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Faculty of Agrobiolgy and Food Resources
Institute of Biodiversity Conservation and Biosafety
Department of Genetics an Plant Breeding
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of Agrobiodiversity
Research Centre AgroBioTech

and



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Department of Fruit Plants Acclimatization

Book of Abstracts

of the

4th International Scientific
Conference

Agrobiodiversity for Improve
the Nutrition, Health and Quality
of Human and Bees Life

September 11–13, 2019

Nitra–2019

Co-organizers



Arboretum and Institute of Physiography
in Bolestraszyce, Poland



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**Institutions and experts were actively involved in the organization
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**Agrobiodiversity for Improve the Nutrition, Health
and Quality of Human and Bees Life**

in the framework of

AgroBioNet

International Network

within the implementation of the International Program

'Agrobiodiversity for Improve the Nutrition, Health and Quality of Life'

in the form of solved research, education and development projects and research stays

Authors and author collectives present at the international conference in lectures,
posters and publications also results and knowledge obtained from the solution

Research Projects

ITEBIO ITMS 26220220115

ECOVA ITMS 26220120015

ECOVA plus ITMS 26220120032

AGROBIOTECH ITMS 26220220180

TRIVE ITMS 26110230085

BIOPOTRAVINY ITMS 25 110 320 104

**Research Programs from research stay of participants with financial support
from the Agencies and the EU program**

**Ministry of Education, Science, Research and Sport of the Slovak Republic – Bilateral
Agreements**

Slovak Academic Information Agency (SAIA)

Visegrad Fund (V4)

ERASMUS World



Erasmus+



Title: Book of Abstracts of the 4th International Scientific Conference Agrobiodiversity for Improve the Nutrition, Health and Quality of Human and Bees Life

Editor: Ján Brindza

Managing Editor: Olga Grygorieva

Associate Editors: Svitlana Klymenko, Olena Vergun, Vladimíra Horčinová Sedláčková

Reviewers: Members of International Scientific Committee of the 4th International Scientific Conference

Author of e-environment design, graphic design: Radovan Ostrovský

Cover designed: Olga Grygorieva

Publication place: Nitra

Publication date: 2019

Language: English

Format: B5

Edition: AgroBioNet

Publisher: Slovak University of Agriculture in Nitra

The publication in printed and electronic form was approved by Rector of the Slovak University of Agriculture in Nitra assoc. Prof. Klaudia Halászová, on 18 October 2019 as Proceedings of Scientific Abstracts from the International Conference.

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In Abstracts Book prepared with minor editing and published, corresponding co-authors are responsible for the accuracy of their submitted abstracts.

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e-ISBN 978-80-552-2070-3

print ISBN 978-80-552-2037-6

DOI: <https://doi.org/10.15414/2019.9788055220703>

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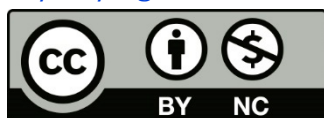


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ISOMERS OF ESSENTIAL OILS COMPONENTS AND THEIR OPTICAL CHARACTERISTICS

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In recent years in the world, a comprehensive study of optical isomers (enantiomers) of organic compounds has been carried out. The main reason for this interest is due to the important role that optical isomers play in the functioning of living systems and manifestations of biological activity. The physicians have proved that differences in the biological effects of optical isomers on the human body are due to different recognition of them at the molecular level. Among the volatile plant substances that make up the smell of plants, there are many examples of these biological manifestations, since odor recognition also occurs at the molecular level.

Optical isomerism plays an exclusive role in the technologies of the processing of essential oils since the enantiomers of one substance usually differ greatly in their flavor tonality and strength. In particular, d (R) – Carvone has a fortifying odor, while l (S) – Carvone – a smell of mint.

In essential oils, one of the forms of enantiomers predominates most often. It is proved that d (R) – limonene predominates in essential oils of orange, lemon, mandarin, lime, grapefruit, bergamot, cumin, dill, fennel, parsley. At the same time, l (S) – limonene is found in essential oils of conifers, fir, stellate anise, peppermint. The value of optical activity may not be large. However, according to this information, you can check the naturalness of essential oils.

It should be noted that so far not all enantiomers of essential oils have been identified, the structure of a number of substances has been sorted out relatively recently, and their characteristics, including aromaticity, even have opposite meanings in the literature.

The subject of research was the optical isomers of Carvone, which was obtained by adapted preparative method from Dill (*Anethum graveolens* L.), Cumin (*Carum carvi* L.) and Mint (*Mentha spicata*) essential oils. We have been established their belonging to “dR – (+)” or “lS – (-)” of the optical series, determined the value of the angle of rotation, and also performed sensory analysis. The maximum isolation and collection of Carvone enantiomers were provided by a high-performance preparative self-produced column.

The composition purity of the selected enantiomers was verified by gas-solid chromatography on a self-made chromatographic column 3500 mm long, 3 mm in diameter, HP – D-mannitol, solid support – W 80–100 mesh chromosorb (1.5–2.0 m).

According to our data, d (R) – Carvone (right-rotating form) is included in the composition of Dill and Cumin, with a specific rotation of the plane of polarization $[\alpha]_D + 62.5 \pm 0.05$; $[\alpha]_A + 61 \pm 0.03$. Essential oil of *Mentha spicata* contains l (S) – carvone (left-rotating form) with a specific rotation of the $[\alpha]_D$ polarization plane – 63.2 ± 0.05 .

The reliably several of the aromatic characteristics of Carvone enantiomers was determined by organoleptic analysis. So: d (R) (+) – Carvone dill, has a spicy aroma of fresh dill, d (R) (+) cumin has a sharp cumin flavor. l (S) – Carvone mint *Mentha spicata* has a mild spicy aroma with a mint shade.

Keywords: essential oils composition, enantiomers, aromatic characteristics.