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CHANGES IN THE STRUCTURE OF *AESCULUS HIPPOCASTANUM* SPECIES INDUCED BY POLLUTION

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Abstract

Although the organism's behaviour to pollution depends on many factors such as health, sex, etc. [2], we have proposed in this paper to highlight a small part of the structural transformation in Aesculus hippocastanum petioles and leaves induced by pollution caused by motor vehicles.

INTRODUCTION

Motor vehicles produce carbon dioxide (CO), hydrocarbons (unburned, partially burned, cracked), nitrogen oxides and sulfur compounds. The largest amount of CO is produced by motor vehicles. Due to the addition of tetraethyl lead in gasoline, the lead is eliminated with the exhaust gases, which are deposited on plants and soil (pollution).

Exhaust gases contain lead vapor which condensed, giving rise to the suspension. Plants and soil at a distance of 50-100 m from the road networks with heavy car traffic are most contaminated with lead. Our research aimed to reveal possible changes in the dimensions of leaves and petioles tissues belonging to *Aesculus hippocastanum* pollution exposed compared with those taken from less polluted areas.

MATERIAL AND METHODS

For the anatomical study, we used fresh material from *Aesculus hippocastanum* (leaf, petiole) harvested from two areas: a polluted (Crângaşi district) and other less polluted (Tineretului Park).

Numerous cross sections were made through leaves and petioles collected from both the less polluted and polluted area. Numerous micrometer measurements were made [1] to leaf and petiole tissues with a microscope ML-4M IOR found in the laboratory of Botany, UASVM Bucharest. The photos were taken with the digital camera Panasonic Lumix DMC-LS60 (6MPX, 3X optical zoom).

RESULTS AND DISCUSSION

The dimensions for the petiole tissues (Figure 1) harvested from less polluted area are shown in figure 2.

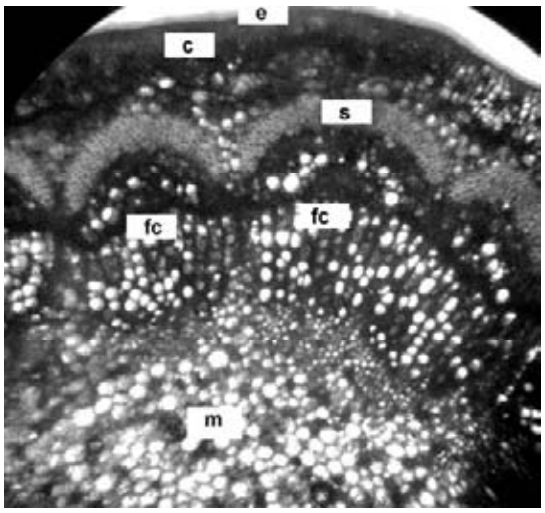

Fig. 1. Cross section through the petiole - less polluted area: e - epidermis; c - colenchyma; s - sclerenchyma; f.c. - vascular bundles; m - pith

The vascular bundles circularly arranged are well developed, showing values of 211.2 μ for phloem, the wood (xylem) being more developed (414 μ).

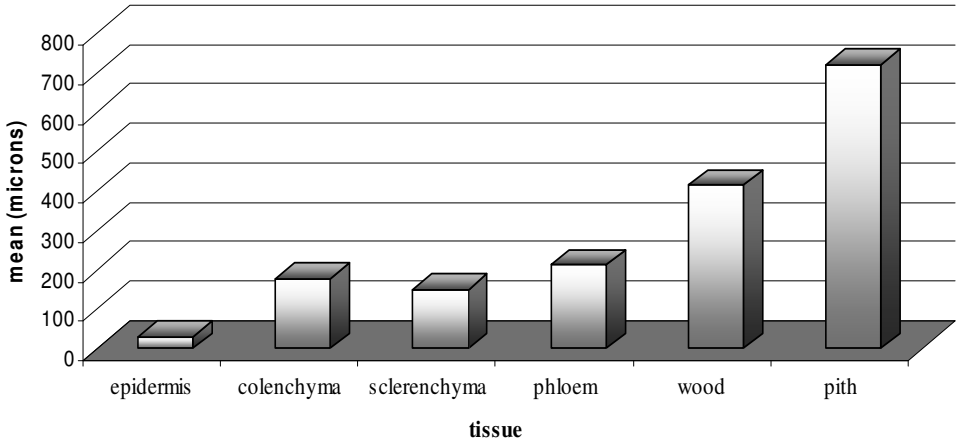

Fig. 2. Dimensions for various tissues of petiole structure - less polluted area (measurement: objective 10x)

The leaf has bifacial structure, dorsal-ventral, consists of upper epidermis, palisade tissue and lacunar tissue disposed under the lower epidermis.

Figure 3 presents different dimensions of the tissue from structure of leaf, harvested from the less polluted area.

Upper epidermis (28.8 μ) is more developed than the lower (16.2 μ) and the average size for the lacunar tissue composed of several layers, is about 102.6 μ.

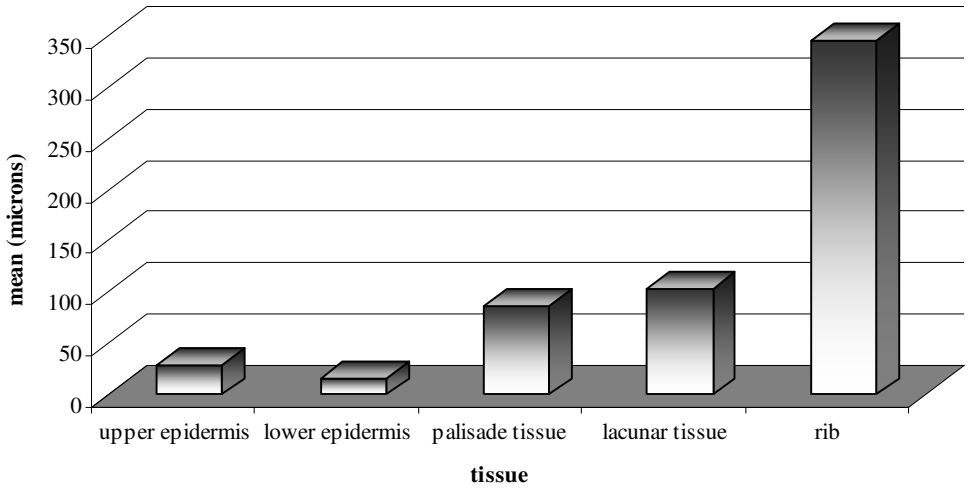

Fig. 3. Dimensions of the various tissues of the leaf structure - less polluted area (measurement: objective 10x)

The dimensions of the petiole vascular tissues harvested from the polluted area are shown in figure 4.

All the tissue measurements recorded weaker growth compared with tissues belonging to the petioles harvested from less polluted area, especially the epidermis (18 μ) and sclerenchyma (105.6 μ), followed by phloem (187.2 μ), xylem (wood) (384 μ) and pith (612 μ).

The lacunar tissue of the leaves taken from polluted area (Figure 5) has fewer cell layers compared with the same type of tissue examined in the leaves collected from less polluted area.

It was also noted a reduction in the size of the vascular bundles.

The measurements of tissues (Figure 6) belonging to the leaves sampled from the polluted area showed some reductions in their size.

Significant differences were recorded mainly in the palisade tissue (57.6 μ) and ribs (288 μ).

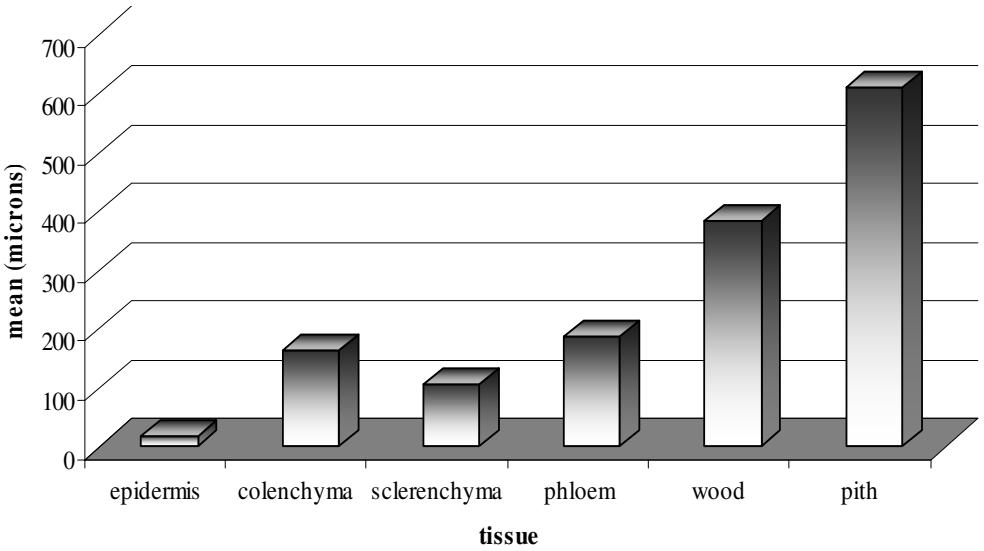

Fig. 4. Dimensions of various tissues from petiole structure - polluted area (measurement: objective 10x)

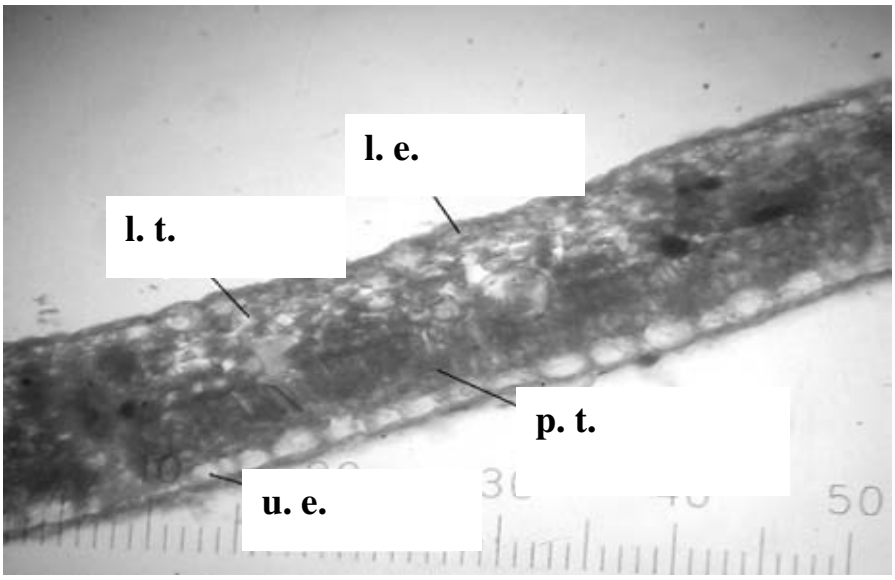

Fig. 5. Cross section through the leaf - polluted area: u.e.- upper epidermis, p.t. - palisade tissue; l.t. - lacunar tissue; l.e. - lower epidermis

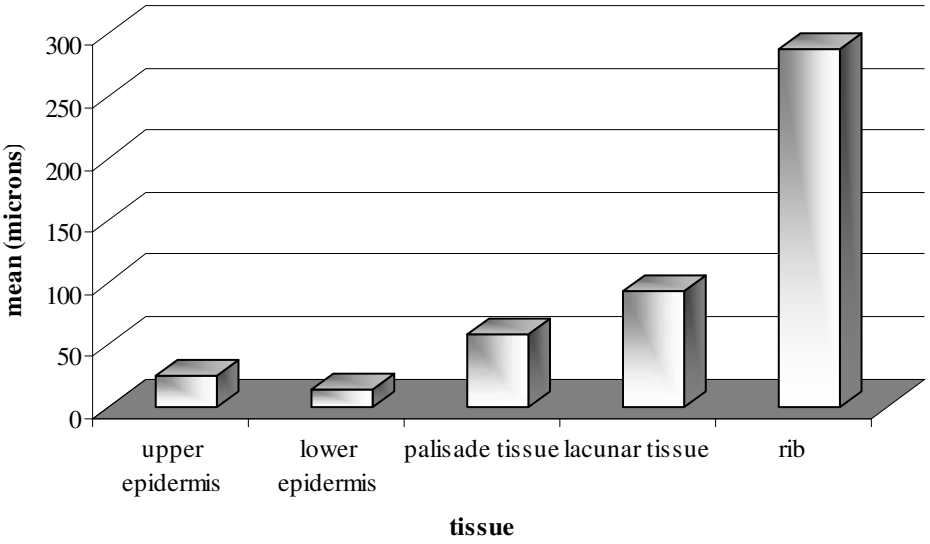

Fig. 6. Dimensions of various tissues from leaf structure - polluted area (measurement: objective 10x)

CONCLUSIONS

1. All measured tissues of the petioles structure belonging to the polluted area, showed a slower growth compared with tissues belonging to the petioles harvested from less polluted area, especially the epidermis and sclerenchyma, followed by vascular bundles and pith.
2. Leaves taken from the polluted area present less developed tissues; lacunar tissue is being formed from a smaller number of cell layers compared with the same type of tissue examined in the leaves collected from less polluted area.

REFERENCES

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