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From Nature to Bioreactor

Abstracts

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***In vitro* culture of native medicinal plants from the Balkan region**

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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. On a territory of 111 000 km² its vascular plants biodiversity encompasses nearly 4000 taxa, of them 213 being Bulgarian, and 315 - Balkan endemics.

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*, *Clinopodium* and *Artemisia* genera. Overall 71 shoot accessions in solid medium, 8 genetically non-transformed roots and 8 suspension lines in liquid culture were developed.

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. Polyphenolic, enzymes, molecular markers of oxidative stress were determined spectrophotometrically; structural and functional characteristics of photosynthetic membranes were studied by fluorescence spectroscopy and flow cytometry. 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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