

ANATOMY OF *GYNURA AURANTIACA* (BLUME) SCH.BIP. EX DC. (ASTERACEAE)

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ABSTRACT

*The paper presents a detailed histoanatomical description, of the vegetative organs (root, stem and leaf) and photographs as well of *Gynura aurantiaca* (Blume) Sch.Bip. ex DC. It was observed that the root have typical primary dictos structure. The stem has a differentiated in two regions cortex and the stele comprise one ring of open collateral vascular bundles with secondary xylem due to the cambium activity. The petiole anatomy is quite similar in its basic structure with the stem. The blade presents a heterogenous and hypostomatic mesophyll and a number of vascular bundles in the midrib zone. Remarkable is the presence of the filamentous, uniseriate non-glandular hairs in the stem, petiole and leaf blade. The mechanical tissue is present in the stem, petiole and blade as well.*

KEY WORDS: *anatomy, vegetative organs, *Gynura aurantiaca**

INTRODUCTION

Gynura aurantiaca (Blume) Sch.Bip. ex DC native from and South- East Asia, Java, Indonezia is commonly known as the purple passion plant or purple velvet plant. It is a perennial vine species that grows up to 60-90 cm, bearing oval leaves with large teeth along the margins. The leaves and stems are covered with short, bright-purple hairs that become more colorful if the plant is grown in bright light. It grows rapidly, but is cultivated primarily for those attractive purple leaves (Fig. 1). Annually during the spring, this plant produces prominent flowers both in appearance and smell, gaudy and malodorous. Parts of plant are poisonous if ingested (Chen et al., 2000; Mioulane, 2004; Sadovsky, 1996).



FIG. 1. Natural view of *Gynura aurantiaca* Blume DC.

Few data are known about this species anatomy. Most of the studies refer to the plant organogenesis, physiological studies concerning the flowers productivity growth and development, the effect of leaf pubescence on light reflectance (Chen et al., 2000; Gausman and Cardenas, 1969; LI Luan et al., 2009) or phytopathological studies (Conejero and Semanicik, 1977). In the Romanian literature data on this species structure lack.

The aims of the present study were to analysis the vegetative organs of *Gynura aurantiaca* and to contribute to the knowledge of this species.

MATERIALS AND METHODS

The plant leaves were collected form S.C. “Iris International” S.R.L. greenhouse. Small pieces of root, stem and leaves were fixed in FAA (formalin: glacial acetic acid: alcohol 5:5:90). Cross sections of the vegetative organs were performed by the freehand made technique (Bercu and Jianu, 2003; Ianovici, 2009). The cross sections samples were stained with alum carmine and iodine green. Histological observations and micrographs were performed with a BIOROM-T bright field microscope, equipped with a TOPICA 6001A digital camera attachment.

RESULTS AND DISCUSSION

Transection of the root reveals a few layers of suberized cells to the exterior (the cork) and 5-6 layers of phelloderm inside, produced by phellogen. Just below the cortex is the centrally located stele consisting of secondary phloem and xylem arranged in a compact mass. The xylem vessels are placed into a sclerencymatous parenchyma (Fig. 2, A, B).

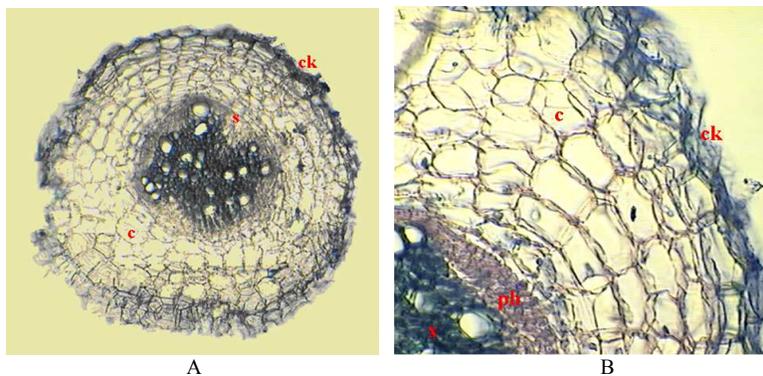


FIG. 2. Cross section of the root – ensamble (A, x 120). Portion with cork and cortex (B, x 322): c- cortex, ck-cork, ph- phloem, st- stele, x- xylem.

Cross sections of the stem presents an irregularly circular-coasted shape, with coasts of different amplitude and discloses the outer layer of the stem - epidermis -

composed of small isodiametric radial elongated cells, without intercellular spaces interrupted by the presence of stomata and long, uniseriate - one cell layer thick, filamentous and sharp-typed non-glandular hairs (Bavaru and Bercu, 2002; Esau, 1977). The epidermal cells are covered by a thin cuticle. Just below the epidermis is the cortex, differentiated into two zones, one zone consisting of 2-3 layers of collenchyma another area made up of several layers of parenchyma cells (Fig. 3, 4, A).

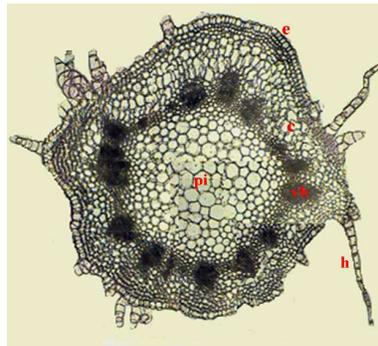


FIG. 3. Cross section of the stem - ensemble (x 50): c- cortex, e- epidermis, h- hair, pi- pith, vb- vascular bundles.

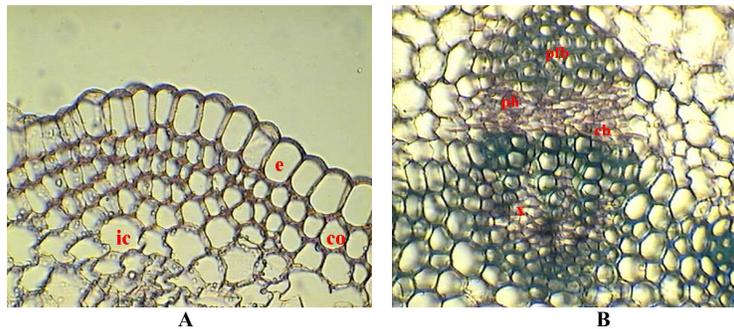


Fig. 4. Cross section of the stem. Portion with epidermis and cortex (A, x 180). A stele vascular bundle - detail – (B, x 190): cb- cambium, co- collenchyma, e- epidermis, ic- inner cortex, ph- phloem, pfb- periphloemic fibers, x- xylem.

In the ground tissue, such other dictot's stem (Toma and Rugina, 1998), a number of open collateral vascular bundles in a circular arrangement, various sized: the larger (11) alternate with the smaller (6-7) with secondary xylem, due to the cambium activity, are present. In periphloemic position, periphloemic fibers occur (Fig. 4, B). The centrally located pith is parenchymatic-cellulosed of meatic type (Fig. 3).

Cross section of the petiole discloses a one-layered epidermis, covered by cuticle and broken by the presence of stomata and non-glandular hairs the same as those of the stem (Fig. 5; 6, A).

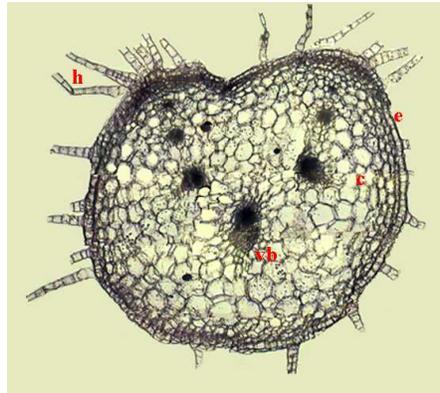


FIG. 5. Cross section of the stem -ensemble (x 30): c- cortex, e- epidermis, h- hair, vb- vascular bundle.

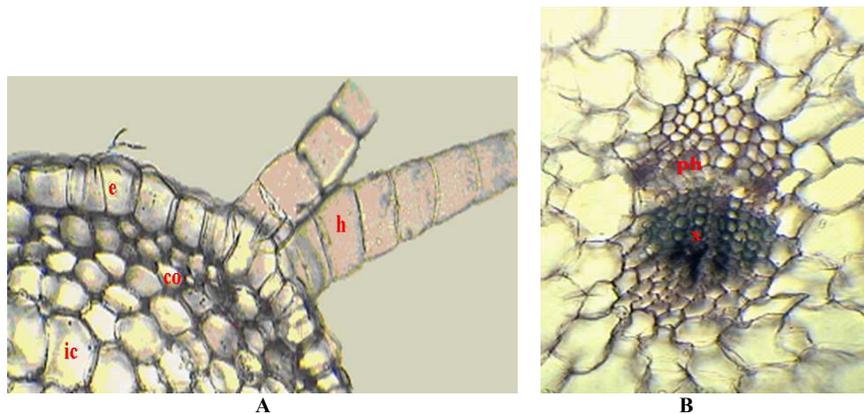


FIG. Cross section of the stem. Portion with epidermis and cortex. A vascular bundle - detail (A, B, x 107): co- collenchyma, e- epidermis, h- hair, ic- inner cortex, vb- vascular bundle, ph- phloem, x- xylem.

Just below epidermis is the hypodermis composed of 1-2 layers of collenchymatous cells, followed by a number of parenchyma cells, forming the inner cortex. The vascular bundles, three larger than the rest of four, are the same as those of the stem (Fig. 5; 6, B)

The blade is bifacial with both surfaces pubescent. Transection of the blade reveals that the epidermal cells of both surfaces are arranged in a single layer, covered by a thin cuticle. The epidermises are interrupted by the presence of the same many-celled non-glandular hairs present in the stem and petiole. Stomata are present only at the lower epidermis. Such as Yoshitama et al. (1994) reported for *Gynura aurantiaca*,

that the epidermal cells and hairs possess reddish purple anthocyanins in the vacuolar systems.

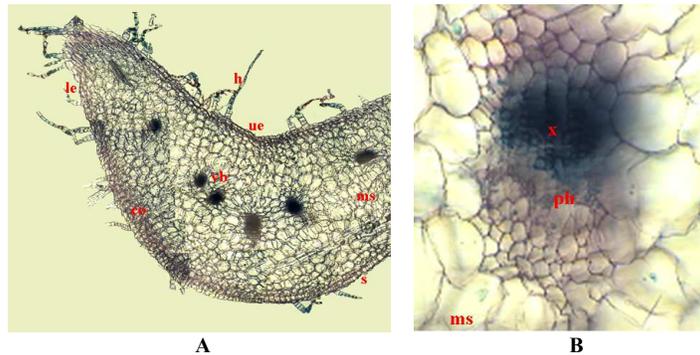


FIG. 6. Cross section of the blade – ensemble (A, x 70). A midrib vascular bundle (B, x 110): co- collenchyma, h- hair, le- lower epidermis, ms- mesophyll, ph- phloem, s- stoma, ue- upper epidermis, vb- vascular bundle, x- xylem.

The mesophyll is composed of palisade tissue and spongy tissues as well, in which vascular bundles are embedded (Fig. 6, A).

The midrib collateral 4 vascular bundles, present the typical foliar arrangement of the conductive elements, unprotected by sclerenchyma or parenchyma sheaths. In the midrib area, just below the upper and lower epidermis, 1-2 layers of collenchyma are present (Fig. 6, B).

CONCLUSIONS

The root has a secondary structure. The stem cortex is differentiated into two zones. The stem stele is represented by a circular ring of collateral vascular bundles with secondary xylem due to the cambium activity.

The petiole anatomy is quite similar in its basic structure with the stem but differences appear concerning the petiole shape and vascular bundles arrangement. The blade is bifacial and hypostomatic with a heterogeneous mesophyll. Uniseriate filamentous non glandular hairs are present in stem, petiole and blade.

The mechanical tissue, present in the stem and less in the leaf, is poorly developed and represented by collenchyma and some vascular bundles sclerenchymatous elements as well.

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Bercu: Anatomy of *Gynura aurantiaca* (blume) Sch.Bip. ex DC. (Asteraceae)

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