THE FRUIT’S STRUCTURAL AND BIOCHEMICAL PECULIARITIES IN PEUCEDANUM AUSTRIACUM (JACQ.) KOCH AND HERACLEUM SPHONDYLIUM L. SPECIES

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Abstract. The paper presents the anatomical structure’s peculiarities and the composition in volatile oils of the mature fruit in Peucedanum austriacum and Heracleum sphondylium species.

Key words: mericarp anatomy, volatile compounds

Introduction

Within the Apiaceae family, the morphology of the mature fruit, the dicaryopsis, is an important taxonomical character for identifying genera and species. To supplement the morphologically data were conducted numerous anatomical studies, some contained in the synthetically works on the internal structure of the fruits, seeds [4] or plants cultivated [6], others with the purpose of providing additional arguments in the characterization of the species [1, 5].

This paper presents a series of structural and biochemical peculiarities of the Peucedanum austriacum and Heracleum sphondylium fruits; these are included in the tribe of Peucedaneae (species whose fruit have lateral ribs wider than dorsal ones, forming marginal wings) [3,7].

Plants, encountered in mountain areas, in bushes or rocky regions, are used in folk medicine like broth or tea made from floriferous stems, in the treatment of the rheumatism or other diseases [2].

Material and methods

The fruits, subject of the anatomical observations and biochemical tests, were derived from plants encountered on the rocky slopes near the cave Ialomicioara and in Zanoaga Gorges (Bucegi Mountains, Dâmbovița district).

The anatomical study was conducted on cross-sections obtained from the median area of the caryopsis, clarified in chloral hydrate for 24 hours and colored in green with iodine and alaun-carmine.

The biochemical tests followed the determination of the content of volatile oils. Their extraction from the fruit was carried out with the distillation apparatus type Cleverger; the separation of the components was carried out using the chromatograph in gaseous phase – Agilent, provided with a massspectometric detector with quadrupol. To confirm the exact position of peaks in chromatogram were used Kovats retention indices.

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Results and discussions

Anatomical research

Morphologically, the *P. austriacum* mericarps are almost smooth, and flattened, with filiforme dorsal ribs, and wings, formed by the lateral ribs, close to the width of the fruit; on the dorsal side, under each valecule a secretor channel is located, and 2 other secretor channels are located on the ventral side (Fig. 1, 2).

The mericarp presents, in cross section, a reniform-costate contour; the outlines of the endosperm is also reniform (Fig. 2).

Externally, on the dorsal side, the epicarp can be observed, composed of a row of polygonal cells, with convex external walls, covered by a cuticula. The parenchymatic mesocarp is more developed in the ribs area, respectively in the bundles region and less developed in the valecule area (Fig. 3). The last 3 layers of the mesocarp are made up of oblong tangential cells; the median layer is composed of porous cells. The endocarp is represented by a row of polygonal cells, acceding to the seed-coat.

The lateral wings are formed by the epicarp and the mezocarp and present a bundle to the basis, higher than the one under the dorsal ribs. On the lateral sides of the bundle are located the secretor channels (Fig. 4). The endosperm, of soft consistency, is composed of cells rich in aleurone and drops of oil.

The *H. sphondylium* fruit is strongly flattened dorso-ventrally; the mericarps have close, filiforme dorsal ribs, and slightly winged lateral ribs; under valecules is located a secretor channel, and, on the ventral side there are 2-4 secretor channels (Fig. 5, 6).
In cross section, both the mericarp with wings and the endosperm show a fusiform contour, the strong dorso-ventral compression being obvious (Fig. 6). The valeules are slightly embedded, and, at the endosperm level longitudinal fosses do not appear. The epicarp composed of a row of cells, their external walls being strongly thickened. In the mature fruit, the mesocarp less developed is composed of a dezorganize cellulosic parenchyma, with the exception of the last 3 layers of cells that have strong lignificated walls (Fig. 7). The lignificate fibers have a different orientation. The seed-coat is covered by a cristate cuticle (Fig. 7). The wing, formed by the epicarp and the mezocarp, presents a very well developed basal sclerenchyma (Fig. 8).

**Biochemical researches**

The analyses of the volatile compounds removed from the fruit of the two species have revealed the existence of some clear differences: to *P. austriacum* they are represented mainly of terpenes. Of these, the slightly volatile terpenele - α-pinenu and β-felandrenul represented 40.79% and 38.67% of the total compounds, and among those with lower volatility the germacrenul represented 5.46%.

The volatile substances extracted from the fruit of *H. sphondylium* were represented mainly by esters, alcohols and aldehydes, the largest shares being those of 3-octenil acetate (85.72%), octil butyrate (4.97%) and octanol (2.25%).

**Conclusions**

The correlation of the results of anatomical studies and those of the biochemical analyses on mature fruit of *P. austriacum* and *H. sphondylium* has outlined the following points:

1. In the mesocarp of the *P. austriacum* there are well developed areas of parenchyma opposite ribs and less developed areas in the right valeulelor.
2. The last three layers of the mesocarp in *P. austriacum* species consist of tangential-oblong cells with thin walls.

3. The *P. austriacum* wing shows at the basal region a bundle accompanied by secretory channels.

4. In terms of volatile compounds, in the fruits of *P. austriacum* the terpenes prevail.

5. The parenchymatic areas of the mesocarp in *H. sphondylium* are reduced and partly disorganized.

6. The last 3 layers of the mesocarp in *H. sphondylium* consist of strongly sclerified cells with different orientations of the fibers.

7. At the base of the *H. sphondylium* wing a very well developed sclerenchymatic tissue is located.

8. The volatile substances from the fruit of *H. sphondylium* belong to the groups of esters, alcohols and aldehydes.

REFERENCES


