

MACRO AND MICROSCOPIC CHARACTERS OF LEAF OF *ARISTOLOCHIA BRACTEOLATA* LAM.

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The paper deals with a detailed investigation on the leaves of *Aristolochia bracteolata* Lam. which includes its morphological, anatomical and powder analysis. The leaf is amphistomatic, with tetracytic, anomocytic and anisocytic stomata. The leaf adaxial surface has unisinate hair, which is a significant character for identification of this plant. Lamina bifacial. Ground tissue of midvein consists of collenchyma and parenchyma tissues. Hypodermal collenchyma is present as a group of cells in the adaxial ridge and is 2-3 layered on the abaxial side. Parenchyma beneath the collenchyma with small intercellular spaces is present. Midvein consists of one large oval shaped v.bundle at the centre. In T.S., petiole is semilunar, adaxially flat with 5 vascular bundles, arranged in an arc.

Key words : *A.bracteolata*, Morpho-anatomical, powder analysis, unisinate hair.

Aristolochia bracteolata Lam., commonly known as 'Gadida gadapa' 'Tella iswari' in Telugu, 'Kitamari' in Hindi belongs to the family Aristolochiaceae. It is a perennial herb, found in plains of Northern India from Haryana eastwards and Southwards to Central and peninsular India. It grows especially in black soil (Anonymous 2008). The family members are distributed in tropical and temperate regions, consisting of woody plants of which are climbers, including some herbaceous species. Leaves are used in treatment of eczema, snake bite and hastens delivery (Jain S K 2012). Leaves are reported to contain aristolochic acid, magnoflorine, N – acetylnornuciferine, aristolactam, β -sitosterol and ceryl alcohol [Anonymous (API), 2008]. The macro and microscopic characters of leaf of *A.bracteolata* Lam. have not been worked out in detail earlier, hence reported here.

MATERIALS AND METHODS

A.bracteolata Lam. (Plate 1 A) was collected from various locations of Warangal district, Telangana, India. Collected material was identified and deposited in Herbarium Hyderabadense, Department of Botany, Osmania University, Hyderabad. The leaves are boiled, fixed in F.A.A. (Formaldehyde –

Acetic acid – Alcohol), dehydrated through xylene – alcohol series and embedded in paraffin wax. The sections were cut at 10 – 12 μ m on Optica 1090A rotary microtome, stained with crystal violet and basic fuchsin combination and mounted in canada balsam (Johansen 1940). Epidermal peels were obtained by gently scraping and peeling by razor blade, were stained with saffranine and mounted in glycerine. The powder microscopy characters were studied by boiling the drug in distilled water, stained in saffranine and mounted with glycerine. The photomicrography was done on Olympus BX-53 trinocular microscope attached with digital Sony camera.

OBSERVATIONS AND RESULTS

Macroscopic characters (Plate 1B) : Leaves reniform or broadly ovate, cordate at base with a wide sinus, entire, finely reticulately veined, pubescent beneath, glabrous above. Petiole slightly grooved on upper surface.

Microscopic characters (Plate 2A-D) : In leaf surface view epidermal cells mostly 5 – 7 sided, few 4 sided, mostly polygonal anisodiametric, few isodiametric, rarely quadrangular, sides thick, surface smooth on either sides but sides straight to curved on adaxial, curved to wavy and wavy to sinuate



Plate 1(A-B) : *Aristolochia bracteolata* . A. Plant habitat, B. Leaf morphology.

on abaxial. Costal cells are anisodiametric to linear, sides thick, straight to curved, surface smooth, parallelly oriented, present on primary and secondary veins. Stomata are present on either sides which are tetracytic, few anomocytic and rarely anisocytic. Subsidiaries 3-5, monocyclic, indistinct and guard cells linear to reniform. Trichomes are of two types namely unisinate hair on adaxial and uniseriate peltate hair restricted to abaxial surfaces. Epidermal cell frequency 1316 per sq.mm., stomatal frequency 86.6 per sq.mm and stomatal index 5.9 (Adaxial surface) and E.C.F.1746 per sq.mm, S.F. 413 per sq.mm and S.I. 19.3 (Abaxial surface).

In Transverse Section the leaf is slightly grooved adaxially, ribbed abaxially at midvein; lamina 119 – 216 (163) μm and midvein 736 – 1132 (956) μm in thickness. Epidermis is single layered, adaxially larger, cells mostly barrel shaped, few oval to

circular and oblong, 27 – 74 (48) μm long, 11 – 27 (20) μm in wide, isodiametric cells 16 – 32 (23) μm in diameter; abaxially cells smaller, barrel shaped, tabular to oval and spherical, 14 – 45 (30) μm long and 8 – 22 (13) μm wide. Epidermal cells on margins as on midvein adaxial, walls thin; cuticle slightly thick on either sides. Stomata amphistomatic, flushed with epidermal cells. Mesophyll is differentiated into palisade and spongy tissues. Palisade is one layered, throughout, interrupted at midvein and secondary veins. Cells cylindrical, columnar, 27 – 80 (51) μm long 8-30 (16) μm wide, perpendicular to the epidermis with small intercellular spaces. Spongy tissue is 3 – 5 layered, loosely arranged with large intercellular spaces; cells circular, oval to oblong, dumbbell shaped, 19 – 41 (28) μm long, 8-16(11) μm wide, isodiametric cells 8-22 (15) μm in diameter. Ground tissue of midvein consists of collenchyma and parenchyma tissues.

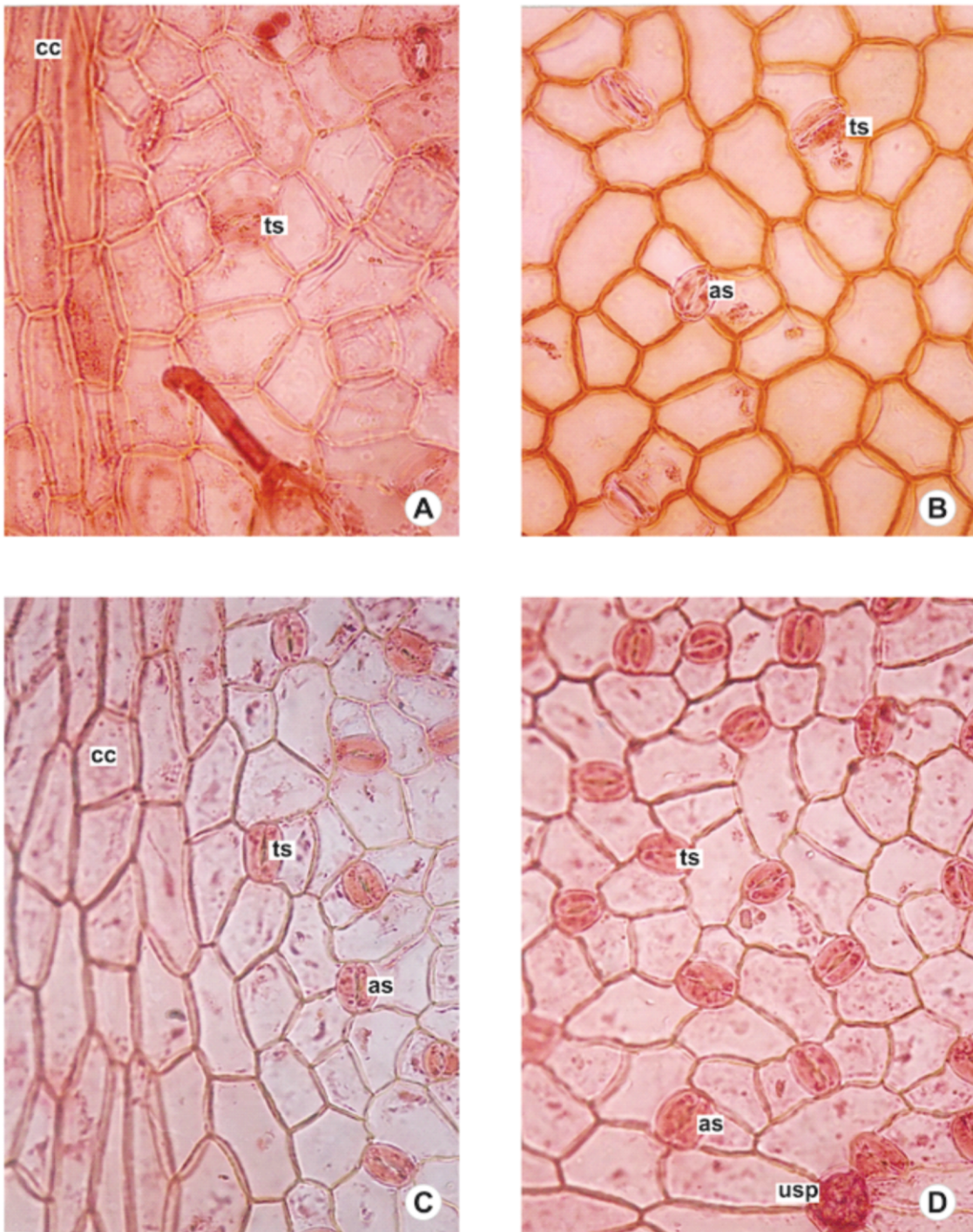


Plate 2(A-D) Leaf epidermis of *A. bracteolata* A. Leaf adaxial surface with uniserial hair and stomata $\times 470$, B. Leaf adaxial surface with stomata $\times 490$, C. Leaf abaxial surface with costal cells and stomata $\times 405$, D. Leaf abaxial surface with stomata $\times 430$. cc – costal cells; ts – tetracytic stomata; as – anomocytic stomata; usp – uniserial peltate hair; us – uniserial hair.

Collenchyma is present as a group of cells in the adaxial ridge and is 2-3 layered on the abaxial side, with lamellar thickenings, 8-30 (15) μm on adaxial and 5-16 (11) μm in diameter on abaxial. Parenchyma is 6-8 celled in thickness in adaxial, 3-5 layered in abaxial, beneath the collenchyma, cells mostly

polygonal to circular, 8-22 (15) μm in diameter, walls thin, with small intercellular spaces.

Vascular tissue of midvein consists of one large oval shaped vascular bundle at the centre, 54 -108 (81) μm in diameter, conjoint, collateral, endarch. Xylem at the centre,

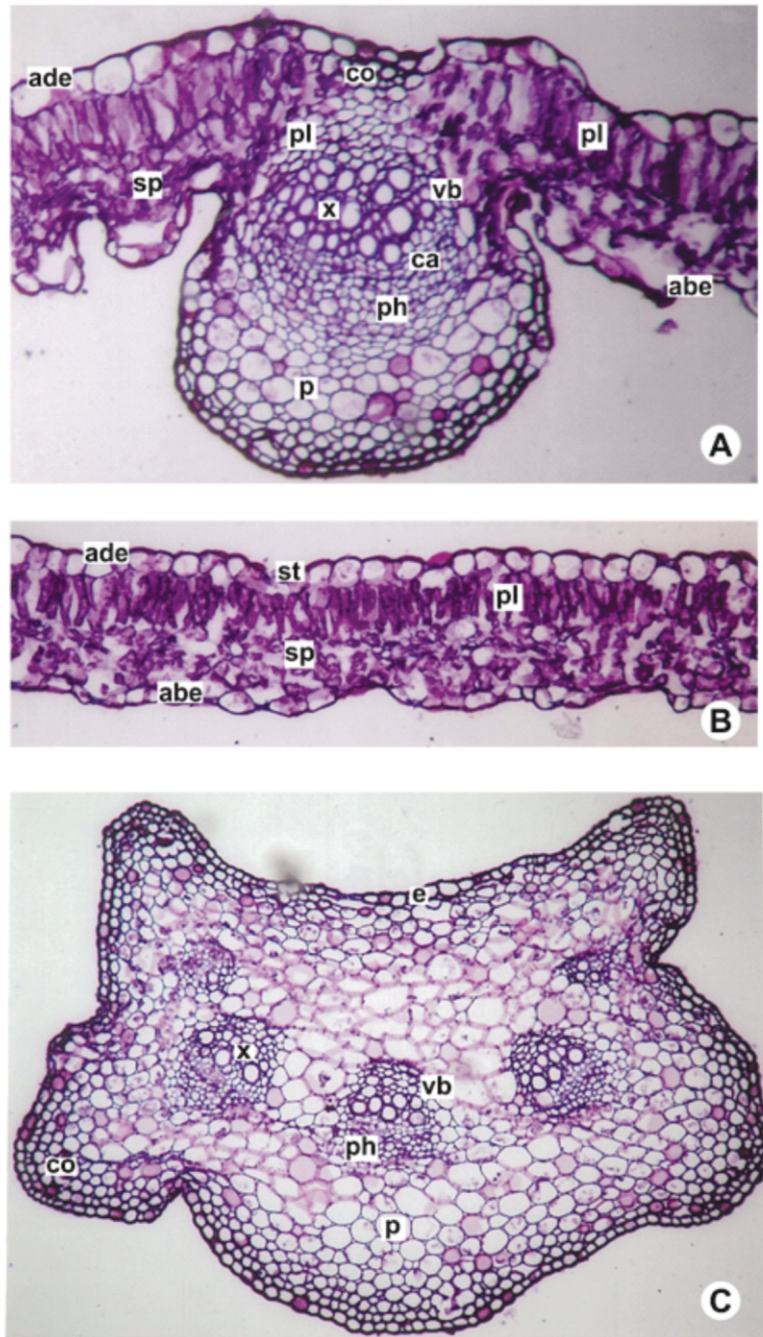


Plate 3(A-C) *A. bracteolata* A. Transverse section of leaf at midvein $\times 310$, B. Transverse section of leaf at lamina $\times 132$, C. Transverse section of petiole $\times 95$. **ade** – adaxial epidermis; **abe** – abaxial epidermis; **pl** – palisade; **sp** – spongy tissue; **co** – collenchyma; **p** – parenchyma; **ph** – phloem; **x** – xylem; **ca** – cambium; **vb** – vascular bundle; **st** – stomata; **e** – epidermis.

enclosed by phloem on abaxial. Tracheary elements 30 – 40 in number in midvein arranged radially and as clusters. Xylem parenchyma is present in between tracheary elements. Phloem consists of phloem parenchyma, sieve tubes and companion cells. In L.S. the vessels /tracheids possess mostly helical, annular and scalariform thickenings

(Plate 3A,B).

In Transverse Section, the petiole is semicircular or semilunar, adaxially flat; laterally 849 – 1018 (948) μm long and vertically 622 – 792 (724) μm wide. Epidermis is 1 – layered with oval to circular and barrel shaped cells, covered by thick cuticle. Hypodermis is 2-3 layered

collenchymatous with lamellar thickened, 11-25 (17) μm in diameter. Collenchyma is followed by parenchymatous tissue, cells polygonal, oval to circular, 22-49 (37) μm in diameter, walls thin, with small intercellular spaces, contents slightly dense with chloroplasts. Vascular bundles 5, arranged in an arc, mostly oval to circular shaped, conjoint, collateral, endarch, aperiocyclic, often 2-3 layered cambium in between xylem and phloem is present. Xylem consists of tracheary elements arranged in radial rows and few isolated, interrupted by xylem parenchyma. Phloem consists of phloem parenchyma, fibers, sieve cells accompanied with companion cells. In L.S. tracheary elements show mostly helical and few scalariform thickenings (Plate 3 C).

Powder Analysis: Powder consists of pieces of epidermal cells with tetracytic stomata; pieces of epidermal cells with costal cells; few whole or broken unisinate hairs; tracheary elements showing helical thickenings.

Organoleptic Characters: Colour – light green, Odour – pungent, Taste – bitter, Touch – smooth.

DISCUSSION

A.bracteolata Lam. is a perennial herb, commonly known as Gadida gadapa, Tella iswari in Telugu, grows especially in block soil. Leaves reniform or broadly ovate, cordate at base with wide sinus, entire. In leaf surface view adaxial epidermal cells are straight walled and abaxial epidermal cells are wavy [Anonymous (API), 2008] however in the present study the adaxial epidermal cells are straight to curved and mostly curved to wavy and wavy to sinuate on abaxial surface. The stomata have been reported to be present on either sides (Metcalfé and Chalk 1950) which belong to anisocytic (Anonymous, 2008) or anomocytic types [Anonymous (API), 2008]. The present study confirms the above observation but reports the occurrence of tetracytic stomata on either sides which is a new information. Trichomes were reported as simple unicellular [Anonymous (API), 2008] and simple uniseriate characterized by a

straight or hook shaped terminal cells (Metcalfé and Chalk, 1950, Anonymous, 2008). In addition to above unisinate and uniseriate peltate hairs have also been observed. One layered (Anonymous, 2008) palisade tissue is observed which is presently confirmed. Ground tissue has been differentiated into collenchyma and parenchymatous tissues. Vascular tissue of midvein consists of a single vascular strand at centre with is presently confirmed. In T.S. petiole is angular in outline and epidermis is followed by 3-4 rows of collenchyma which is confirmed [Anonymous (API), 2008] with earlier observations. Presently it is 2-3 layered and lamellar thickened. Vascular bundles 5 in numbered, arranged in an arc shape have reported to be confined. 2-3 layered cambium is present in between xylem and phloem.

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