CONSIDERATIONS UPON SOME TAXA FROM *POACEAE* FAMILY

CONSIDERAȚII ASUPRA UNOR TAXONI DIN FAMILIA *POACEAE*

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Abstract. *The anatomical features from three Poaceae taxa are discussed in relation with their ecological adaptation. For each of the axial organs studied are presented the more peculiar characteristics. Structural tipe of the leaf are interpredet correlated with new Clayton and Renvoize ideas.*

Rezumat. *Caracteristicile anatimice ale trei staxoni din familia Poaceae sunt analizate în corelație cu adaptările ecologice. Pentru fiecare dn organelle axiale studiate sunt prezentate caracteristicile mai representative. Tipul de structură al frunzei este interpretat în corelației cu părerile mai noi emise de Clayton şi Renvoize.*

Numerous morphological-anatomic studies have been conducted on representatives of the POACEAE family due to their economic importance. Many of these studies concentrated on the leaves of the gramineae and their annexes. Metcalfe [4] distinguishes between two types of leave structure: "festucoid" and "panicoid". Avdulov [1] also mentions two basic types of the leave anatomy in the Poaceae family, types that are similar to those described by Prat [6]. Based on the characteristics of the parenchyma sheath, Brown [2] proposes six types of leaves while Nikolaevski [5] shows that only three types of structures are present in poacee.

A more realistic view is given by Clayton and Renvoize [3] who highlight several subtypes of leave structure, also introducing the new crown (krantz) type of structure.

The structures of the species presented here are following the general plan of the *Poaceae* family. For each of the axial organs studied we will make obvious the more peculiar characteristics that are relevant for the ecologic adaptation.

MATERIAL AND METHOD

The vegetal material is represented by the three taxa: *Oplismenus hirtellus* (L.) P.Beauv., *Phalaris arundinacea* L. ssp. *picta* Janch. and *Stenotaphrum secundatum* (Walt.) Kuntze *'Variegatus'* (*Poaceae* family). All taxa were cultivated in Botanical Garden of Iaşi.

The fixation and processing of the material was done according to the usual protocol of the Vegetal Morphology and Anatomy Laboratory belonging to the Biology Department of the University "Al. I. Cuza" of Iaşi [7].

There were made cross sections at the middle level of the root, of the stem and of the leaves. As well there were made superficial sections at the leaf level. The

permanent preparations obtained were analyzed and photographed with the optical microscope type Novex.

RESULTS AND DISSCUTIONS

Adventitious root (fig. 1, 2). The exodermis is either one-layered (e.g. *Oplismenus hirtellus and Stenotaphrum secundatum 'Variegatus'*) or very thick (3-4 layers for *Phalaris arundinacea* ssp. *picta*) with cells having slightly suberified walls. The mechanical tissue is missing in *Phalaris arundinacea* ssp. *picta*.

In the case of *Oplismenus hirtellus* and *Stenotaphrum secundatum 'Variegatus'* the last layer of the parenchyma contains cells with slightly lignified lateral and internal walls. Many of the cells in the middle layer of the parenchyma disintegrate, resulting in a multitude of aeriferous cavities.

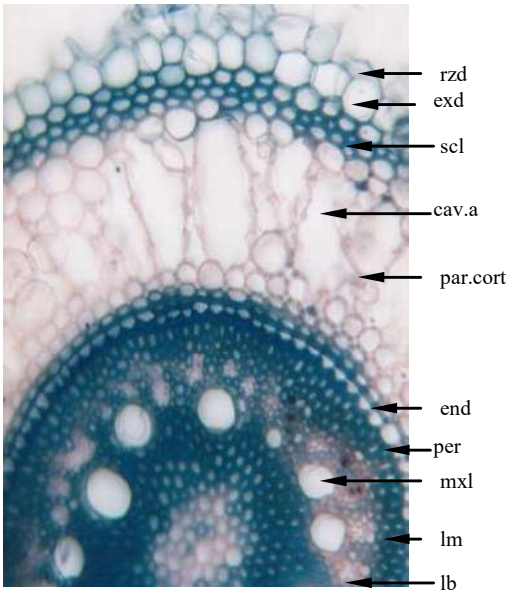


Fig. 1. *Stenotaphrum secundatum 'Variegatus'* – details of root

In the central cylinder the vascular system is represented by 15 (or 10-12 for *Stenotaphrum secundatum 'Variegatus'*) xylem areas separated by the same number of phloem areas, the latter being significantly smaller than the former. In addition, large metaxylem central vessels, independent of the xylemic bundles, are present.

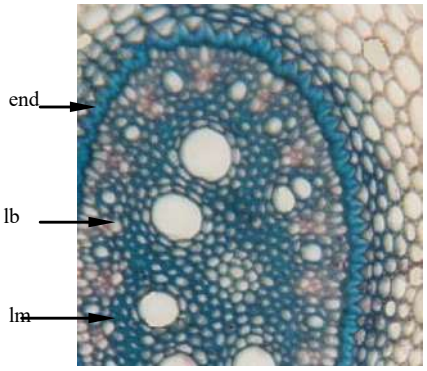


Fig. 2 *Phalaris arundinacea* ssp. *picta* - details of root

The pith is parenchyma-cellulose like (in *Oplismenus hirtellus*) while is slightly sclerified and lignified for the other two taxas.

The stem: base internode (fig. 3, 4, 5)

In cross-section it has either circular or rounded rectangle (for

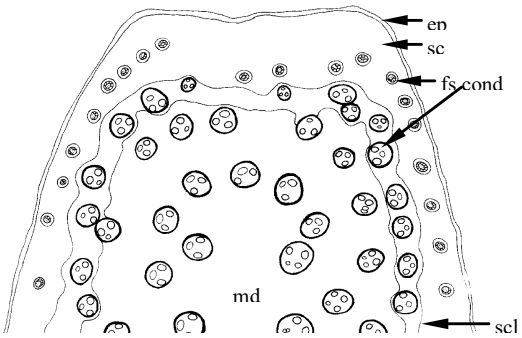


Fig. 3. *Stenotaphrum secundatum 'Variegatus'* – schema of stem

Stenotaphrum secundatum 'Variegatus') shape.

The epidermis is covered by a thick cuticle in the case of *Oplismenus*

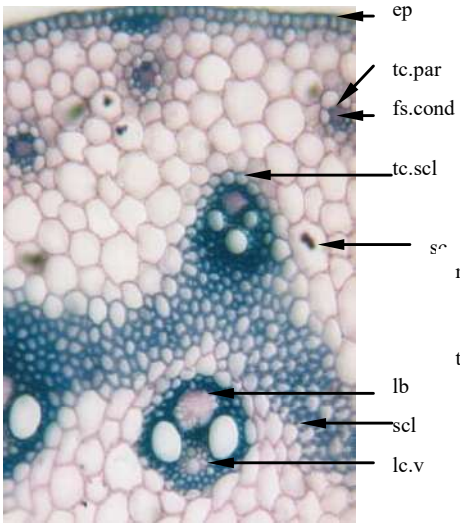
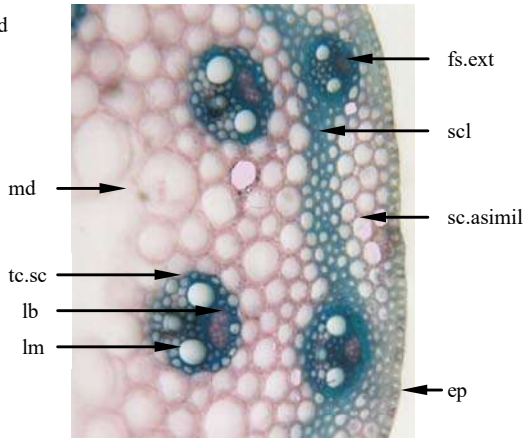


Fig. 4. *Stenotaphrum secundatum 'Variegatus'* – details of stem

Fig. 5. *Oplismenus hirtellus* – details of stem



hirtellus and *Phalaris arundinacea* ssp. *picta* and thin in the case of *Stenotaphrum secundatum 'Variegatus'*. Only for *Oplismenus hirtellus* and *Stenotaphrum secundatum 'Variegatus'* the hypodermic layer is sclerified, something that is never seen in *Phalaris arundinacea* ssp. *picta*. The cork is either totally assimilating (for *Stenotaphrum secundatum 'Variegatus')*, or it has the last layers consisting of a mechanical area pierced by closed collateral bundles.

The conducting tissues make up a large number of vascular bundles arranged in two almost concentric circles (less obvious in *Stenotaphrum secundatum 'Variegatus'*). These big bundles generally have aquiferous cavity

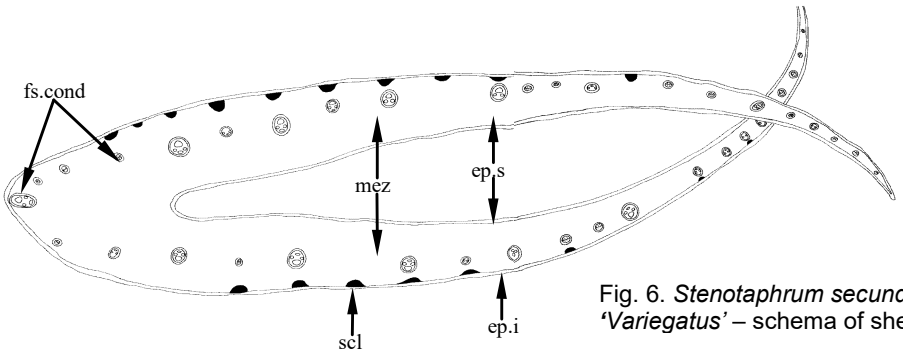


Fig. 6. *Stenotaphrum secundatum 'Variegatus'* – schema of sheath

and sclerenchymatous sheath.

The fundamental cellulose parenchyma, containing vascular bundles in three concentric circles (in the case of *Oplismenus hirtellus* şi *Phalaris*

arundinacea ssp. *picta*) is replaced in the centre of the stem by a large aeriferous cavity (in *Stenotaphrum secundatum 'Variegatus'*).

The leaf. The sheath (fig. 6,7). In cross-section it has the shape of an incomplete circle (for *Oplismenus hirtellus* and *Phalaris arundinacea* ssp. *picta*) and that of the letter **"U"** for *Stenotaphrum secundatum 'Variegatus'*.

The vascular system is made up by numerous phloem-xylemic bundles with collateral closed tips, some of them large, separated by much smaller ones.. The latter are represented only by the phloem (for *Oplismenus hirtellus*).

In between veins, the mesophyll is homogenous, parenchymatous; Relatively large aeriferous cavities are scattered in the central area of *Oplismenus hirtellus* and *Phalaris arundinacea* ssp. *picta*.

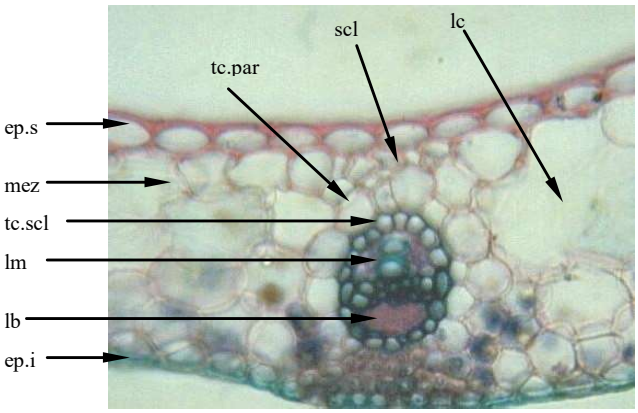


Fig. 7 *Oplismenus hirtellus* - details of sheath

The lamina (fig. 8, 9, 10, 11).

The epidermis, as seen from the front, displays elongated polygonal cells in parallel strings, amongst which halteriform stomata can be seen. Many of the epidermis short cells are turned into aculescent trichomes. They can be uni- (in *Phalaris arundinacea* subsp. *picta*) or bicellular. The stomata are present in the both epidermis.

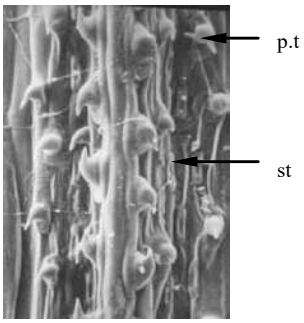


Fig. 8 -*Phalaris arundinacea* ssp. *picta* - details of lower epidermis

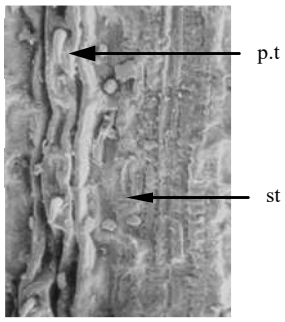


Fig. 9- *Oplismenus hirtellus* - details of upper epidermis

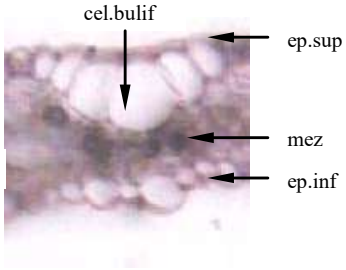


Fig. 10 -*Phalaris arundinacea* ssp. *picta* - details of bulliform cells

The upper epidermis shows numerous groups of bulliform cells: 5-7 very large cells (for *Oplismenus hirtellus*) or 2-4 cells (for *Phalaris arundinacea* ssp. *picta*). In the case of *Stenotaphrum secundatum 'Variegatus'* the upper face of the epidermis - hypodermis has very long cells which look like bulliform cells. The stomata are situated in the case of *Stenotaphrum secundatum 'Variegatus'* in the

upper epidermis, below the level of the epidermis cells, thus forming suprastomatal chambers.

The conducting tissues form large vascular bundles in the midvein and small ones between the lateral veins. The large bundles have a parenchymatous sheath and a sclerenchymatous sheat. The latter is present at *Stenotaphrum secundatum 'Variegatus'* only around phloem, cut off in the middle part. The mechanical tissue is constituted of groups of sclerenchymatic fibres placed next to the conducting bundles, always (for *Phalaris arundinacea* ssp. *picta*) or seldom (for *Oplismenus hirtellus*) coming in direct contact with these, but always in contact with the two epidermes.

For *Stenotaphrum secundatum 'Variegatus'* the small bundles are in a circular shape and they only have parenchymatous sheat; they are made up by

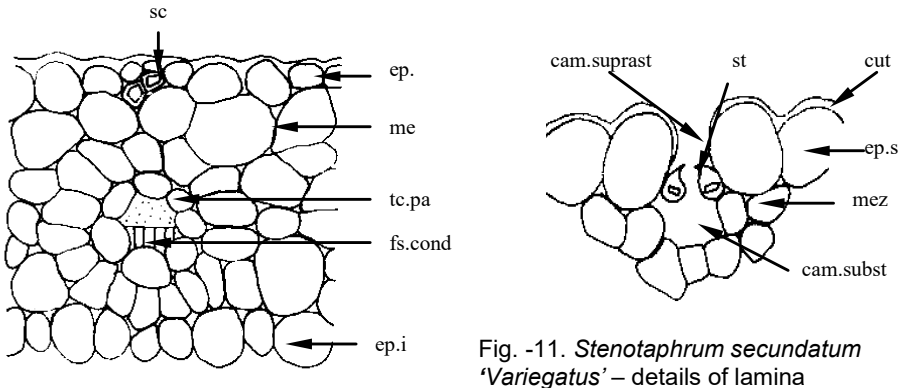


Fig. -11. *Stenotaphrum secundatum 'Variegatus'* – details of lamina

phloem elements, seldom accompanied by 1-2 small xylem vessels.

For *Oplismenus hirtellus* the mesophyll is clearly separated in unstratified

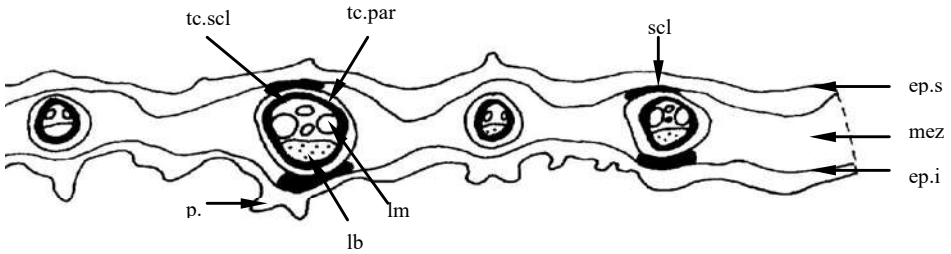


Fig. 12 -*Phalaris arundinacea* ssp. *picta* - schema of lamina

palisadic tissue and spongy parenchyma bi or tri-layered, thus the lamina has dorsiventral structure. The palisadic tissue takes up around 75% of the mesophyll's thickness. The palisadic cells in the vicinity of the conducting bundles are either oblique or perpendicular to them.

For the other two taxa the mesophyll is homogeneous, parenchymatic, with elongated cells placed tangential to *(Phalaris arundinacea* ssp. *picta*) or radial around the bundles *(Stenotaphrum secundatum 'Variegatus')*; the cells in the green areas contain chloroplast.

CONCLUSIONS

- Anatomical peculiarities of root are related with moist and dry habitats.
- Related with Clayton and Renvoize subtype, the leaf from *Oplismenus hirtellus* is non-krantz type, but with character from radial clorenchima subtype and palisade cells subtype.
- The leaf from *Phalaris arundinacea* ssp. *picta* is non-krantz type.
- The leaf from *Stenotaphrum secundatum 'Variegatus'* is krantz (crown) type, mestome sheath subtype.

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