

IDENTIFICATION AND STANDARDIZATION OF *TECOMA STANS* LINN THROUGH TRANSVERSE SECTION, PHYTOCHEMICAL INVESTIGATION AND POWDER CHARACTERISTICS DETERMINATION OF ROOTS

LOVELY THAKUR*, NEHA SITAPARA¹, NAVIN SHETH²

^{1,2}Department of Pharmaceutical Sciences, Saurashtra University, Rajkot-360005, Gujarat, *Govt College of Pharmacy, Rohru-171207, Shimla, H.P., India. Email: lovethakur41@yahoo.com

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ABSTRACT

Establishment of pharmacognostic profile of the roots helps in standardization and identification of plant. To include *Tecoma stans* linn in Herbal Pharmacopeia, its roots were accurately identified and standardized in this study. Evaluation of the fresh roots, powder characters, transverse anatomical sections and determination of active constituents of the *Tecoma stans* linn roots was carried out to determine morphological, microscopical and phytochemical profile of roots. Results of morphological data indicate that roots of *Tecoma stans* linn are hard, woody in fracture, pale brown and have characteristic taste. Leaves of *Tecoma stans* linn are compound, ovate or lanceolate, alternate and trifoliate. Fine and clear microscopical evaluation of thin transverse section of roots revealed the presence of epidermal layer, peculiar arrangement of a number of xylem vessels, pericycle and very much reduced pith peculiar to this plant. Powder microscopic study showed the presence of epidermal cork cells, fibres, phloem fibres which are characteristic to the plant. Phytochemical evaluation of roots by different chemical tests revealed the presence of alkaloids (antidiabetic property reported), amino acids, carbohydrates, flavonoids, glycosides, steroids, tannins and triterpenoides. Leaf parameters were reported earlier, the present research aid and support the previous study for setting specific diagnostic features for plant, preparation of plant monograph, its identification, standardization and reduction in adulteration of its formulation.

Keywords: Diuretic, Pharmacognostic profile, Powder characters, Phytochemical investigation, *Tecoma stans*, Transverse section.

INTRODUCTION

Plant for the present investigation belonging to the family Bignoniaceae named Sonapatti in Tamil and also known as Yellow elder or Ginger Thomas¹. Plant is 20-30 ft in height, having moderate growth and yellow flowers. Leaves are green, compound, imparipinnate, and lanceolate with serrate margin. Fruits are elongated and clustered². Ginger Thomas leaves, bark and roots contains biologically active chemicals, and extracts from those tissues are in use as traditional folk medicines³. Plant is in use through Mexico and Central America for diabetes, roots for diuretic and urinary disorder control^{4, 5}. *Tecoma stans* was also investigated for antifungal effect in roots⁶. Standardization of a plant is first requirement for its use in herbal medicines. Hence present research aid in the purity, quality and standardization of *Tecoma stans* through transverse section, powder characters and phytochemical study of extract of roots.

MATERIALS AND METHODS

Collection and authentication of plant

Fresh plant roots were collected from Saurashtra University campus Rajkot, Gujarat in the month of July-August. The authenticity of freshly collected plant was confirmed by Dr. A. S. Reddy, Department of Biosciences, Sardar Patel University, Vallabh Vidyanagar, Gujarat, India. A voucher specimen SU/DPS/Herb/33 was deposited in herbarium of Department of Pharmaceutical Sciences, Saurashtra University, Rajkot, Gujarat, India.

Macroscopy of roots

Macroscopy of roots was done to investigate the colour, odour, taste and type of roots (tap/advantaceous).

Phytochemical Investigation

Chemical tests were employed in the preliminary phytochemical screening for various secondary metabolites such as alkaloids (Dragendorff's, Tannic acid), amino acids (Ninhydrin test), carbohydrates (Molisch's test), fats and oils (Saponification test), flavonoids (Alkaline reagent, Shinoda test), glycosides (Keller-Killiani, Legal and Kedde tests), Mucilage (Ruthenium red test), saponins (Froth formation, Haemolysis test), steroids and

triterpenoides (Salkowski and Liebermann-burchard test), Tannins (Ferric chloride)^{7, 8}.



Fig. 1: *Tecoma stans*

Microscopy of roots

Free hand transverse section of the fresh roots was carefully stained with phloroglucinol and hydrochloric acid (1:1). The sections were transferred to mountant (glycerine) on slides and cover slip was placed on it. Sections were observed under light microscope in 10X.

Powder characters of roots

Roots were properly cleaned and sun dried. Size reduction of roots was done by electric grinder and powder passed through 60 # sieve. Powder slides were prepared with glycerine and covered with cover slip and investigated in 40X under light microscope.

Photomicrography

Photomicrographs were made at different magnifications depending upon the anatomical detail to be studied. Photomicrography was carried out using Olympus microscope and attached with Magnu MIPS camera.

RESULTS

Roots of *Tecoma stans* are tap roots, brownish, having characteristics taste and hard in fracture. The table 1 show morphological details of roots of *Tecoma stans*.

The phytochemical constituents are responsible for activity of plant. Phytochemical investigation of root of *Tecoma stans* shows the presence of alkaloids, amino acids, carbohydrates, flavonoids, glycosides, steroids, tannins and triterpenoides. There is absence of fats, oils, mucilage and saponins in roots. See table 2.

Morphological characters determination helps in plant identification. However is supported by transverse section to avoid confusion with related species.

Transverse section of hard tap roots clearly shows the presence of xylem vessels arrangement, epidermal cells and reduced pith which aid in no doubt identification of plant. See figure 2.

Powder characters of roots of *Tecoma stans* were also studied. Powder microscopy revealed the presence of outer epidermis and fibres. See figure 3. Hence complete morphological macroscopy, powder microscopy, phytochemical investigation and transverse section of plant minimizes adulteration possibilities and aid in purity, quality and preparation of monograph for *Tecoma stans* by many pharmacopoeias.

Table 1: Morphology of *Tecoma stans* roots

Morphological parameters	Observation
Colour	Pale brown
Fracture	Hard and Woody
Odour	Odourless
Taste	Characteristics
Type	Tap root

Table 2: Phytochemical screening of *Tecoma stans* roots

Phytoconstituents	Methanolic extract of roots
Alkaloids	+
Amino Acids	+
Carbohydrates	+
Fats and oils	-
Flavonoids	+
Glycosides	+
Mucilages	-
Saponins	-
Steroids	+
Tannins	+
Triterpenoides	+

'+' present; '-' absent

Transverse section of *Tecoma stans* roots

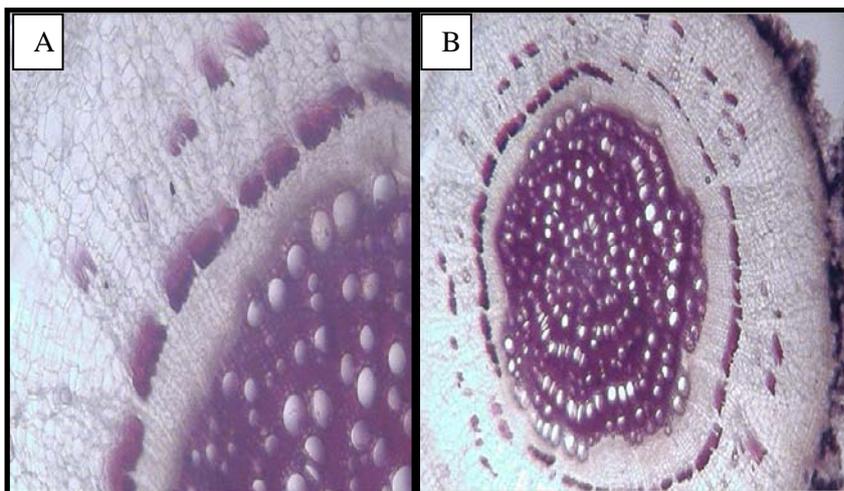


Fig. 2: Transverse section of *Tecoma stans* roots under Olympus microscope attached with Magnus MIPS camera (A=40X), (B=10X) revealed presence and arrangement of xylem vessels and reduced pith.

Powder characters of roots of *Tecoma stans*

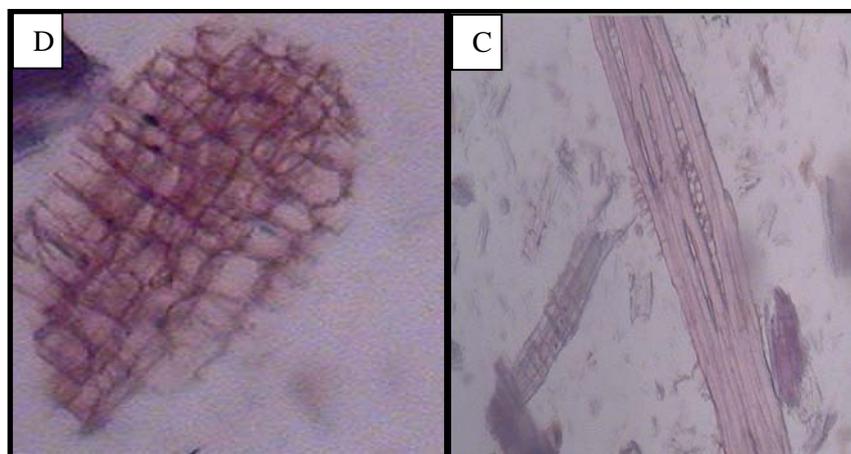


Fig. 3: Powder characters of *Tecoma stans* roots under Olympus microscope attached with Magnus MIPS camera (40X), revealed presence and type of C - Epidermal cells and D - Fibres.

DISCUSSION

Tecoma stans is a plant of use in many ailments in present era as antifungal, diuretic, urinary disorder control, antispasmodic⁹ and anti-aggregate¹⁰. However it relates morphologically to many other species which may give rise to problem of adulteration and deterioration of formulation. Further in order to be included in herbal pharmacopeia, a plant must be completely standardized for its characters. Previously, an attempt has been made to provide data for standardization using leaves of *Tecoma stans*¹¹. However *Tecoma stans* roots have wide applications and uses in traditional system of medicines¹². Hence we research out the data for standardization and identification of *Tecoma stans* roots by phytochemical investigation, macroscopic and microscopic studies. Standardization data for roots is helpful to include the plant in Herbal Pharmacopeia and maintain its quality and purity in formulations.

CONCLUSION

These parameters reported first time for roots, support the previous research to include plant in Herbal Pharmacopeia and help in its identification without confusion with related species which helps in preventing adulteration in its formulations.

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