

PHARMACOGNOSTIC STUDY AND DEVELOPMENT OF QUALITY PARAMETERS OF WHOLE PLANTS OF *TRICHODESMA INDICUM* (Linn.) R.Br.

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ABSTRACT

Trichodesma indicum is a common weed widely present in India. No detailed work on its pharmacognostical and development of quality parameters has been done on *Trichodesma indicum*. The present study deals with macroscopical, cytomorphological and quantitative microscopy of the leaf and macroscopical and cytomorphological evaluation of the stem and root. Establishment of its quality parameters include physicochemical and phytochemical evaluation of the powder as well as the extract. Macroscopical and microscopic evaluation of leaf, stem and root gave special identification characters. Several physicochemical parameters were also performed. Phytochemical investigation reveals the presence of tannins, flavonoids, phytosterols, sugars, saponins, protein and free amino acids. This is important tool for the standardization of plant materials, isolation of bioactive principles, screening of pharmacological activities, ensuring the quality of formulation and also useful to distinguish it from its related species.

Keywords: Microscopical study, physicochemical study, Phytochemical study, *Trichodesma indicum* (Linn) R.Br

INTRODUCTION

The plant has numerous medicinal values such as anti diarrhoeal [1], cough suppressant [2] and anti inflammatory [3]. In folklore medicine the paste of the leaves of *Trichodesma indicum* along with rhizomes of *Acorus calamus* and *Allium sativum* were used for the wound healing potentials [4].

The present study aims to study the pharmacognostical characters and to develop quality parameters of the whole plant of *Trichodesma indicum*.

MATERIALS AND METHODS

Collection and authentication of the plant

Whole plants were collected from the campus of Madurai Medical College, Madurai and authenticated by Dr. Stephenk, Lecturer in Botany, The American College, Madurai. A herbarium was deposited in the Department of Pharmacognosy as PCG/001/2010 in Madurai Medical College, Madurai.

Pharmacognostic studies [5-7]

Morphological characters of the leaf, stem and root were studied.

Transverse section of the leaf, stem and root were also studied. Leaf constants were also determined by using camera Lucida and stage micrometer (Table 1). The plant materials were cleaned, shade dried and powdered.

Physicochemical evaluation [8&9]

Various physicochemical parameters like FOM, LOD, ash values (total ash, water insoluble ash, acid insoluble ash, water soluble ash), extractive values (petroleum ether, ethanol, methanol), swelling index and foaming index of the powdered materials were established (Table 2). The behavior of the powdered materials was also determined [10, 11] (Table 3).

Phytochemical studies [5, 7 & 12-13]

The powdered materials were extracted with solvents like petroleum ether, ethanol and methanol and the active principles present in the extracted plant materials were determined by their respective chemical tests with suitable reagents (Table 4).

Table 1: Quantitative analytical microscopical parameters of the leaf of *T. indicum*

S. No.	Parameters*	Values obtained
1	Stomatal number in upper epidermis	10.17 ± 0.27
2	Stomatal number in lower epidermis	15.92 ± 1.32
3	Stomatal index in upper epidermis	26.5 ± 0.55
4	Stomatal index in lower epidermis	23.76 ± 1.96
5	Vein islet number	10.5 ± 1.27
6	Vein termination number	6.4 ± 0.86
7	Palisade ratio in upper epidermis	9.25 ± 0.70

* mean of 6 readings ± SEM

Table 2: Standardization parameters of *T. indicum*

S. No	Parameters*	Values* expressed as %
1	Volatile oil	Nil
2	Foreign organic matter	0.02 ± 0.12
3	Moisture content	8.746 ± 0.02
4	Ash values	
	Total ash	15.56 ± 0.56

	Acid insoluble ash	7.17 ± 0.36
	Water soluble ash	2.98 ± 0.90
	Water insoluble ash	13.75 ± 0.59
5	Extractive Values	
	Petroleum extract	1.473 ± 0.03
	Ether extract	6.180 ± 0.02
	Chloroform extract	4.201 ± 0.04
	Ethyl acetate extract	3.358 ± 0.01
	Ethanol extract	4.200 ± 0.03
	Methanol extract	8.598 ± 0.01
	Aqueous extract	9.913 ± 0.03
6	Foaming index	less than 100
7	Swelling index	expressed as mL
	Initial volume	2.6 ± 0.10
	Final volume	9.3 ± 0.17

* mean of three readings

Table 3: Behavior of the *T. indicum* powder with various chemical reagents

Powder + Reagents	Colour / Precipitate	Presence of active principle
Picric acid	Yellow precipitate	Protein present
Conc. sulfuric acid	Reddish brown color	Phyto sterols present
Lieberman Burchard reagent	Reddish brown color	Phyto sterols present
Aqueous ferric chloride	Greenish black color	Tannins present
Iodine solution	Blue color	Starch present
Mayer's reagent	No cream color	Absence of alkaloids
Spot test	No stain	Fixed oils absent
Sulfosalicylic acid	White precipitate	Protein present
Aq. Sodium hydroxide	Yellow color	Flavonoids present
Mg - HCl	Magenta color	Flavonoids present
Aq. Lead acetate	White precipitate	Presence of tannins

Note: - Colour reactions are viewed under natural light by naked eye

Table 4: Preliminary phytochemical tests for various crude extracts of *T. indicum*

S. No.	Chemical Test	Petroleum ether extract	Methanol extract	Ethanol extract
1.	Terpenoids	-	-	-
2.	Flavones	-	+	+
3.	Steroids	+	+	+
4.	Anthraquinones	-	-	-
5.	Glycosides	-	-	-
6.	Sugars	-	+	+
7.	Alkaloids	-	-	-
8.	Quinones	-	-	-
9.	Phenols	-	+	+
10.	Tannins	-	+	+
11.	Saponins	-	+	+
12.	Proteins & free amino acids	-	+	+

Note: (+) Present (-) Absent

RESULTS

The leaf is a dorsiventral and hypostomatic with anomocytic stomata. It has amoeboid outlined epidermal cells. It has a thick epidermal trichomes and the midrib is deeply grooved on adaxial side with a semi circular abaxial part. It has well defined vein islets and once or twice forked vein termination on its venation pattern.

The microscopical studies of the young stem showed thin layer of narrow rectangular epidermal cells and vascular bundles whereas thick stem showed well preserved epidermal cells and also has primary, secondary xylem cylinders with phloem and vessels up to 40µm wide.

The microscopical studies of the young root showed solid central secondary xylem cylinder with thin layer of secondary phloem. It also has lignified xylem fibers. The narrow vessels are 40µm and wider ones are 130µm in diameter. The thick root showed secondary xylem as major component and also has narrow central core of vessels and fibers with few islands of less stained phloem elements.

Evaluation of powder microscopy showed non glandular, unbranched, unicellular trichomes with 350-900µm long. Xylem

fibers are also seen narrow one is 500µm long and wider one is >500µm long. It has a peculiar character of fiber - tracheids cells it has a multi seriate pits resembling the tracheids. The vessel elements vary from 50-480µm in length and 70-130µm in width. It has masses of starch grains when seen under a polarizing microscope.

DISCUSSION

The present study deals with the macroscopical, microscopical, physicochemical and phytochemical evaluation of the whole plant materials of *Trichodesma indicum*. The microscopic characters revealed that the leaf was dorsiventral in shape with hypostomatic (anomocytic stomata). The stem on its thick stage showed the presence of both primary and secondary xylem elements. The root section showed the presence of islands of less stained phloem. The powder microscopy showed the presence of unicellular, unbranched covering trichomes, starch grains and fibre-tracheids. The behavior of the powder, phytochemical examination of the ethanol and methanolic extracts indicate the presence tannins, phenolic compounds, flavonoids, sugars, saponins, mucilage, proteins and free amino acids. A detailed information will be useful for the development of standardization parameters, isolation of

phytoconstituents, screening of preclinical and clinical investigation, manufacturing of formulations and also distinguishing it from its closely related species.

CONCLUSION

Trichodesma indicum Linn R.Br was used in the folklore medicine as a anti inflammatory. Hence this study provide useful information for the identification of this plant for the future plan and also give standardization parameters for the development of herbal formulation.

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