COMPARATIVE DATA REGARDING THE HISTO-ANATOMY OF THE VEGETATIVE ORGANS IN TWO *ORNITHOGALLUM* TAXA FROM THE FLORA OF ROMANIA

DATE COMPARATIVE PRIVIND HISTO-ANATOMIA ORGANELOR VEGETATIVE LA DOI TAXONI DE *ORNITHOGALUM* DIN FLORA ROMÂNIEI

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Abstract. *The study deals with the histo-anatomy of vegetative organs in two spontaneous Ornithogalum taxa (Ornithogalum boucheanum and Ornithogalum orthophyllum ssp. kochii) collected from Gârboavele Forest from Romania. The aim of the study is to identify the inter–specific variation of histo–anatomical characters correlated with the ecological factors of the enviromment in whitch the investigated taxa grow. The results showed that they present similar characteristics, with some specific features: the structure of the vascular bundles in the inferior part of the stem; the structure of the mesophyll, the density of the stomata on both sides of the leaf.*

Key words: histo-anatomy, vegetative organs, *Ornithogalum orthophyllum* ssp. *kochii* Jka., *Ornithogalum boucheanum* (Kunth) Asch.

Rezumat. *Autorii cercetează structura aparatului vegetativ la doi taxoni spontani de Ornithogalum (Ornithogalum boucheanum şi Ornithogalum orthophyllum) colectate din pădurea Gârboavele, România. Scopul studiului este de a evidenţia variaţiile interspecifice ale caracterelor histo–anatomice, corelate cu factorii ecologici în care trăiesc speciile luate în studiu. Din analiza microscopică comparativă a structurii organelor vegetative la Ornithogalum orthophyllum ssp. kochii Jka. şi Ornithogalum boucheanum (Kunth) Asch., remarcăm că ele prezintă caractere asemănătoare, cu unele particularităţi: alcătuirea fasciculelor libero-lemnoase din partea inferioară a tulpinii; structura mezofilului limbului foliar, densitatea stomatelor pe ambele feţe ale frunzei*.

Cuvinte cheie: histo-anatomie, organe vegetative, *Ornithogalum orthophyllum* ssp. *kochii* Jka., *Ornithogalum boucheanum* (Kunth) Asch.

INTRODUCTION

Zaharidi C. has brought important contributions to the understanding of the structure of the vegetative apparatus in species of the genus *Ornithogalum*, by publishing various articles in journals, both in the country and abroad. He has studied, throughout several years (1961 - 1965), the morphology, anatomy, cytology, ecology as well as the biology of the blooming of some species of *Liliaceae,* among which species of the genus *Ornithogalum*.

Some cytology aspects regarding the *Ornithogalum* species belong to Lungeanu I. (1970-1971).

In the foreign literature, Cullen J. and Ratter J. A. (1967) as well as Agapova N.D. (1977) have conducted studies which deal with the taxonomy, cytology and anatomy of this genus.

Ornithogalum boucheanum and *Ornithogalum orthophyllum* are ephemerous taxa, adapted to the thermal conditions offered by the forest steppe , with an average yearly temperature of 9,5 – 9,6°C, that grow especially in the shade, in wet soils with water accessible between 15% and 30%.

The aim of the present study is to highlight the interspecific variations of the histo-anatomical characters, correlated with the ecological factors within which the studied species live.

MATERIAL AND METHOD

The material of the research

It is represented by mature plants (in the anthesis stage) of *Ornithogalum orthophyllum* ssp. *kochii* Jka. and *Ornithogalum boucheanum* (Kunth) Asch.

Histo-anatomy researches

The cross sections of the vegetative organs done by the hand microtome, were coloured with iodine - green and ruthenium - red, analysed and photographed with the Olympus BX51 photonic microscope equipped with an Olympus E-330 photo camera.

Morphometric analysis

In order to calculate the density of the stomata on both sides of the leaf there have been made superficial sections through the leaf. There have been counted the stomata from 27 microscopic fields (100x resolution) for both sides of the foliar limb, the samples being chosen randomly (leaves from different levels, different regions of the limb). The data were statistically analised, using the Anova (Microsoft Excel) programme.

RESULTS AND DISCUSSIONS

The structure of the stem (fig.1-4)

Characteristic to all the monocot species, the axial vegetative organs have only a primary structure.

For both analysed taxa, the stem is protected along its entire length by a unistratal epidermis, with more or less isodiametric cells, having the external wall much thicker than the others and covered by a thin cuticle. Here and there, there can be noticed stomata which are on the same level with the real epidermic cells.

The bark is meatus type parenchymatic-cellulose, thicker (5-6 strata) in the superior part of the stem and thinner (3 strata) on the base. The diametre of the cortical cells increases centripetally.

The central cylindre begins with a thick pericycle, made up of cells with thickened cellulose walls in the greatest part of the stem, lignified only in the

base region. The vascular bundles of closed collateral type are placed in several circles in the fundamental meatus type parenchyma. Their size increases centripetally, the smallest bundles being located in the sclerenchymatous pericycle.

There can be noticed a structural specific feature of the vascular bundles from the lower third of the stem for both species that were studied: the manner of the placement of the vascular bundles (grouped on several rows – for the *Ornithogalum ornithophyllum* ssp. *kochii* Jka; they were grouped in a single file for the *Ornithogalum boucheanum* (Kunth) Asch).

Some cells of the fundamental parenchyma disorganized, resulting numerous aeriferous cavities of various dimensions, especially in the central region of the stem.

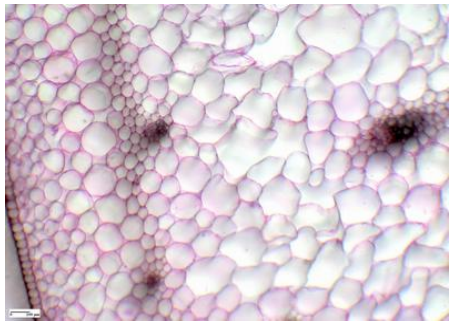

Fig. 1. Cross section through the superior third part of the stem of the *O. ornithophyllum ssp. kochii* Jka

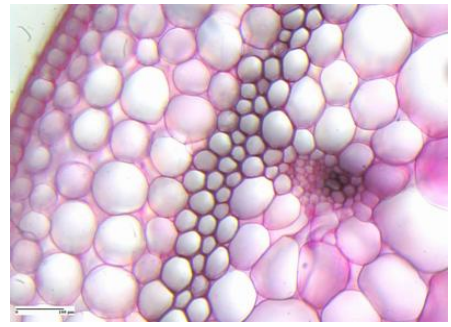

Fig. 2. Cross section through the middle third part of the stem of *O. boucheanum* (Kunth) Asch.

Fig. 3. Cross section through the inferior third part of the stem of *O. ornithophyllum ssp. kochii Jka.*

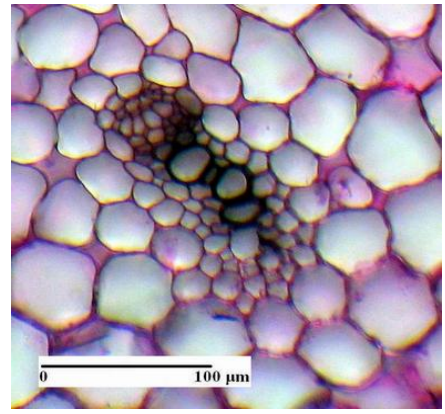

Fig. 4. Leading fascicle in cross section through the inferior third part of the stem of *O. boucheanum* (Kunth) Asch .

The structure of the leaf

The structure of the leaf differs in the two taxa that were analysed. Thus, for *Ornithogalum ornithophyllum* ssp. *kochii* Jka. (fig. 5), the limb presents a bifacial isofacial heterogeneously centred structure (a layer of high palisade cells under both epidermises and central lacunous tissue), in comparison to *Ornithogalum boucheanum* (Kunth) Asch. (fig. 6), in which the mesophyll is homogeneous for the greatest part of the limb (bifacial isofacial homogeneously centred structure), some unistratal palisade tissue with short cells being possible to be found in some areas (under the lower epidermis).

For both taxa, in the lacunous tissue, big aeriferous cavities and numerous vascular bundles of various dimensions (bigger in the central part of the limb), corresponding to the parallel ribs can be found.

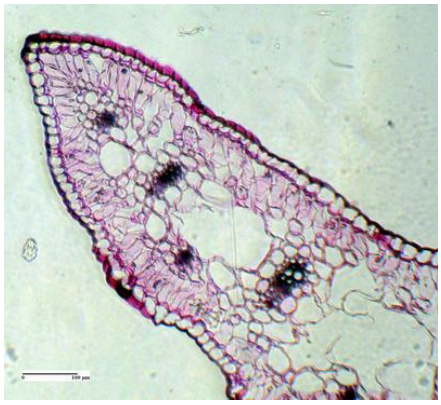

Fig. 5. Cross section through the *O. ornithophyllum* ssp. *kochii* Jka . leaf

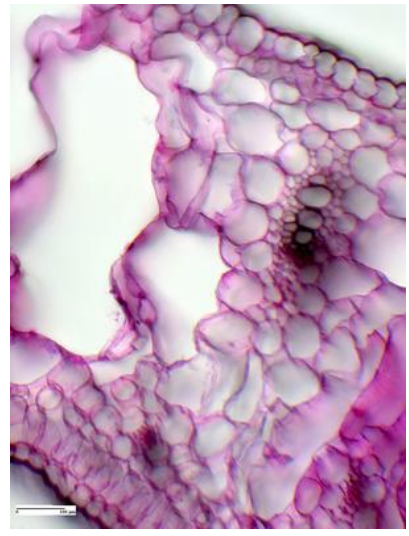

Fig. 6. Cross section through the *O. boucheanum* (Kunth) Asch. leaf

The density of stomata (fig. 7) on both sides of the foliar limb varies in the two taxa that were analysed, being much higher in the leaves of *Ornithogalum orthophyllum* (the data have a statistic significance - Anova Single Factor, F>F crit.).

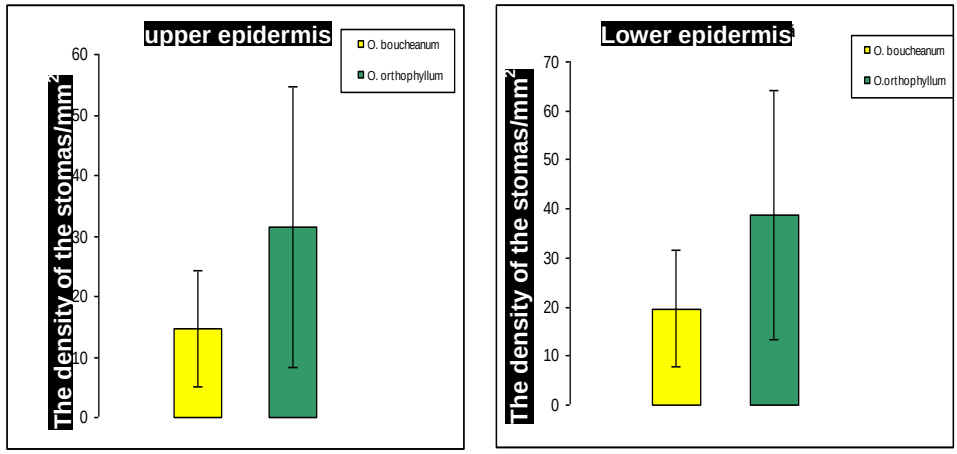

Fig. 7. Comparasion between the density of the stomas in the upper epidermis (left) and the lower one (right) of the *Ornithogalum boucheanum* (Kunth) Asch. and *Ornithogalum orthophyllum* ssp*. kochii* Jka. leaf

CONCLUSIONS

From the comparative microscopic analysis of the structure of the vegetative organs of the la *Ornithogalum orthophyllum* ssp. *kochii* Jka. and *Ornithogalum boucheanum* (Kunth) Asch., we remark that they present similar characters as to the structure of the stem in its superior third part and in its middle.

As for the differences between the two taxa we can mention that: for the *Ornithogalum orthophyllum* ssp. *kochii* Jka. in the base region of the stem the vascular bundles are grouped in several rows, while for the *Ornithogalum boucheanum* (Kunth) Asch. the vascular bundles are grouped in one row.

We noticed that the structure of the leaf differs in the two taxa, thus for *Ornithogalum orthophyllum* ssp. *kochii* Jka. the limb presents a central heterogeneous isofacial bifacial structure and for *Ornithogalum boucheanum* (Kunth) Asch. the limb has a central homogeneous isofacial bifacial structure.

As a result of the analysis of the density of stomata, in the two taxa, we can specify that the stomata are more numerous in the *Ornithogalum orthophyllum* ssp. *kochii* Jka. leaves in comparison to the number of stomata in the leaves of the *Ornithogalum boucheanum* (Kunth) Asch.

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