

Comparative Morphology and Stem Anatomical Studies of *Tecomastans* (Bignoniaceae) in Kerala

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Abstract: Comparative morphological and stem anatomical studies were carried out in two varieties of *Tecomastans L.* (Bignoniaceae) in Kerala. The species taxonomically complicated, earlier various taxonomist identified the species as *Tecomastans* due to its morphological variability. Critical morphological study resulted determination two sub species of *Tecomastans*; *Tecomastans var. angustata* and *Tecomastans var. stans*. Stem anatomical characters are also found important to distinguish the varieties within the species.

Keywords: *Tecomastansvarstans*, *Tecomastansvarangustata*, Morphology, Anatomy

1. Introduction

The genus *Tecoma* (Bignoniaceae) comprises about 14 species distributed in tropical America and Africa. *Tecomastans* is deciduous under trees, introduced in India as flowering tree, now it naturalized. Two morphological meaningful varieties; *Tecomastansvarstans* and *Tecomastansvarangustata* are seen in Kerala. The species taxonomically complicated and among its varieties continues to be hardest nut to crack. Earlier many authors arise problems in its identification, Shinnors^[1] provided a scholarly account of *Tecoma*, noting its establishment and that it is typified by *T. stans* (L.) Juss. ex H.B.K. Gentry^[2] in his account of *Tecoma* for the state of Veracruz, treated *Tecomastans var. angustata* as synonymous with *Tecomastans var. stans*. Turner^[3] conducted taxonomic revision of *Tecomastans* in central America it reveals that there are only two meaningful populational categories *Tecomastans var. angustata* and *Tecomastans var. stans*. Anatomical information is scarce for the species of the genera. The present study describes the morphological and stems anatomical structure of two varieties of *Tecomastans* growing in Kerala with the purpose of pointing out anatomical characters useful to distinguish these species under varieties level.

2. Materials and Methods

Collection and authentication of the plant

Two varieties of *Tecomastans* were collected from different localities of Kerala for present study. Specimens were collected in the flowering stage, studied their morphology, compared with authenticated specimens and determined their taxonomic identity. Voucher specimens were deposited in the herbarium of RHK.

Microscopic studies

The materials for anatomical study were fixed in Formaldehyde- Acetic acid Alcohol mixture. Staining was carried out according to standard procedure Johansen^[4]. Anatomical microphotographs were transferred using the computer controlled microscopic system and camera.

Trinocular 'Leica DM 3000' microscope attached with 'Leica DFC 295' digital camera connected to the computer and Leica Application Suite software was used for the observation and transferring microscopic images of the samples. The images were examined thoroughly and compared the anatomical characteristics.

3. Observation and Results

a) Taxonomic description

Tecomastansvarangustata Rehder

Large shrub or much branched tree, 1.5-5 m tall, the younger stem are smooth, glabrous. Leaves opposite, imparipinnate, petiolate, petiole 9-11cm long, number of leaflets 3-7, lamina lanceolate 7.5-10cm x1-2.5cm, oblique base, acute apex, glabrous, margin serrated, puberulate midrib, adaxial surface of lamina posses wart like structures. Inflorescence terminal raceme or axillary, 5-15cm long; flowers are bright yellow in colour, tubular in shape, pedicellate, pedicel somewhat curved or twisted, 0.7cm long; calyx cup shaped, 5 lobes, 0.7cm long; corolla tubular 5-6cm long, corolla tube 3-4 cm long, 5 rounded lobes 0.8-3cm long, seven faint reddish line in the throat of corolla tube, which is slightly ridged or hairy ;stamen didynamous, dorsifixed anther, anther puberulent hairs at the base of anther; staminode 0.5-0.7cm long, curved; pistil 4cm long; ovary 0.3cm long, style 3cm long, stigma bifid, spathaceous, yellow annular disc present, nectar present. Fruit large linear compressed, capsule 30x2cm, green to brown in colour, split to release numerous papery seed; seeds are flat, oblong 0.7x0.4cm, transparent wing.

b) Stem anatomical Description

TS almost circular in outline, outer margin ruptured at places due to the presence of lenticels. Cork consists of 8-15 layered thick walled lignified cells. Cells are squarish to rectangular in shape, which are irregularly arranged. Cork followed by cortical cell consist parenchymatous cells with chlorophyll. Outer cortex is lignified. Pericyclic fibre patches of varying size are seen in cortical region, which are group of 5-15 arranged as broken ring. Phloem cells are small, compressed and compactly arranged. Phloem fibres

are arranged continuously in the form of rings. Xylem Vessels size and shape may vary, vessel in the group of 2-5. Medullary rays uni-biseriate extending up to cortex. Parenchymatous pith consist prismatic calcium oxalate crystals (Fig.a-c).

c) Taxonomic description

Tecomastans(L) Juss. ex Kunth,

Perennial shrub or medium sized trees lush green nature. Bark is pale brown to grey and roughens with age. Leaves are opposite, compound and imparipinnate, 2 -3 pairs of leaflets, terminal leaflet larger, lamina ovate to lanceolate, 1.0-4.0 cm wide, to some degree pubescent (rarely not), margins not sharply serrate, their apices not sharply acute, leaflets nearly glabrous to sparsely pubescent. Inflorescence racemose, Flowers occur in clusters at the ends of the branches and are trumpet shaped with 5 rounded lobes, 6 cm long; calyx cup shaped 5 lobe 0.5 cm in length corolla 4 cm length, bilipped, campanulate, pale to bright yellow, with faint orange stripes at the throat. stamen didynamous large filament 1.5 cm small filaments 1cm in length staminode absent stigma bifid spathaceous style 2 cm ovary 0.3 cm annular green coloured disc present at the base of ovary. Fruits are narrow, slightly flattened to pointed capsules, up to 20 cm long, containing many winged seeds; green when young, pale brown on ripening.

d) Stem anatomical Description

TS almost circular in outline. Outer margin is ruptured at places due to the presence of lenticels. Cork is thick walled, 5-10layered tangentially elongated lignified cells; Cells are squarish to rectangular in shape. Cortex region is tangentially elongated thin walled parenchymatous cells. pericyclic fibre patches of varying size are seen in cortical region., group so pericyclic fibres arranged as broken ring. Phloem wide zone, condensed and compressed cells phloem fibres forms continuous band, sometime it may be discontinuous. Xylem vessels are lignified, vary in size

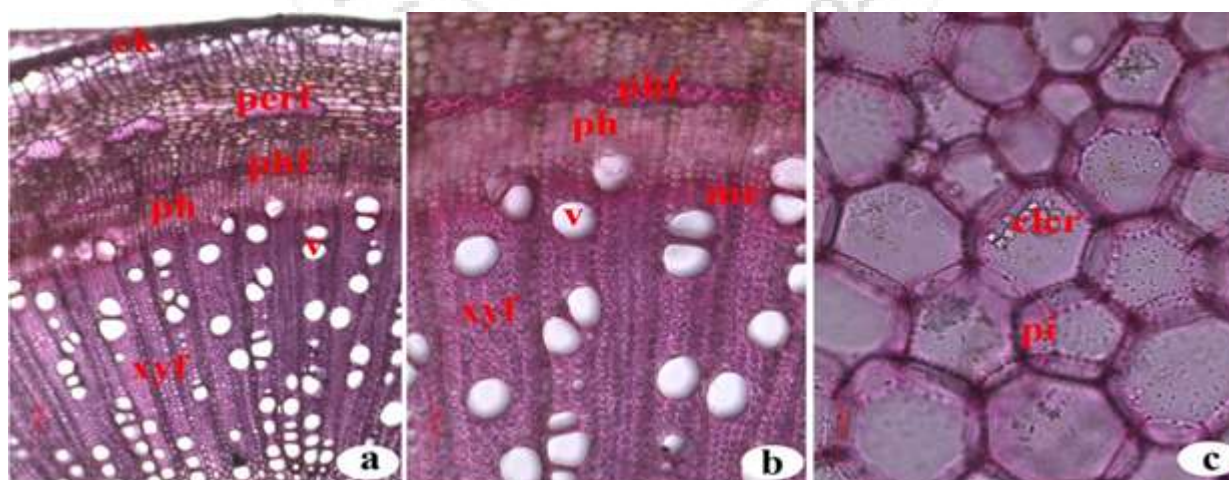
arranged in radial manner. Vessels are seen in single or groups of 2-3. Medullary rays are uni or biseriate, extending towards phloem region. Pith wide zone made up of loosely arranged parenchyma cells. All the pith cells are enriched with coloured matrix (Fig. d-f).

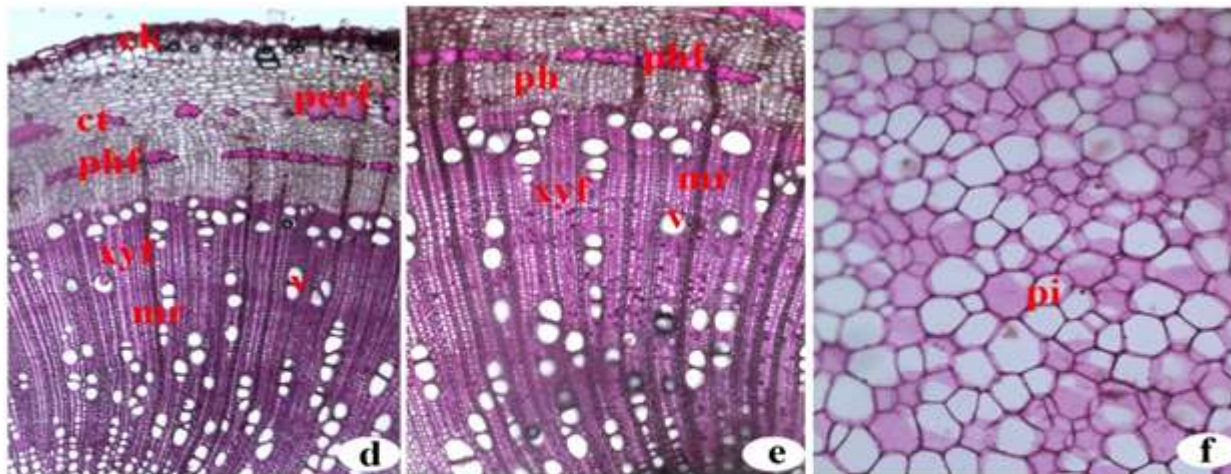
Table1: Stem anatomical characters of varieties of *Tecomastans*

| Characters | <i>T.stansvarangustata</i> | <i>T.stansvarstans</i> |
|-------------------|--|---|
| cork | 8-15 layered Square or rectangular cells Lenticel present randomly | 5-10layered tangentially elongated lignified cells |
| cortex | Parenchymatous cells Chlorophyll present Pericyclic fibres group of 5-15 arranged as broken ring | Tangentially elongated thin walled parenchymatous cells Groups o pericyclic fibres arranged as broken ring |
| phloem | Compressed tangentially elongated cell Phloem fibres arranged in ring manner | Wide zone, compressed cellsploem fibres forms continuous band, isolated fibres also seen |
| xylem | Xylem vessel in the group of 2-5. Size and shape may vary | Vary size arranged in radial manner |
| Medullary rays | rays uni-biseriate Extending up to cortex | Rays uniseriate extending up to phloem |
| pith | Parechymatous Prismatic calcium oxalate presen | Thin parenchymatous cells in pith cells filled with coloured matrix |

Artificial key

Phloem fibres forms complete band, medullary rays extending to cortex, pith consist prismatic calcium oxalate crystals.....*Tecomastansvarangustata*
 Phloem fibres form isolated patches, medullary rays extending to phloem, Pith cells filled with coloured matrix.....*Tecomastansvarstans*.





Anatomical comparison of the stems of *Tecoma* spp. a - c, *T. stans* (L.) HBK. d - f, *T. stans* var. *aungustata*. ck, cork; clcr, calcium oxalate crystals; ct, cortex; fi, fibres; mr, medullary ray; perf, pericyclic fibres; ph, phloem; phf, phloem fibres; pi, pith; v, vessels; xyf, xylem fibres.

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