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Pharmacognostical studies on Leaves of *Trichodesma Indicum* Linn.

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ABSTRACT

Nature has been a source of medicinal agents for thousands of years and impressive number of modern drugs on their use in traditional medicines have been isolated from natural source. With increasing demand in the field of herbal medicines and cosmetics, it has become necessary and pertinent to probe into the area of systematic knowledge about herbal drugs. There is a need for the application of this knowledge in authentication, detailed study and practical utilization of crude drugs. In the present study, pharmacognostical studies of leaves was studied with the following parameters: T.S leaf, Powder microscopy, Histochemical colour reaction, fluorescence analysis, Inorganic elements and heavy metal analysis.

Keywords: *Trichodesma Indicum, Pharmacognostical, Fluorescence analysis. Inorganic elements, heavy metals.*

INTRODUCTION

The plant *Trichodesma indicum* Linn belongs to the family Boragainaceae is an important medicinal plant used for the treatment of various diseases. All parts of the *Trichodesma indicum* plant are medicinally very important. Leaves are acrid, bitter in taste. This herb is also used in arthralgia, inflammations, dyspepsia, diarrhoea, dysentery, skin diseases, Wound healing, anti-inflammatory, carminative, constipating, diuretic, & ophthalmic [1, 2]. Root used for anti-inflammatory. The plants has been reported for its anti-inflammatory (Perriyanagam et.al., 2005) [3]. Detailed pharmacognostical studies have not been reported so far. So, an attempt has been made to standardize the drug on the basis of botanical and pharmacological parameters.

MATERIALS AND METHODS

Collection and Authentication:

The leaves of *Trichodesma indicum* Linn were collected from kayatharu in Tirunelveli , Tamilnadu. The plant was identified and authenticated by V.Chella Durai, Research officer, Botanist (Scientist-c), Govt council for Research in Ayurveda & Siddha, Govt. of India (Retired). After collection of fresh leaves of the plant were preserved in FAA solution. The dried leaves were made into coarsely powdered and used for further studies. An exhaustive pharmacognosy study was carried out using standard methodology [7-12].

RESULT

Morphology of leaf:

Type : Simple
Size : 2-8 cm
Shape : Lanceolate
Surface : Upper surface clothed with stiff hair arising from circular tubercles.
Lower surface less densely villous.
Apex : Acute
Margin : Entire
Base : Heart shape
Venation : vertical

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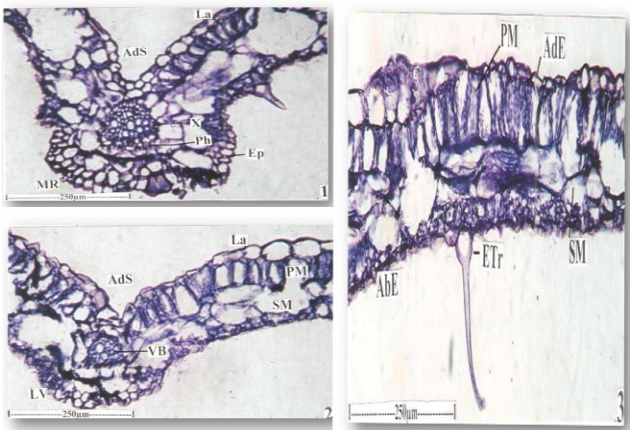
Microscopy:

T.S. of Trichodesma indicum - leaf showed following features:

The leaf consists of a thick semicircular midrib with upwardly directed lamina (**Fig. 1**). The midrib is 250µm thick and 380 µm broad. It consists of thick walled narrow epidermal layer and 3 or 4 layers of ground parenchyma tissue. The vascular strand is single, top shaped and collateral. It includes a few narrow, thick walled clusters of xylem elements and narrow segment of phloem located and the lower part. The bundle is surrounded by radially oblong layer of bundle sheath cells (**Fig.1**) the lateral vein similar to midrib comprising a small vascular strand with narrow groove on the adaxial part of the midrib (**Fig. 2**).

Lamina:

The lamina is bifacial with distriction into adaxial and abaxial sides. The adaxial epidermis is their comprising narrow, cylindrical epidermal cells. The abaxial epidermis consist of fairly wide, rectangular thick walled epidermal cells, epidermal non-glandular trichomes arise from the epidermal cells of adaxial and abaxial layers. The basal part of the trichomes is highly dilated with gradually tapering upper part (**Fig. 3**). The palisade zone consists of single layer of wide compact palisade cells and 2 or 3 wided loosely arranged spongy mesophyll tissue (**Fig. 3**). The lamina is 130µm thick.

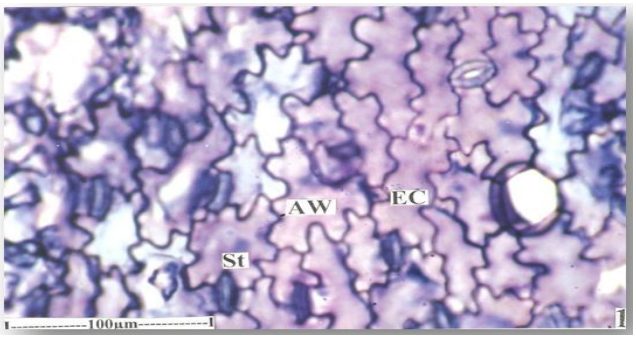


AdS-Adaxial Sides, La-Lamina, X-Xylem, MR-MidRib, Ep-Epidermis, PM-Palisade Mesophyll
SM-Spongy Mesophyll, VB- Vascular Bundle, AbE-Abaxial Epidermis,AdE-Adaxial Epidermis.

Fig. 1: Transverse section Leaf of with midrib and adaxially folded lamina.
Fig. 2: Transverse section of leaf showing lateral vein and adaxial groove
Fig. 3: Transverse section of lamina with epidermal trichome

Epidermal Cells and Stomata:

In surface view of the paradermal sections, the epidermis of the lamina exhibits cells which are highly lobed and amoeboid cells. Some of the epidermal cells are widely circular which extend into epidermal trichomes. The stomata are elliptical with district stomatal pore. The stomata are anamocytic type. The guard cells of the stomata are 30x40 µm in size (**Fig.4**).



St-Stomata, AW-Antidiral Wall, EC- Epiderml Cells

Fig. 4: Abaxial epidermis in surface view showing stomata and amoeboid epidermal cell Venation

The venation system of the lamina consists of many vertical, parallel thick secondary veins from which minor veins originate. The veins give rise to district reticulate system of venation. The vein-islets are rectangular with thick vein boundaries. The vein terminations are either singular or forked ones (**Fig.5**).

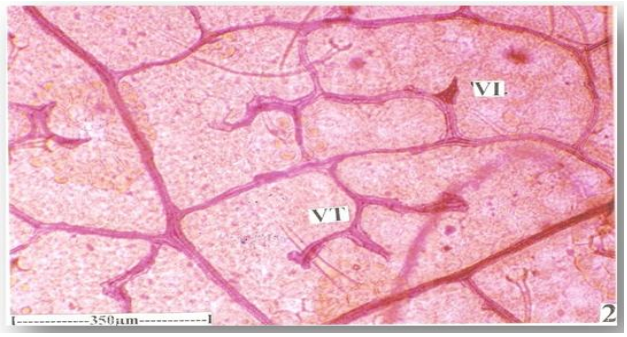


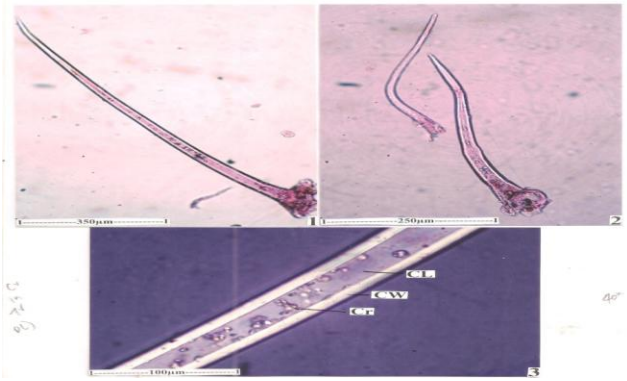
Fig. 5: Venation system of the lamina consists of many vertical, parallel thick secondary veins

Powder Microscopy:

The leaf powder shows the following inclusions:

(I) ***Epidermal Trichomes:***

Unicellular , unbranched , long epidermal trichomes are abundant in the powder .They have thick lignified walls and wide lumen .Crystals and some -times starch grains are seen distributed within the lumen of the trichome. The trichomes are 600-800µm long and up to 50 µm thick. (Fig.6)



CL-Cell Lumen, CW-Cell Wall, Cr-crystal

Fig. 6: Epidermal trichomes and shape& size.

(ii) ***Epidermal Cells:***

Epidermal peelings are often seen in the powder .In the epidermal layer there are prominent circular ring of dilated thin walled cells enclosing a central thick walled cell. The central cell bears the epidermal trichome and the cell is surrounded by 2 rings of dilated radially oriented rosette cells. Stomata are often seen on the abaxial side of the epidermis .the stomata are anamocytic type, the guard cells are broadly elliptical ,they are 25x30 µm in size.(**Fig. 7&8**)

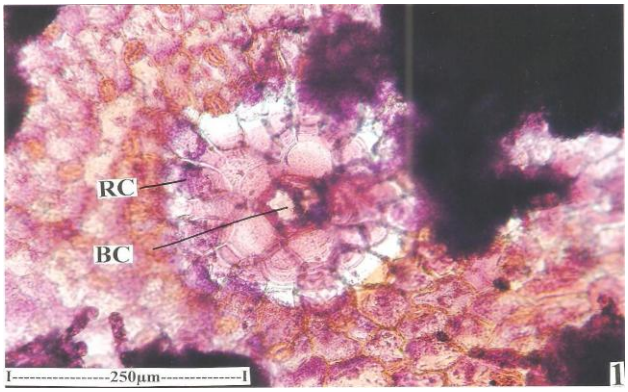
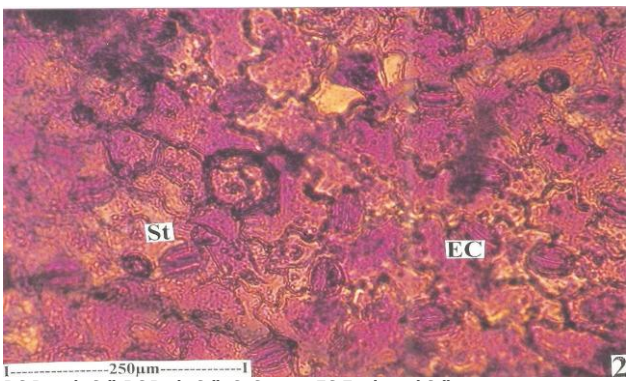


Fig. 7:Trichomes bearing epidermal cells surrounded by Rosetle Cells



RC-Rosetle Cell, BC-Body Cell , St-Stomata EC-Epidermal Cell

Fig. 8: Epidermal cells in surface view showing stomata

Quantitative Microscopy:

The results of leaf constants like stomatal number, stomatal index, vein-islet, vein let termination number and palisade ratio and also the liner measurement of Trichomes were reported as follows.

Table No. 1: Leaf constants of Leaves of *Trichodesma indicum* Linn

S. No.	Parameters	Values per Sq.mm
1	Stomatal No	12
2	Stomatal Index	23
3	Vein Islet Number	35
4	Vein Termination	41
5	Palisade Ratio	12

Table No. 2: Linear Measurement of Trichomes

Parameters	Minimum (µm)	Average (µm)	Maximum (µm)
Length	90.23	135.2	225.5
Width	3.4	12.3	15

Table No. 3: Histochemical colour reaction of leaf *Trichodesma indicum* Linn.

S. No.	Chemicals	Test for	Nature of Change	Histology	Degree of Change
1	Phloroglucinol + HCl	Lignin	No pink colour	-	-
2	Dil.$Fecl_3$	Tannins	No black colour	-	-
3	Methylene blue	Mucilage	No blue colour	-	-
4	Conc. H_2SO_4	Saponin	No yellow colour	-	-
5	Saffranin	Lignin	Pink colour	Trichomes	+
6	Iodine followed by Conc.$H2SO_4$	Cellulose	Blue Colour	Phloem & xylem vessels	+
7	Sudan red	-	-	Cork	+

Fluorescence Analysis:

The leaf powder showed fluorescence at 254 and 366 nm. This indicates presence of chromophore in the plant.

Table No. 4: Fluorescence analysis of Leaf Powder in *Trichodesma indicum* Linn.

S. No.	Treatment	Day Light	Short UV	Long UV
1	Powder	Light, Green	Green	Green
2	Powder+ Water	Brown	Light brown	Reddish brown
3	Powder+1N HCl	Colorless	Pale green	Light green
4	Powder+1N H2SO4	Colorless	Light brown	Reddish brown
5	Powder+1N HNO3	Green	Yellow	Green
6	Powder+Acetic acid	Colorless	Light brown	Dark brown
7	Powder+1N NaOH	Reddish brown	Dark brown	Yellowish brown
8	Powder+1N Alc. NaOH	Yellowish Brown	Reddish brown	Light brown
9	Powder+1N KOH	Brown	Bluish green	Brownish green
10	Powder +1N Alc.KOH	Light green	Fluorescence Green	Reddish brown
11	Powder +Ammonia	Brownish Red	Green	Brown
12	Powder +Iodine P	Dark brown	Dark green	Reddish brown
13	Powder +Ethanol	Green	Fluorescence green	Green

Table No. 5: Fluorescence analysis of extract of leaves in *Trichodesma indicum* Linn.

S. No.	Treatment	Day Light	Short UV	Long UV
1	Pet. Ether Extract	Greenish Yellow	Brown	Greenish Yellow
2	Ethyl Acetate Extract	Brown	Reddish Brown	Greenish Yellow
3	Ethanol Extract	Pale yellow	Greenish Florescence	Yellowish Green
4	Aqueous Extract	Brown	Light Brown	Reddish Brown

Table No. 6: Quantitative inorganic elements of *Trichodesma Indicum* Linn

S. No.	Inorganic Elements	Total Amount (%W/W)
1	Aluminium	1.75
2	Iron	3.25
3	Potassium	2.33
4	Calcium	0.78
5	Phosphorus	1.23
6	Sulphate	1.56
7	Sulphur	0.56
8	Sodium	1.33
9	Chloride	1.56
10	Carbonate	1.89

Table No. 7: Quantitative analysis of Heavy Metals of leaves *Trichodesma indicum* Linn.

S. No.	Heavy metals	Observation (ppm)	Standard limits
1	Arsenic	0.078 ppm	5 ppm
2	Cadmium	0.043ppm	0.3 ppm
3	Lead	0.065ppm	10 ppm
4	Iron	3.627ppm	10 ppm
5	Mercury	Not detected	0.5 ppm

DISCUSSION

The Pharmacognostic standards for the leaves of *Trichodesma indicum* Linn are laid down for the first time in this study.Macroscopic and microscopic characters - Useful to establish the botanical identity of the herbal drug. Inorganic elements analysis showed the trace amount of inorganic elements (Aluminium, Chloride, Sodium, Phosphate, Sulphur, Phosphours, Carbonate). Heavy metals showed that the within the limits as per WHO standards and considered to be safe to consume medicinally.

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