

7th CMAPSEEC

Conference on Medicinal and Aromatic Plants of Southeast European Countries

organized by

Association for Medicinal and Aromatic Plants
of Southeast European Countries (AMAPSEEC)
&
Institute for Medicinal Plant Research
"Dr Josif Pančić", Belgrade, Serbia



BOOK OF ABSTRACTS

27th–31st May, 2012
Subotica, Republic of Serbia

ESSENTIAL OIL COMPOSITION OF DIFFERENT PLANT PARTS OF *SESELI RIGIDUM* WALDST. FROM BULGARIA

Todorova N. Milka[1], Trendafilova B. Antoaneta[1], Dimitrov Dimtar[2]

[1]Institute of Organic Chemistry with Centre of Phytochemistry, Bulgarian Academy of Sciences, Acad. G. Bonchev Str. bl. 9, 1113 Sofia, Bulgaria.
[2]National Museum of Natural History, Bulgarian Acad. of Sciences, 1 Tsar Osvoboditel Blvd., 1000 Sofia, Bulgaria.

The genus *Seseli* L. (family Apiaceae) comprises 34 species distributed in Europe. Some *Seseli* species have been used in folk medicine since ancient time against human inflammation, swelling, rheumatism, pain, common cold as well as exhibited antihelmintic, and carminative activity. In Bulgaria this genus is represented by 9 species. One of them, *S. rigidum* Waldst. is an endemic plant species at Balkan Peninsula and Romania. The literature survey revealed only two articles dealing with essential oil composition of this species of Serbian origin.

Herein, we report the chemical composition of the essential oils from different plant parts (flowers, leaves, stems, and roots) of *S. rigidum* wild growing in Bulgaria.

The essential oils were prepared by micro steam distillation-extraction and analyzed by GC and GC/MS. The investigated *S. rigidum* showed a higher essential oil yield in flowers and leaves (0.56 and 0.40% w/w, respectively) and a lower – in stems and roots (0.24 and 0.16% w/w, respectively). A total of 39 compounds, representing 94.7-97.3% of the oils were identified according to their retention indices (RI) and mass spectra. The oils from flowers, leaves and stems were characterized by high amount of monoterpene hydrocarbons (89.5, 90.0 and 83.3%, respectively). The main difference was observed in the percentage ratio of β-phellandrene and sabinene: 47.5/19.8% in flowers; 37.0/39.8% in leaves, and 63.1/6.5% in stems. In contrary, the root essential oil was quite poor of monoterpenoids (21.0%) and rich in sesquiterpenoids (24.2%). Moreover, oxygenated sesquiterpenes (10.3%) were found in root oil only. It is worth to note a relatively high percentage of elemol (8.7%) in the studied oil. The polyacetylene alcohol Z-falcarinol (48.1%) was found to be the main component in the root oil, while its amount in the other essential oils was less than 0.5%. Cryptone (2.3%) was the main oxygenated monoterpene in the stem oil, while the flower essential oil differed from those obtained from leaves and stems by the presence of Z-asarone (1.9%). To the best of our knowledge cryptone is described for the first time in representatives of genus *Seseli*, while euasarone, an isomer of asarone, has been previously reported as a component of *S. libanotis*.

The observed qualitative and quantitative differences between essential oils from *S. rigidum* of Bulgarian and Serbian origin are probably due to the existence of chemotypes.

Keywords: *Seseli rigidum*, Apiaceae, different plant parts, essential oil composition.

INFLUENCE OF ECOLOGICAL FACTORS ON THE ESSENTIAL OIL COMPOSITION OF *SIDERITIS SCARDICA* GRISEB.

Todorova N. Milka[1], Trendafilova B. Antoaneta[1], Evstatieva N. Ljuba[2], Antonova V. Daniela[1]

[1]Institute of Organic Chemistry with Centre of Phytochemistry, Bulgarian Academy of Sciences, Acad. G. Bonchev Str. bl. 9, 1113 Sofia, Bulgaria.
[2]Institute of Biodiversity and Ecosystem Research, Bulgarian Academy of Sciences, 1113 Sofia, Bulgaria.

Sideritis scardica Griseb. is an alpine endemic plant for the Balkan Peninsula, very popular in traditional medicine for different purposes – treatment of inflammations, gastrointestinal disorders, cough, etc. This species is intensively collected from the natural Bulgarian habitats for years. Nowadays it is included in the Red book of Bulgaria as a rare plant and it is under governmental protection. This fact imposes the necessity of its cultivation.

The aim of this investigation was to analyze the affect of the ecological factors in cultivation conditions on the essential oil composition of this species.

Essential oil composition of six samples of *Sideritis scardica* was studied: one from wild population and five cultivars planted at different cultivation conditions. The oils were analyzed by GC and GC-MS. It is established that the variability in essential oil composition is closely related to the climatic and environmental conditions. Thus, the cultivar growing close to the natural habitat produces essential oil which composition was most similar to that from wild growing plants. Oils from plants at the same stage of development, but growing under different ecological conditions (soil, climate) differed considerably. The stage of flowering (initial or full bloom) is not a determining factor on the oil composition.

Keywords: *Sideritis scardica*, essential oils, terpenoids.

Acknowledgments: The authors are grateful for the financial support provided by the Bulgarian National Science Fund, Ministry of Education, Youth and Science (Contract DTK-02/38).

GROWTH REGULATORS AFFECT DEVELOPMENTAL PATTERNS, TERPENOID PROFILE AND PHOTOSYSTEM II STRUCTURE IN *ARTEMISIA ALBA* TURRA *IN VITRO*

Krumova B. Sashka[1], Todorova N. Milka[2], Trendafilova B. Antoaneta[2], Evstatieva N. Liuba[3], Taneva G. Stefka[1], Danova M. Kalina[2]

[1]Institute of Biophysics and Biomedical Engineering, BAS, 1113 Sofia, Bulgaria.
[2]Institute of Organic Chemistry with Centre of Phytochemistry, BAS, 1113 Sofia, Bulgaria.
[3]Institute of Biodiversity and Ecosystem Research, BAS, 1113 Sofia, Bulgaria.

Artemisia alba Turra is a fragrant shrub, distributed in Southern Europe. It's essential oil possesses strong spasmolytic and antimicrobial properties. Research has revealed great variability of its terpenoid profile, attributed by different authors to environmental conditions, geographic distribution or to genetic factors. Our previous research showed that modifications of plant growth regulators (PGR) in the medium bring about significant alterations of the essential oils obtained by the shoots of *A. alba*. This motivated us to conduct a broader study in order to better understand the developmental and biochemical basis of factors affecting terpenoid biosynthesis in this species. In the present work, 77 K steady state fluorescent emission spectra were recorded on thylakoid membranes isolated from the aerial parts of shoots cultures grown in media with modified supplementation of PGR. The differences in the structural organization of photosystem II (PS II), were shown to be related to the morphological development and essential oil types observed. Thus, extensive root development was associated with a higher degree of aggregation of PS II peripheral antennae, accompanied by strong domination of the monoterpenoids in the oils. This feature was observed in PGR-lacking control and in media, supplemented with 0.5 and 1.0 mg/l indole-3-butyric acid (IBA). On the contrary, intensive callusogenesis, absence of a root system and extensive aerial parts development led to decrease in the peripheral antennae aggregation and domination of sesquiterpenoids in the oils (combinations of 0.2 mg/l benzyladenine with both 0.5 mg/l and 1.0 mg/l IBA). It is well established that PS II is highly sensitive to environmental stress factors and inherent growth and development regulators, and is enrolled in several protective mechanisms. For the first time we demonstrate that there is also a relation between its structure and the factors affecting terpenoid biosynthesis in *Artemisia alba* Turra.

Keywords: *Artemisia alba* essential oil, terpenoid biosynthesis, growth and development, photosystem II structure *in vitro*.