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**Biodiversity and Conservation Strategies for Utilization of Medicinal and Aromatic Plants of the Balkans**

*M. Todorova<sup>1</sup>, A. Trendafilova<sup>1</sup>, S. Krumova<sup>2</sup>, V. Genova<sup>1</sup>, Y. Markovska<sup>3</sup>, L. Evstatieva<sup>4</sup>, E. Wolfram<sup>5</sup>, Kalina Danova<sup>1</sup>*

<sup>1</sup> Institute of Organic Chemistry with Centre of Phytochemistry, BAS

<sup>2</sup> Institute of Biophysics and Biomedical Engineering, BAS

<sup>3</sup> Faculty of Biology, Sofia University St. Kl. Ohridski

<sup>4</sup> Institute of Biodiversity and Ecosystem Research, BAS

<sup>5</sup> Institut für Biotechnologie, Zurich University of Applied Sciences

*E-mail: k\_danova@abv.bg*

Bulgaria is located in the Southeast of Europe, in the central part of the Balkan Peninsula. The various relief, geology and specific microclimatic conditions determine the rich diversity of species, populations and natural habitats, ranking the country amongst the first in Europe regarding biodiversity richness. Medicinal plants are a group of special interest due to their importance for human survival and in need for conservation due to potential risks of overexploitation of natural habitats. The tools of plant cell and tissue culture provide a flexible choice for preservation of valuable plant germplasm, conducting *ex situ* fundamental research as well as for the supply of raw material with controllable and constant active constituent content. The aim of the work was to develop biotechnological approaches for the controlled delivery of biologically active compounds of medicinal and aromatic plants characteristic for the Balkan region. Investigated species include representatives of the *Hypericum*, *Pulsatilla*, *Sideritis*, *Inula* and *Artemisia* genera. Optimizations of growth regulators and vitamin supplementation as well as initiation of callus, suspension and conventional genetically non-transformed roots were performed. Essential oils were prepared by micro-steam distillation of fresh material, and characterized by GC-MS chromatography. Extracts were prepared by exhaustive ultrasonic extraction (with hexane, chloroform and methanol) and compounds were purified by column chromatography and structures of isolated compounds – elucidated by NMR spectroscopy. HPTLC fingerprinting coupled with DPPH assays was applied in order to assess secondary metabolite and active compound content simultaneously. Polyphenolic, enzymes, molecular markers of oxidative stress were determined spectrophotometrically; structural and functional characteristics of photosynthetic membranes were studied by 77 K fluorescent microscopy. The identified factors affecting secondary metabolite production for the studied species will further be utilized for up-scale of their production in bioreactor system.

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