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POTENTIAL OF *I. BRITANNICA* FOR BIOTECHNOLOGICAL PRODUCTION OF BIOLOGICALLY ACTIVE SESQUITERPENE LACTONES

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Inula britannica is a biregional element (Euro-Siberian and Irano-Turanian regions) widely distributed in Western Europe and Turkey, extending eastward to China through Iran and Pakistan. It is an important plant species used in Traditional Chinese Medicine (TCM) and Kampo Medicines. It is known as 'Xuan Fu Hua' in TCM. It is also known as British yellowhead or meadow fleabane. Its decoction is used as antibacterial, carminative, diuretic, laxative, stomach, tonic remedies, and for treating asthma, hepatitis and tumors. Major bioactive secondary metabolites in *I. britannica* are sesquiterpene lactones. In the present study the capacity of in vitro cultivated *I. britannica* to accumulate sesquiterpene lactones characteristic of the intact plant was investigated. Plant material was collected from the region of Western Balkan mnt. in Bulgaria. *In vitro* culture was initiated by surface sterilization of stem segments of the plant in 0.5 benzyl adenine supplemented medium. After axillary shoots formation stock cultures were further maintained in plant growth regulators free medium.

The aerial parts of the wild collected plant afforded pulchellin C, gailiardin, britannin, ivalin and 11,13-dihydro-inuchanolide. Their structures were determined by spectral methods. The isolated compounds were used as references for characterization of the sesquiterpenoid lactones profile of in vitro culture derived plant material. Qualitative similarity of the sesquiterpene lactone profiles of the intact plant and in vitro derived material was shown by TLC using sulfuric acid spray reagent for visualization. These results are an indication of the potential of *I. britannica* as a biotechnological source of controlled delivery of valuable phytopharmaceuticals.

Keywords: *I. britannica*, sesquiterpene lactones, in vitro culture, biotechnological delivery of phytopharmaceuticals

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BIOTECHNOLOGICAL APPROACHES FOR THE TARGETED DELIVERY OF ESSENTIAL OILS WITH DEFINED COMPOSITION FROM ARTEMISIA ALBA TURRA SHOOT CULTURES

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The essential oil of the fragrant shrub *A. alba*, is characterized by high variability which has been attributed by different authors to ecological, climatic or genetic factors. The established spasmolytic and antimicrobial activities of the oil have motivated our research to develop biotechnological approaches for the controlled delivery of raw plant material with targeted terpenoid profile of its essential oil. Previously it was established that plant growth regulators (PGR) treatment strongly influenced the terpenoid profile of the oils *in vitro*. In continuation of this work, we developed a broader experimental model for affecting essential oil content in PGR free and benzyl adenine (BA) and indole-3-butyric acid (IBA) treatments individually and in combination. Essential oils were obtained by micro-steam distillation-extraction. Identification and quantification was performed by GC and GC/MS techniques. Essential oils were compared based on the ratios between the total monoterpenoid and sesquiterpenoid contents in them (M/S ratio). As a result three distinctive *in vitro* culture systems for essential oil production were obtained. While different combinations between IBA and BA led to an M/S ratio of 1.8 – 2.7, the treatment with each of the two regulators separately, led to a drop of sesquiterpenoids in the oils. Thus individual BA treatment increased 1.5 times the levels of sesquiterpenoids in the oils and IBA treatment increased these compounds even further to a level of M/S 5.2. Interestingly, PGR free control displayed similar terpenoid profile to IBA treated plants and all described effects were weakly dependent on the concentrations of the applied PGR. Further research is in progress to evaluate the potential of the developed *in vitro* systems for non-volatile extractable biologically active compounds.

Keywords: *Artemisia alba*, *in vitro* culture, plant growth regulators, essential oil variability, terpenoid profile

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