ANATOMICAL ASPECTS OF *CHLOROPHYTUM COMOSUM* (THUNB.) JACQUES „*VARIEGATUM*" (ANTHERICACEAE)

ASPECTE ANATOMICE ALE SPECIEI *CHLOROPHYTUM COMOSUM* (THUNB.) JACQUES „*VARIEGATUM*" (ANTHERICACEAE)

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Abstract. *The article comprises the investigation of the adventitious root, the aerial stoloniferous stem and leaf anatomy of a very popular houseplant, native of the tropical and subtropical regions of South Africa* Chlorophytum commosum (Thunb.) Jaques 'Variegatum'. *The mature root possesses a typical monocot's prymary structure with numerous vascular bundles but possessing few xylem and phloem elements. The aerial shoot stele is atactostelic with poor developed collateral bundles, composed of xylem and phloem. The blade mesophyll of* Chlorophytum commosum *is homogenous with poorly developed vascular bundles veins. The stem and blade epidermis is covered by a thick cuticle. The leaf and shoot epidermis continuity is interruptured by the presence of stomata. The poorly developed vascular system (in the adventitious root, shoots and leaf), the few mechanical elements of collenchyma, present in the aerial stolons and some sclerenchyma cells in the blade are in accordance with the plant pendant condition.*

Rezumat *Lucrarea are drept scop descrierea unor caracterele anatomice ale organelor vegetative aeriene ale speciei ornamentale Chlorophytum commosum (Thunb.) Jaques 'Variegatum', originară din zonele subtropicale şi tropicale ale Africii de Sud. Planta este spectaculoasă prin stolonii săi aerieni ce poartă frunze în rozetă. Analiza histo-anatomică înfăţişează o structură primară tipică monocotilelor cu numeroase fascicule vasculare de xilem şi de floem, sărace în elemente vasculare. Stelul lăstarilor stoloniferi aerieni este un atactostel cu mici fascicule vasculare colateral închise. Mezofilul frunzei sesile este omogen iar fasciculele vasculare ale nervurilor mari şi mici sunt sărace în elemente vasculare. Continuitatea epidermei lăstarilor şi frunzei este întreruptă de prezenta stomatelor. Atât slaba reprezentare a ţesutului mecanic în structura lăstarilor stoloniferi şi în mezofil cât şi slaba dezvoltare a sistemului vascular sunt caractere specifice naturii pendante a acestei plante.*

Key words*: anatomy, adventitious root, aerial shoot, leaf,* Chlorophytum comosum "Variegatum"
Cuvinte cheie**:** *anatomie, rădăcină, adventivă, lăstari, frunză,* Chlorophytum comosum "Variegatum"

INTRODUCTION

Chlorophytum Ker Gawl. is a genus of about 200-220 species of evergreen, herbaceous, stoloniferous and rhizomatous perennials plants native of subtropical and tropical regions of South Africa and Asia. They also known as ribbon plants or spider plants. Some authors include this genus in Agavaceae family (Wikipedia, the free encyclopedia) other in Anthericaceae family (WATSON & DALLWITZ 1992).

The spider plant - *Chlorophytum comosum* (Thunb.) Jaques *'Variegatum'* - have long narrow grassy green-and-white-striped leaves that are 20-40 cm long and 5-20 mm broad, which grow from a central rosette growing from a thick, fleshy rhizome. Some of the species may form mycorrhizas (BRUNDRETT 2002). It also produces branched stolons with small white flowers and baby plantlets.

Periodically a flowers stem emerges, and tiny white flowers—not always produced—are replaced by young plantlets, which can then be detached and rooted (PHILIPS 1963). The indoor flowers are small, usually white, produced on sparse panicles up to 120 cm long; in

some species the panicle also bears plantlets, which take root on touching the ground.

Although the spider plant are generally considered to be non-toxic, ingestion can often result in vomiting and temporarily altered behaviour (WOLVERTON 1996). In the literature a study into the anatomy of the species almost lack, excepting some ontogenetic studies of the root of this plant (STEWART & DERMAN 1979). Our purposes were to show some certain anatomical features of some vegetative organs in accordance with it pendent condition

MATERIAL AND METHODS

The plant was collected form S.C. Mamaia S.R.L. greenhouse near by Constantza town. Small pieces of the adventitious root, aerial shoot and sessile leaf were fixed in FAA (formalin:glaciar acetic acid:alcohol 5:5:90).

Cross sections of the vegetative organs were performed using a rotary microtome. The sections were stained with alum-carmine and iodine green (BERCU & JIANU, 2003). The samples were embedded in Canada balsam.

Histological observations and micrographs were performed with a BIOROM –T bright field microscope, equipped with a TOPICA 6001A video camera. The microphotographs were obtained from the video camera through a computer.

RESULTS AND DISCUSSION

Cross sections of *Chlorophytum commosun* adventitious root exhibit a rhizodermis, a cortex and a stele. The rhizodermis consists of one layer of radialy slightly elongated cells. Bellow rhizodermis is the cortex which bears small intercellular spaces in between the cells. Remarkable are the few calcium oxalate needle-like crystal in the cortex parenchymatuc cells (Fig. 1, B).

Internally, the endodermis encloses the stele. The endodermis consists of a single layer of U-shaped cells and pasage cells facing the xylem strings. The stele contains the vascular system, surrounded by the pericycle (one-layered). The vascular system is represented by 24 xylem and phloem bundles in a radiar and alternative arrangement. Xylem consists of 3-5 protoxylem vessels, one, rarely 4, metaxylem vessels (towards the center) and xylem parenchyma (facing the pericycle). Phloem elements are located between the xylem strings (Fig. 1, A, C).

The aerial shoot, in cross section, exhibits a one-layered epidermis, covered by a thick cuticle. Bellow the epidermis is the cortex, composed by 4-5 layers of slightly-thickend collenchymatous cells (Fig. 2, B). As other monocot's species (BATANOUNY 1992, BAVARU & BERCU 2002; ESSAU 1988) *Chlorophytum commosum* "*Variegatum*" shoot's stele is an atactostele possessing a number of vascular bundles, generated by a many-celled sclerenchymatous pericycle, aleatory spread into the basal tissue (Fig. 2, A).

The vascular bundles are poorly represented by close collateral bundles composed of xylem and phloem elements. The phloem elements (phloem vessels, companion cells and phloem parenchyma) are placed toward the epidermis whereas the xylem vessels (proto- and metaxylem vesses) to the inner zone of the stem. The ground tissue is composed by parenchymatous cells enclossing intercellular spaces between them (Fig. 2, A, C).

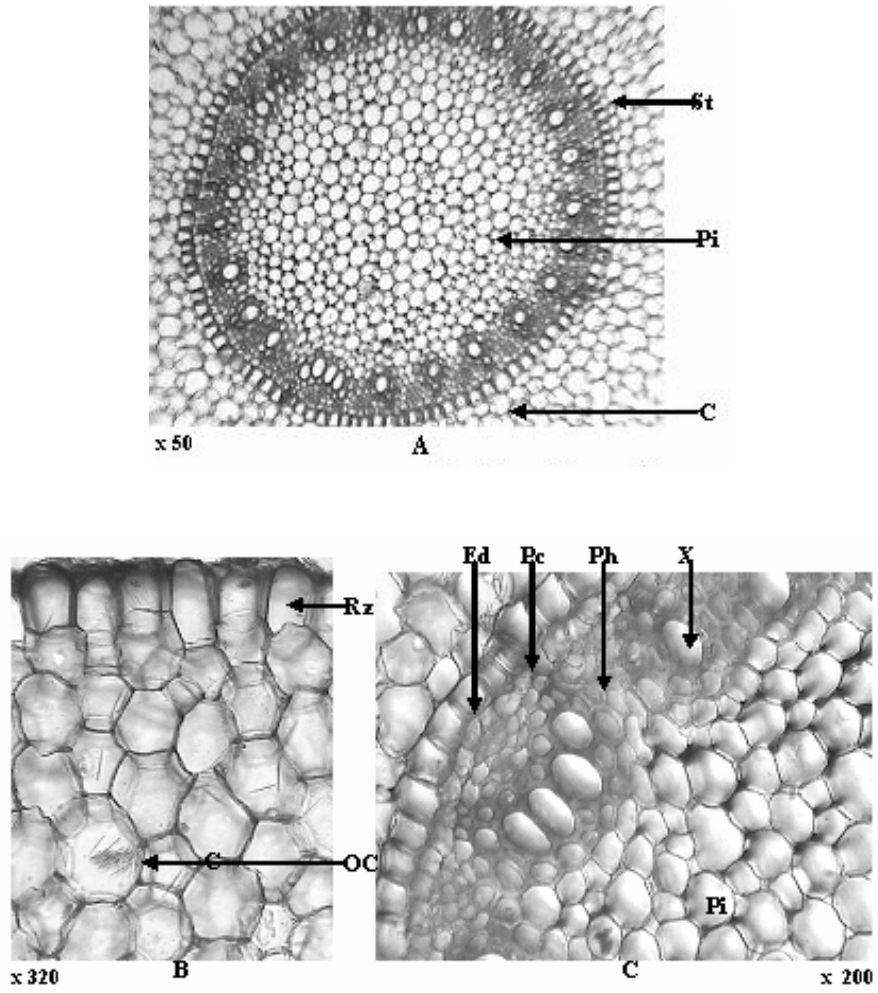

Fig. 1. Cross section of the adventitious root. General view of the stele (A). Portions with rhizodermis and cortex (B). Portion of the stele (C): C- cortex; Ed- endodermis; OC- oxalate crystals; Pc- pericycle; Ph- phloem; Pi-pith; R-rhizodermis; Rz- rhizodermis; St- stele; X- xylem (orig.).

Cross section of the leaf blade discloses a homogenous mesophyll possessing a spongy tissue with numerous parenchyma cells. Bellow the upper epidermis, covered by cuticle, a number of cells possesses chloroplasts (Fig. 3, A). Remarkable are the close collateral bundles of the large and small veins, represented by few xylem and phloem elements. Few slightly-thickened sclerenchymatous cells, with mechanical role, surround the phloem elements of the large veins.

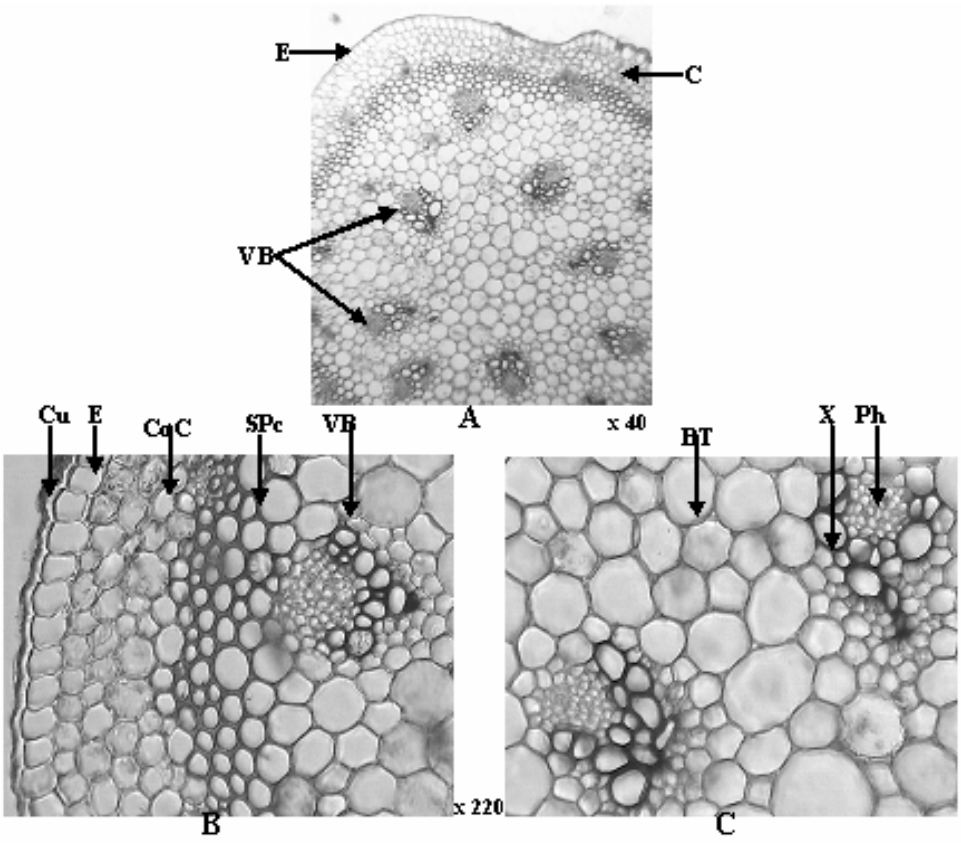

Fig. 2. Cross section of the aerial shoot. General view (A). Portion with epidermis and cortex (B). Portion of the stele with vascular bundles (C): BT- basic tissue; Cu- cuticle; CoC- collenchyma; E- epidermis; Ph- phloem; SPc- sclerenchyma pericycle; VB- vascular bundle; X- xylem (orig.).

The lower epidermis consists of a single layer of smaller cells (Fig. 3, B). The blade epidermis continuity is interruptured, at places, by stomata. In mesophyll cells few needle-like and prismatic oxalate crystal occur (Fig. 3, A), as WATSON & DALLWITZ (1992) mentioned , but the authors reported nothing abour the presence of the oxalate crystals in the adventitious root structure.

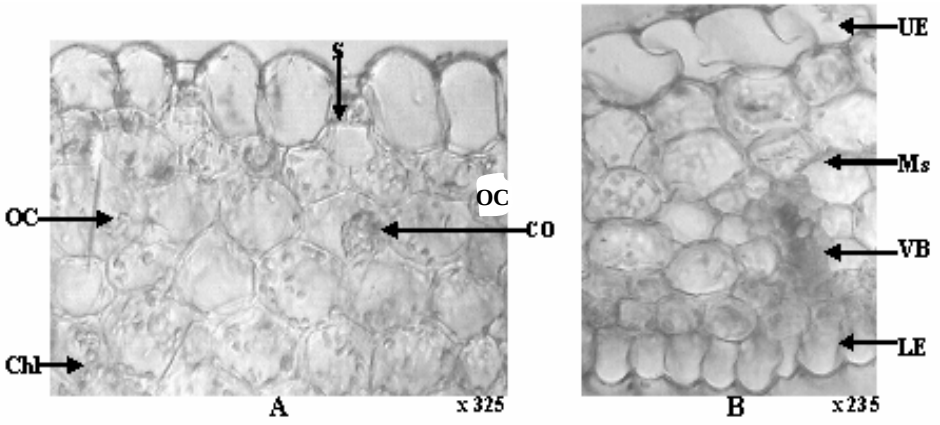

Fig. 3. Portion of the leaf cross section with a large vein: Chl- chloroplasts; LE- lower epidermis; Ms- mesophyll; OC- oxalate crystal; S- stoma; UE- upper epidermis; VB- vascular bundle (orig.).

CONCLUSIONS

Chlorophytum comosum "*Variegatum*" possesses an usualy monocot's primary adventitious root structure with numerous vascular bundles with few xylem and phloem elements and a well developed cortex.

The aerial shoot stele is atactostelic with a poorly developed cortex and vascular collateral bundles. Remarcable is the many-layered sclerenchymatous pericycle producing vascular bundles and mechanical support as well. In the homogenous leaf mesophyll are embedded large and small collateral and close vascular bundles with few xylem and phloem elements. Notable is the presence of oxalate crystals in the root's cortex and in the mesophyll cells.

The mechanical tissue is almost absent in the analysed plant vegetative organs. The shoots plant strengthening is represented by few layers of slightly collenchyma cells and by some sclerenchyma cells around the vascular szstem of the blade large veins. It is absent in the root.

Remarkable are the poorly developed vascular tissue in the adventitious root, shoots and leaf. All anatomical features of the adventitious root, shoots and leaf are in accordance with the plant pendent condition.

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