

Leaf anatomy of *Justicia bradegeana* Wassh. & L.B. Sm. (Acanthaceae)

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Workshop Information

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INTRODUCTION

The family Acanthaceae comprises about 3,500 species and 200 genera which are worldwide distributed, predominantly in the tropics (Cronquist 1981; Scotland and Vollesen 2000), and Brazil is one of its highest centers of diversity (Daniel 2000). *Justicia* L. is the largest genus in the family and has around 700 species distributed in tropical and subtropical regions (Graham 1988). The current morphological boundaries of the family point out some problems of genera circumscription, which need further studies, especially on the neotropical species. The anatomical works of *Justicia* are mostly with paleotropicals species (McDade et al. 2008).

Justicia bradegeana Wassh. & L.B. Sm. is a native species from Mexico and fairly cultivated by its ornamental red bracts (Lorenzi and Souza 2008). This work aimed to study the leaf anatomy of *J. bradegeana*.

MATERIAL AND METHODS

Leaf samples of *J. bradegeana* species were gathered from cultivated specimen at the Botanic Institute of

São Paulo. Mature leaves from 2nd and 4th nodes were selected to this study.

The leaves were fixed using FAA solution (formaldehyde: acetic acid: 50% ethyl alcohol, 2:1:18 v/v), according to Johansen (1940), and held for 48 hours and then transferred to ethanol 70%.

Cross sections from leaf blade's middle third and petioles were hand sectioned using razor blade and foam, then clarified with a solution of sodium hypochlorite 25%, stained with astra blue and safranin 1% (Bukatsch 1972), and mounted with semipermanent glycerinated gelatin. Slides were analyzed under photonic microscope and illustrations obtained in microscope with projected micrometer scales.

The description of trichomes was based on Ahmad (1978) and Patil and Patil (2009), as well as the descriptions of the stomata and cystoliths were based on Inamdar et al. (1983) and Patil and Patil (2011), respectively.

RESULTS AND DISCUSSION

The leaves of studied species have uniseriate epidermis with square epidermal cells which are

smaller on the abaxial leaf surface when compared to the adaxial one (Figure 1 – 1). The leaves are hypostomatic and the stomata are slightly above the level of other epidermal cells which is a common feature in Acanthaceae species (Ahmad 1978, Inamdar et al. 1983, Monteiro and Aoyama 2012).

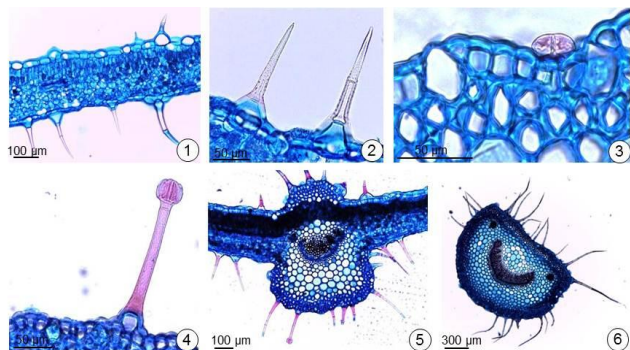


Figure 1. Cross sections of leaves of *Justicia brandegeana* Wassh. & L.B. Sm. 1. General appearance of mesophyll. 2. Tectors trichomes. 3. Subsessile glandular trichomes. 4. Peltate glandular trichome. 5. Midrib. 6. Petiole.

The leaves have uniseriate multicellular, peltate, glandular, and subsessile trichomes (Figures 1 – 4). The tectors trichomes consist of three to five cells and the cell wall presents ornamentation (Figure 1 – 2). It was observed two different types of glandular trichomes whose according to Ahmad (1978) are classified as glandular subsessile trichomes with head formed by four cells and unicellular stalk with basal cell immersed in epidermis, and peltate glandular trichomes consisting of three cells that form the pedicel and an apical cell secretory. The presence of trichomes is common on Acanthaceae species. Features like, tectors trichomes, shape changing, number of cells, ornamental and thickness may be used in a taxonomic survey (Ahmad 1978). Herein, it was observed that *J. brandegeana* has no unicellular tector trichomes which are not a common character among *Justicia* species (Aoyama and Indriunas 2012a, Aoyama and Indriunas 2012b).

In cross section, the elongated and cylindrical lithocysts of *J. brandegeana* are arranged between the epidermal cells on both leaf surfaces (Figure 1 – 4). These structures are restricted to a few families among angiosperms such as Moraceae, Urticaceae and Acanthaceae (Metcalf and Chalk 1983) and may vary in Acanthaceae where isolated cystoliths are the most common (Inamdar et al. 1990).

The midrib is biconvex (Figure 1 – 5), at the level of the middle third, in cross section, with a wider abaxial arc. The epidermal cell shave reduced diameter, with subepidermal angular collenchyma with 2-4 and 2-3 layers on the adaxial and abaxial surfaces, respectively. Around the vascular system there is a fundamental parenchyma with thin walled isodiametric

cells within conspicuous intercellular spaces. The vascular system shows a central arch with and two small bundles at the ends (Figure 1 – 6).

The mesophyll is dorsiventral provided by 2-3 layers of palisade parenchyma and 4-6 layers of spongy parenchyma (Figure 1 – 1). This type of mesophyll is common in several species of the family (Metcalf and Chalk 1983, Tavares and Neves 1993, Monteiro and Aoyama 2012). The vascular system has side ribs organization in all of the leaves.

The petiole has, in cross section, a convex-plan shape (Figure 1 – 6), as observed for *Justicia carnea* and differing of *J. kleinii* and *J. scheidweileri* that present, in the distal portion, side wings that correspond to the beginning of the expansion of the leaf as observed by Aoyama and Indriunas (2012a). The epidermis is uniseriate and at subepidermal position occurs a sheath composed of 3-5 layers of angular collenchyma. The underlying parenchyma is the fundamental type. The vascular system is organized as a central arc and has two small lateral beams at the ends. This feature also has been observed in other species of Acanthaceae (Aoyama and Indriunas 2012a; Aoyama and Indriunas 2012b; Monteiro and Aoyama 2012).

CONCLUSION

Summarizing, it was observed that anatomical features may be usefull for specific delimitation in family Acanthaceae, once morphological boundaries are still unclear for genera circumscription. This work contributes for a better understanding of this representative and almost anatomically unknown genus.

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