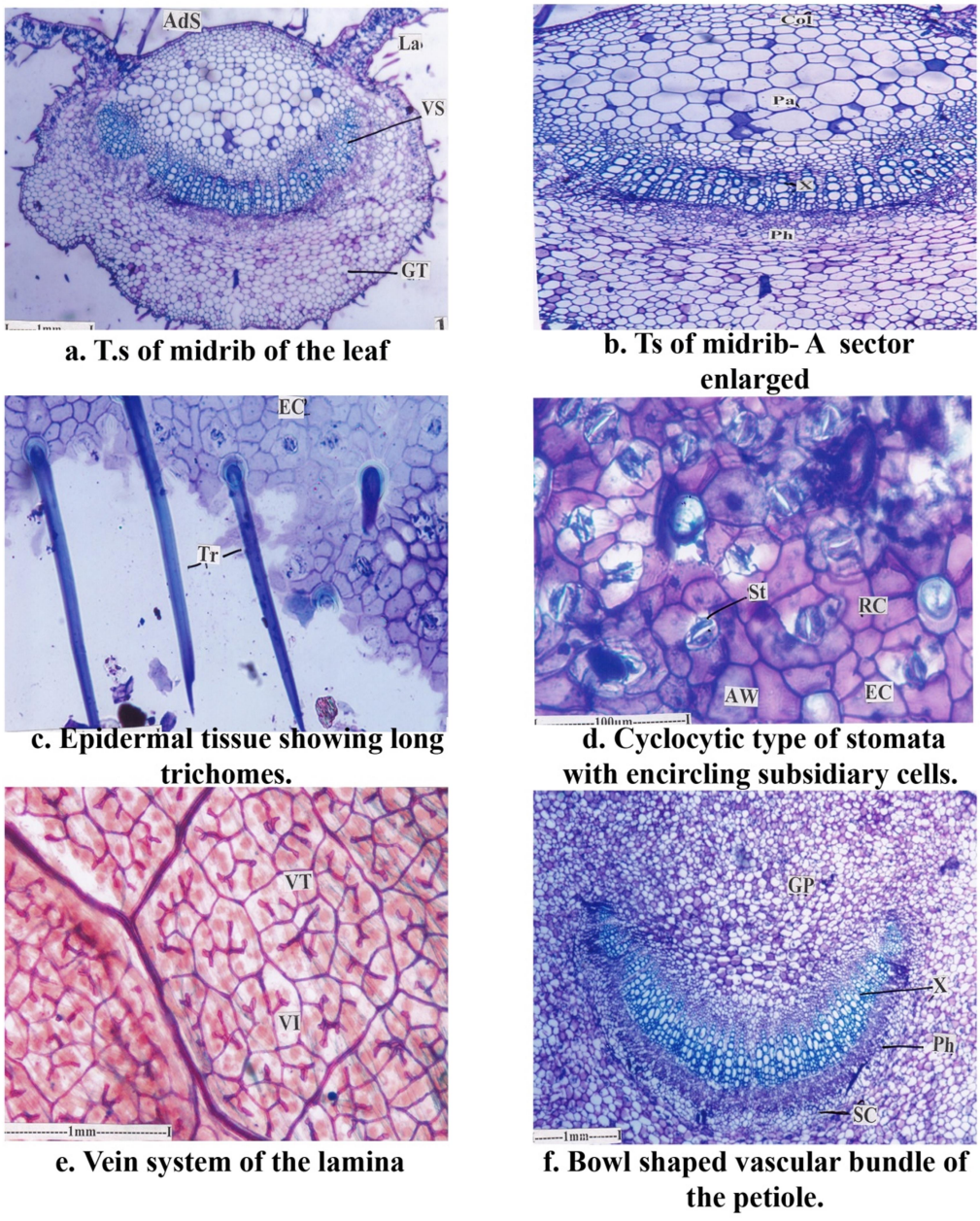
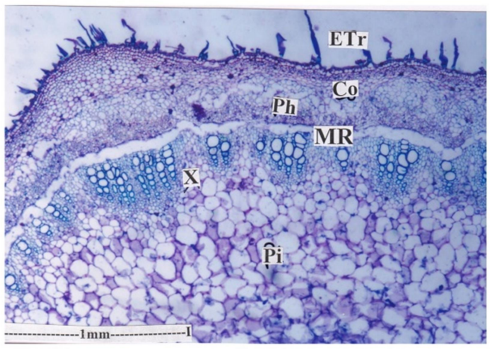
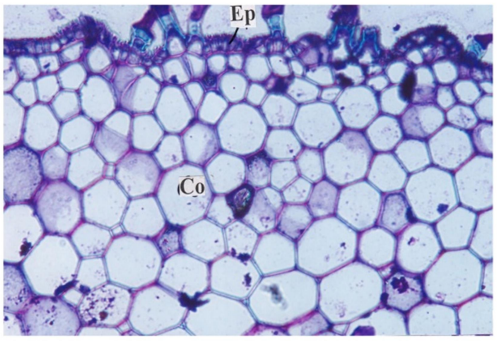


Figure 1: ***Crotalaria longipes*** **Wight & Arn Anatomy of the leaf**

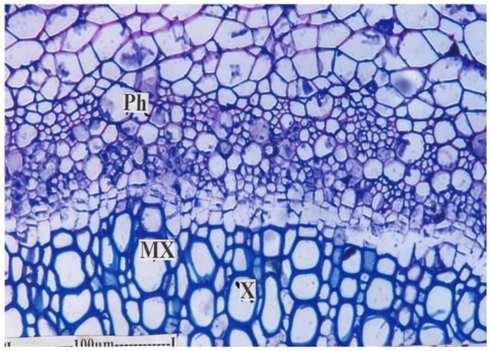
Ads-Adaxial side, GT- Ground tissue, La-lamina, Mx-metaxylem, Px-protoxylem, vs-vascular strand,Col-colenchyma cells, Pa- Parenchyma, Ph-Phloem, X-Xylem, Ec-Epidermal cell, Tr-Trichome,AW-Anticlinal walls, Ec-Epidermal cells, Rc- Rosette cells, Sc-Subsidary cells, St-Stomata, Tc- Trichome producing cells, TTr-Terminal tracheids, VI- Vein islets, Vein termina-



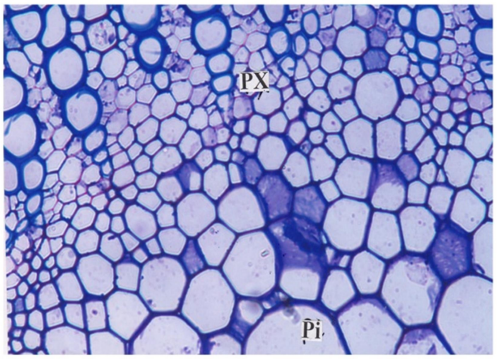
a. T.s of stem A sector enlarged



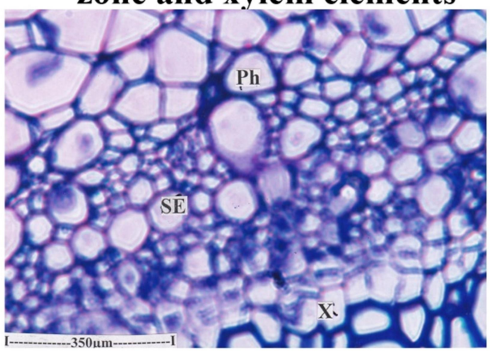
b. T.s of stem- cortical zone



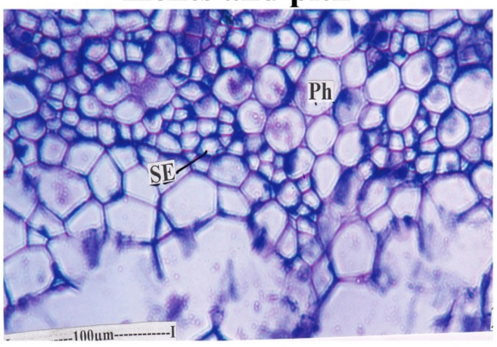
c. T.s of stem- phloem zone and xylem elements



d.T.s of stem- protoxylem elements and pith



e. phloem elements of the stem-Enlarged



d. phloem elements of the stem-Enlarged

Figure 2: *Crotalaria longipes* Wright & Arn Anatomy of the stem

Co-Cortex,Pi- Pith, Ph- Phloem, X-Xylem,
Etr- Epidermal trichome, MR- Medullary ray, Mx- metaxylem,
Pi- Pith, Px- Protoxylem.

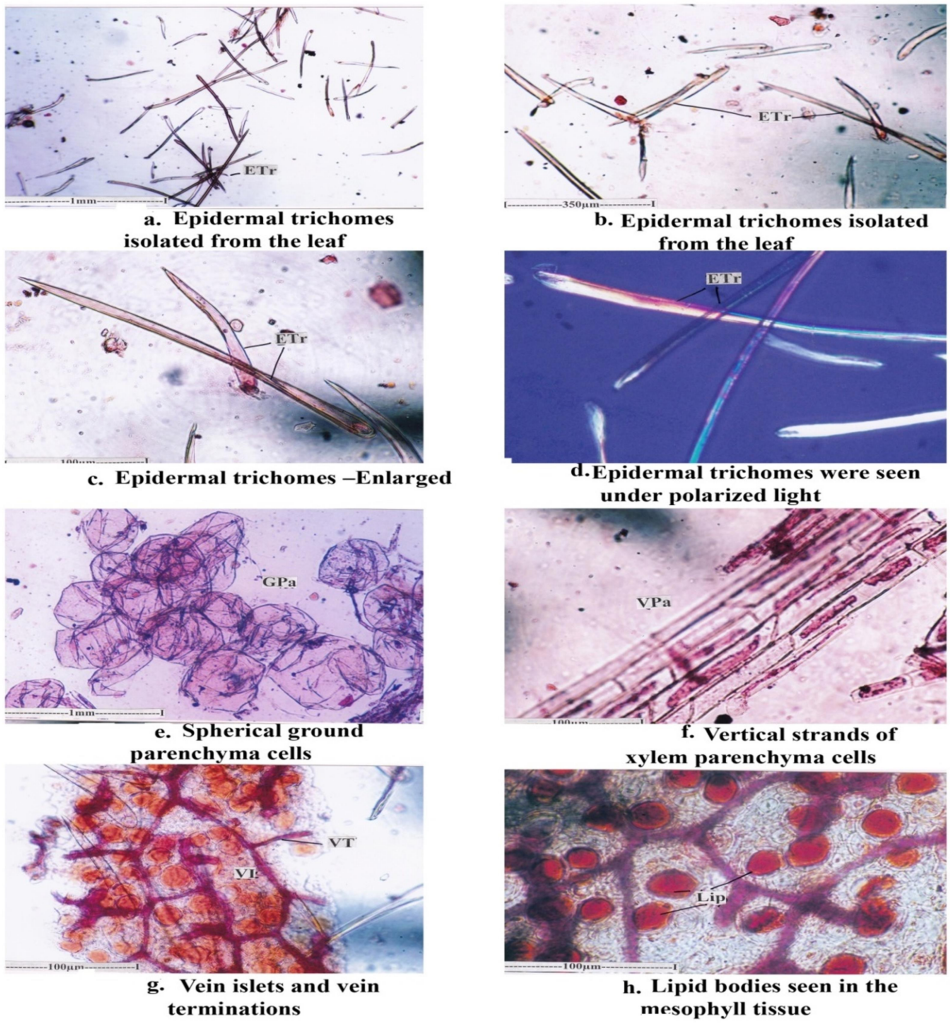


Figure 3: ***Crotalaria longipes*** **Wight & Arn powder microscopy**

ETr - Epidermal trichomes, Gpa- Ground parenchyma, VPa- Vertical parenchyma, Lip- Lipids, VI- Vein islets, Vt- Vein terminations

Table 1: Ash and extractive values of powdered aerial part of *C. longipes*

Ash values		
S. No.	**Type of ash**	**% of ash *C. longipes***
1	**Total ash value of powder**	**8.94±0.010**
2	**Water soluble ash**	**2.62±0.01**
3	**Acid insoluble ash**	**3.40±0.03**
4	**Sulphated ash**	**9.21±0.06**
Extractive values		
S. No.	**Name of the extract**	**Extractive value (%)**
1	**Petroleum ether**	**5.62±0.02**
2	**Benzene**	**5.84±0.03**
3	**Chloroform**	**6.02±0.05**
4	**Acetone**	**6.86±0.04**
5	**Methanol**	**7.41±0.08**
6	**Ethanol**	**7.86±0.04**
7	**Water**	**8.24±0.11**

[a] **All values are means of triplicate determinations ± denotes standard error**

Table 2: Fluorescent analysis of powdered aerial part of *C. longipes*

S. No.	Experiments	Visible/ day light	UV -light	
			254 nm(short wave length)	365 nm (long wavelength)
1	Powder as such	Green	Dark green	Dark green
2	Powder+1NNaOH(Aqueous)	Yellowish green	Greenish yellow	Dark green
3	Powder+1N NaOH(Alcohol)	Yellowish green	Greenish yellow	Dark green
4	Powder +1N HCL	Green	Fluorescent green	Brown
5	Powder +Conc. H_2SO_4	Light green	Fluorescent green	Dark blue
6	Powder +50% H_2SO_4	Green	Fluorescent green	Dark green
7	Powder +Conc.HNO_3	Green	Green	Dark green
8	Powder +Conc.HCL	Light green	Fluorescent green	Bluish green
9	Powder +50%HNO3	Yellowish green	Fluorescent green	Brown
10	Powder +40%NaOH + 10% Lead acetate	Pale green	Dark green	Dark green
11	Powder +Acetic acid	Green	Light green	Dark green
12	Powder +Ferric chloride	Dark green	Dark green	Dark green
13	Powder +HNO_3 +NH_3	Yellowish green	Yellowish green	Dark blue
14	Powder +HNO_3	Green	Yellowish green	Blue
15	Powder +Benzene	Yellowish green	Pale yellow	Dark brown
16	Powder +Petroleum ether	Yellowish green	Yellowish green	Dark green
17	Powder +Acetone	Dark green	Fluorescent green	Dark green
18	Powder +Chloroform	Yellowish green	Pale yellow	Brown
19	Powder +Methanol	Yellowish brown	Pale yellow	Dark brown
20	Powder +Ethanol	Yellowish green	Green	Dark brown

Table 3: Preliminary phytochemical screening of whole plant of *C. longipes*

Test	Petroleum ether	Benzene	Ethyl acetate	Methanol	Ethanol
Alkaloid	-	-	+	+	+
Anthraquinone	+	-	+	+	+
Catechin	+	-	+	+	+
Coumarin	-	+	+	+	+
Flavonoid	-	+	+	+	+
Phenol	+	-	+	+	+
Quinone	-	+	-	+	+
Saponin	-	-	+	+	+
Steroid	-	+	+	+	+
Tannin	-	-	+	+	+
Terpenoid	+	+	+	+	+
Sugar	-	-	+	+	+
Glycoside	-	-	+	+	+
Xanthoprotien	-	-	-	+	+
Fixed oil	+	+	+	-	+

+ Presence - Absence

DISCUSSION

The standardization of a crude drug is an integral part of establishing its correct identify. Before any crude drug can be incorporated in an herbal pharmacopoeia, pharmacognostic parameters and standards must be created. Literature dealing with the anatomy of *C. longipes* is completely lacking. The present study is the first comprehensive investigation of the leaf and stem of *C. longipes.* The present investigation has laid down a set of anatomical features of the leaf and stem which can be employed for its botanical diagnosis. The following are the salient features of identification of the fragmentary samples are;

- The midrib of the leaf is biconvex in sectional view comprising thicker

semicircularabaxial part and slightly raised adaxial part

- The vascular strand is broadly cup shape, collateral and includes numerous parallel long lines of thick walled xylem elements and thick abaxial layer of phloem units.
- The lamina in simple and thin with less distinct differentiaton of palisade and spongy mesophyll.
- Large cavities filled with mucilaginous substance are common in the lamina
- Non-glandular, unbranched, unicellular, short and long types of epidermal trichomes common on the lamina
- The stomata are cyclocytic type with four to six subsidiary cells encircling guard cells
- The epidermal cells bearing the trichomes are circular is surface view surrounded by many radiating rosette cells.
- The venation system of the lamina is densely reticulate with short thick forked vein-terminations. The tip of vein-terminations bears a small cluster of terminal tracheids.
- The petiole is thick and biconvex with dense epidermal trichomes, parenchymatous ground tissue and wide bowl shaped vascular strand, which collateral is having phloem on the outer part of the xylem.
- The stem is broadly elliptical with shallow furrow on two opposite sides. The stem surface is densely trichomatous.
- The vascular system is primary system with thin hollow cylinder of primary xylem and phloem.
- The xylem cylinder includes several discrete wedge shaped collateral vascular bundles of varying sizes. The xylem elements are wide circular and thick walled.
- Phloem includes several small clusters of sieve elements which are darkly stained and thick walled.

The powder preparation of the plant exhibits following inclusions

- Non- glandular, unicellular sun-branched epidermal trichomes are abundantly have thick walls, wide lumen, pointed tip and lignified walls.
- Parenchyma cells are abundant. The ground parenchyma cells are spherical, thin walled and aggregated.
- Vertically elongated, rectangular thick walled parenchyma cells are seen in small vertical bundles. These parenchyma cells have prominent and dense protoplasts.

- Fragments of veins are often come across in the powder. The possess vein islets and forked or simple vein termination.
- Spherical bodies, stained reddish brown are abundant in the powder. They are oil bodies freely distributed in the lamina.

Physicochemical parameters

Physicochemical standardization is a prerequisite in quality control of herbal drugs. The effectiveness of herbal drug mostly depends upon its physical and chemical properties. Therefore, the determination of physicochemical characters for the authenticity of the drug is necessary before subjected to pharmacological activities. The qualitative and quantitative analysis of major bioactive chemical components of crude drug constitute important and reliable part of quality control protocol as any change in the quality of the drug directly affects the constituents **(Thirumurugan *et al*., 2008)**.

Ash and extractive values

Evaluation of ash and extractive values of crude drugs will help in the identification and determination of its purity and quality (Kokate *et al*., 2010). Ash value determination is a very important tool to access the quality of herbal raw material since higher ash value is an indication of adulteration and or improper processing of raw material. The percentage variation of the weight of ash in certain drugs from sample to sample is very small and any marked difference indicates a change in quality **(Sanghai *et al*., 2015)**. Ash value indicates presence of various impurities like carbonate, oxalate and silicates. The water soluble ash is used to estimate the amount of inorganic compound present in drugs. The acid insoluble ash consists of mainly silica and indicates contamination with earthy material **(Menpara *et al*., 2014)**. In the present investigation, a considerable amount of total ash (8.94%) was noticed in aerial part of *C.longipes* and this finding can be employed as a quality parameter to evaluate *C.longipes* biomass for any adulteration. As the ash values are constant for a given drug these values are furthermore one of the diagnostic parameters of the drug.

The extractive values are functional to evaluate the chemical constituents near the crude drug and also assist in estimation of specific constituents soluble in a scrupulous solvent. Higher extractive value of petroleum ether extract is due to the presence of fixed oil and fat. Water soluble extractive value is higher than any other solvent, which

indicates the presence of higher polar chemical constituents such as flavonoids, proteins, carbohydrates etc. It makes a valuable test to check the quality of drug and any variation in the chemical constituents may cause a change in the extractive values. Thus, it helps in the determination of the adulteration and is an index of the purity of drug. The extractive values of aerial part of *C.longipes* were determined by extraction in different solvents. The variation in the extractive values may be possible due to the presence of specific compound, solubility, soil condition, atmospheric condition and water content of the same (Nasrim *et al*., 2008).

Fluorescence analysis

The fluorescence quality of powdered drug plays a fundamental role in the purpose of quality and purity of the drug material. In the current study, aerial part powder of *C.longipes* treated with different reagents explained characteristic fluorescence at 254 nm and 366 nm wavelength. Some constituents showed fluorescence in the visible range in daylight. The ultra violet light produces fluorescence in many natural products which do not visibly fluoresce in day light. If substance themselves are not fluorescent; they may often be converted in to fluorescent derivatives or decomposition products by applying different reagents. The organic molecules absorb light over a specific range of wavelength and remit radiations and hence it can be used for the identification of the powdered drug, extract or fractions of herbs. Hence crude drugs are often assessed qualitatively in this way and it is an important parameter for pharmacognostic evaluation of crude drugs **(Kumar and Kumar, 2012, Rashida *et al*., 2012 & Zhao *et al*., 2011)**.

Preliminary phytochemical analysis

The plants are considered as biosynthetic laboratory for a multitude of compounds that exert physiological effects. Secondary metabolites are the compounds which are responsible for imparting therapeutic effects. The preliminary phytochemical analysis will give an idea about the chemical nature of the drug. The information obtained will be useful in further structural characterization of the nature of constituents present in the plant material under investigation. It could be also helpful to extract out particular constituents by a particular solvent. The preliminary qualitative phytochemical investigation of *C.longipes* aerial part was performed which exhibited the

presence of alkaloid, anthraquinone, catechin, coumarin, flavonoid, phenol, quinone, saponin, steroid, tannin, terpenoid, sugar, glycoside and xanthoprotein.

Such data is useful in identification and standardization of plant drug and in this study, it is *C. longipes* leaf and stem and such standardization parameters will help in identifying the drug even in the powdered form and it can be easily distinguished and identified form adulterants. Thus such parameters are helpful and are of great value in the quality control and formulation development. Establishing standards is an integral part of establishing the correct identity and quality of a crude drug. The microscopic characters, the physicochemical studies and fluorescence analysis can be used for the quality control of the crude drug. Such a pharmacognostic study is helpful for standardizing crude drugs and can be employed to differentiate closely associated species. Various physicochemical parameters established can be important in detecting adulteration and mishandling of the crude drug. In this dimension pharmacognostic studies on *C. Longipes* is a substantial step and it further requires a long term study to evaluate pharmacological action as well as therapeutic efficacy and toxicity of said plant to establish as the drug. The pharmocognostic study of the *C. longipes* has been carried out for the first time. This could be useful in the preparation of the herbal section of proposed pharmacopoeia.

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