



**MORPHOLOGICAL AND STEM ANATOMICAL CHARACTERIZATION OF TRIBE BIGNONIEAE DUMORT. (BIGNONIACEAE) IN KERALA**

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**ABSTRACT**

Stem anatomical studies of four species; *Clytostoma binatum*, *Mansoa alliacea*, *Doxantha unguis cacti*, *Pyrostegia venusta* coming under tribe. Bignonieae (Bignoniaceae) were carried out and compared. Tribe Bignonieae shows anomalous secondary growth and special phloem wedges. Taxonomic confirmation depends on morphological and floral features. Based on stem anatomical characters a diagnostic key prepared which can be used as supporting tool for taxonomic delimitation of species.

**Key words:**

*Clytostoma binatum*, *Mansoa alliacea*,  
*Doxantha unguis cacti*, *Pyrostegia venusta*

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**INTRODUCTION**

Bignonieae largest tribe in the family Bignoniaceae. It consist 377 species and nearly half of the species in this family<sup>[1]</sup>. This tribe includes lianas and shrubs distributed in variety of habitat. In Kerala only four woody climbers present; *Clytostoma binatum*, *Pyrostegia venusta*, *Doxantha unguis cacti* and *Mansoa alliacea*. These species are neotropical, introduced and cultivated for its floral beauty. Apart from aesthetic sense, *Mansoa* and *Pyrostegia* also used as folk medicine by different tribal groups of Kerala. *Pyrostegia* distributed in high altitude regions where as others seen everywhere. Tribe Bignonieae are characterized by the presence bi or trifoliate leaf, terminal leaflet modified into tendrils. Tendrils may be triforked or simple. Members of this group shows anomalous wood anatomy, denominated furrowed xylem with 4 or multiples of four phloem wedges that interrupt the xylem. Previous study conducted in Bignoniaceae, it based morphological and wood anatomical features for generic level treatment in tribe Bignonieae<sup>[2]</sup>. Present study is an attempt to prepare diagnostic tool for identification based on both morphological and stem anatomical characters.

**MATERIALS AND METHODS**

**Collection and authentication of the plant**

Four species included in this study; *Clytostoma binatum*, *Pyrostegia venusta*, *Doxantha unguis cacti* and *Mansoa alliacea* were collected from different localities of Kerala.

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Specimens all species 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<sup>[3]</sup>. 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. Images are examined thoroughly and compared the anatomical characteristics.

**Observation and results**

**Taxonomical description**

***Clytostoma binatum* (Thunb).sandwith,**

Deciduous, woody climber native of Brazil, white stem. Leaves opposite, bipinnate, exstipulate, leaflets glabrous, obovate, acuminate apex, entire margins, coriaceous, terminal pinnae modified into simple tendril; petiole 1-2cm. Inflorescence terminal or axillary cymose; pedicel 1-1.5cm long. Flowers reddish pink; calyx cupular, toothed, pale green colour; corolla, corolla trumpet shape, 5-6cm long, glabrous outside, ten pink line traversed through corolla tube, lobes orbicular; stamen 4, didynamous, large filament 2.5-3cm long, small filament 1.7-2.2cm long, papillae present at the

anther adhesion, anthers included; staminode rudimentary; yellow annular disc present; ovary 2 celled, up to 0.5 cm long, style up to 4 cm long, stigma bifid, spathaceous. Capsule oblong; seeds with papery wing

***Doxantha unguis cacti (L.) A.H. Gentry***

Semi evergreen woody climber, native of tropical America widely cultivated throughout West Indies, Mexico to south Brazil and Argentina. up to 20 m high, thin small aerial roots used for climbing. Leaves dark green, opposite and bifoliate, glabrous; leaflets 3-4 cm long, terminal pinnae modified into three cat-clawed tendril, 0.3-1.7 cm long; petiole present, lamina obovate, acuminate apex, margin entire. Inflorescence axillary cyme. Flowers bright yellow 5-5.5 cm long; calyx cupular, 3-5 mm long; corolla trumpet shaped, 6-8x5-7 cm; stamen 4, didynamous, anthers included, larger filament 1-1.5 cm, smaller filament 0.8-1.2 cm long; staminode rudimentary; ovary 2 celled, oblong, 3-4 mm long, stigma clavate. Capsule 15-50x0.8-1.2 cm, flattened, glossy green, dark brown when they mature; seeds 10-40x0.4-1 cm, elliptic with papery wing.

***Mansoa alliaceae (Lam) Miers***

Evergreen climber, commonly known as garlic vine. native of Amazon rain forest of south America and tropical America widely planted in tropics. Grow up to 2-2.5 m high, stem light brownish, rough, cylindrical, small pits present. Leaves opposite, bipinnate, terminal leaflet modified into forked tendril, petiolate. Stipule present base of petiole; lamina, 7-15 cm x 4-5 cm in size, ovate to lanceolate, base symmetric and tapering, mucronate apex, margin entire, surface glabrous and glaucous, texture papery, with garlic odour. Inflorescence terminal panicle. Flowers in bunches of 10-15 glabrous purple with garlic like aroma; flowers tricolor bloom, pink later it becomes white, pedicel 1-1.2 cm long; calyx 0.5-0.6 cm long campanulate, toothed; corolla 5-6 cm long, funnel shaped; stamen 4, didynamous, anthers exerted, large filament 1.7-2 cm long, small filament 1-1.3 cm long; staminode rudimentary; ovary 2 celled, 0.6-0.8 cm long, linear, ridged, style 2.6-3 cm long, stigma spathaceous. Capsule long and flattened; seeds with papery wing.

***Pyrostegia venusta (Ker Gawl.) Miers***

Climbing shrub, native of Brazil, branchlets angular. Leaves are 2-foliolate, often with an terminal trifid tendril. Leaves 3-foliolate, petioles densely pubescent, pilose in the adaxial canal or glabrous; lamina ovate, slightly sub inequilateral, chartaceous, 3 to 5 pairs of lateral veins prominent below, densely short-pilose to glabrous, with large glands in the axils of lower lateral veins, base truncate or cordate, acuminate-mucronulate apex, Inflorescence terminal or axillary panicle, flowers in bunches of 6-22. Flower 6-7 cm long, fairly thick texture, with a narrow tube and wider mouth, glabrous internally, orange or reddish orange; calyx up to 5 mm long, cupular, truncate, 5 toothed rims, calyx excluding denticules at apex; corolla 5-6 cm long, corolla tubular-infundibular, tube externally glabrous, lobes oblong, puberulent apically and marginally; stamens 4, didynamous, exerted, large filament 4-4.5 cm long, small filament 3-3.5 cm, anthers dorsifixed; staminode inserted 1.2-1.6 cm above insertion of higher stamens; globose disc present; ovary 2 celled, 3-5 mm long, style 7.5-8 cm long, stigma ovate. Capsule glabrous, base acute, aristate apex.

**Stem Anatomical description**

***Clytostoma binatum (Thunb.) sandwith***

TS almost circular in outline. Outer margin is ruptured at places due to the presence of lenticels. Cork consists of 8-10 layered thick walled lignified cells. Cells are compressed rectangular in shape. Cortex collenchymatous, 15-20 layers are seen in cortical region. Pericyclic fibre patches of varying size are seen in cortical region which are arranged in broken ring manner. Multiple of 4 dissected Phloem wedges present, phloem fibres forms a continuous band. Xylem vessels shows dimorphism (the association of wide and very narrow vessels). Medullary rays are uni or biseriate. Pith clear starch grains or crystals absent (Fig. 1 a-e).

***Doxantha unguis cacti (L.) A.H. Gentry***

TS quadrangular in outline. Cork consists compressed, thick walled lignified cells, which are squarish to rectangular in shape. Outer cortex is chlorenchymatous while inner cortex collenchymatous. Pericyclic fibre patches are more or less equal in size are seen in cortical region, which forms discontinuous band. Phloem irregularly dissected to form phloem wedges. Phloem fibres are arranged continuously in the form of a ring, wide solitary lignified vessels. Medullary rays are uniseriate, ray parenchyma dissect secondary xylem into pieces. Starch grains are abundant in pith region. (Fig. 1 f-j)

***Mansoa alliaceae (Lam) Miers***

TS almost circular in outline. Outer margin is ruptured at places due to the presence of lenticels. Cork consists multilayered, compressed, thick walled lignified cells. Cortex region is collenchymatous and parenchymatous, thin walled cells with intercellular spaces. Pericyclic fibre large and small in size which are alternate each other, which forms continuous band. Multiples of 4 phloem wedges, phloem fibres are arranged continuously in the form of a ring. Wide solitary lignified vessels. Medullary rays are uni or biseriate. Medullary ray cells are extending towards phloem region, cells enriched with numerous prismatic crystals. Pith is a wide zone made up of loosely arranged parenchyma cells. All the pith cells are enriched with numerous prismatic crystals (Fig 1. k-o)

***Pyrostegia venusta (Ker Gawl.) Miers***

TS almost circular in outline. Outer margin is ruptured at places due to the presence of lenticels. Cork consist compressed cells which are intermingled with sclerenchymatous patches. Cork cells are squarish to rectangular in shape. Cortex consist collenchyma and parenchyma cells with intercellular spaces. Pericyclic fibre patches small in size which are arranged in discontinuous manner. Multiples of 4 phloem wedges, phloem fibres are arranged continuously in the form of a ring. Wide xylem vessels, vessels are seen in single or groups of 2-3. Medullary rays are uniseriate. Pith is a wide zone made up of loosely arranged parenchyma cells. All the pith cells consist prismatic crystals (Fig. 1 p-t)

**Artificial key**

Wide solitary xylem vessel, Pith consist starch grains.....*Doxantha unguis cacti*  
Xylem vessel dimorphism, Pith without starch grains or crystals.....*Clytostoma binatum*

Prismatic crystal present in ray cells  
and pith.....Mansoa alliacea  
Prismatic crystals present only in pith  
cells.....Pyrostegia venusta

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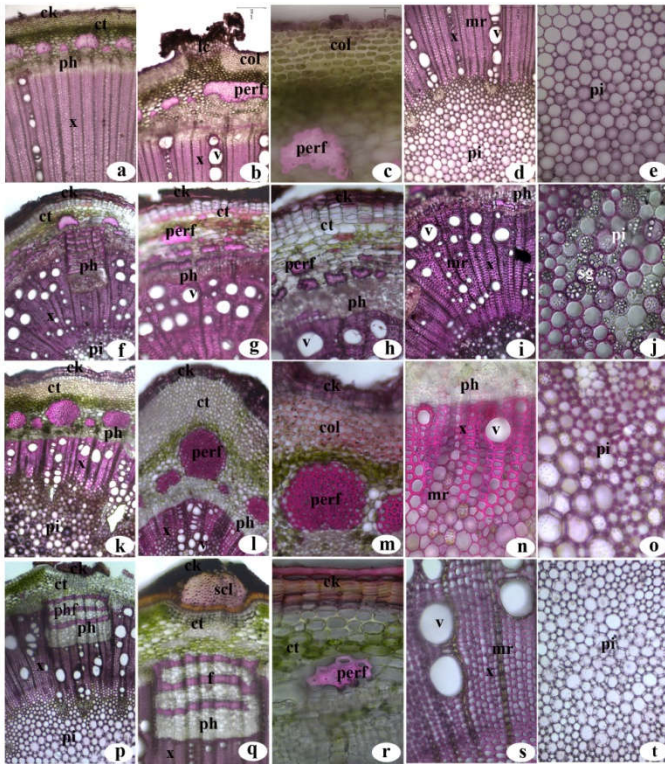


Figure 1

Anatomical comparison of the stems of the tribe *Bignoniae*. a - e, *Clytostoma*; f - j, *Doxantha*; k - o, *Mansoa*; p - t, *Pyrostegia*. ck, cork; col, collenchyma; ct, cortex; f, fibres; lc, lenticel; mr, medullary ray; perf, pericyclic fibres; ph, phloem; phf, phloem fibres; pi, pith; sg, starch grains; v, vessels; x, xylem.

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