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P03\_08

### Canopy effects on the distribution of *Goodyera repens* (Orchidaceae) – preliminary results from hemispherical imaging analysis

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**Aim:** *Goodyera repens* (L.) R. Brown is small sciophilous relict boreal orchid found only in century old forests. Because of its peculiar biology and environmental requirements it's among the most threatened vascular plants in Bulgaria due to various threats as deforestation and others. The study aimed to explore and evaluate canopy effects on the species distribution in Mt. Rhodopes.

**Materials and methods:** Exploration and investigation of few populations of the orchid *Goodyera repens* in Mt. Rhodopes region, Bulgaria was done from 2013 till 2018. Geospatial data were recorded and hemispherical photographs were collected and analyzed for evaluation of canopy effects on their distribution.

**Results and discussion:** The results show that more open areas with the index of canopy closure less than 65% are less favorable for the species distribution. It was also found that in inhabited by the species areas where the canopy closure index has dropped below 40% due to canopy destructive processes and activities have some detrimental and suppressive effects upon the existed or existing species population. It is known that many shade-tolerant/sciophilous plants have adapted their photosynthetic apparatus to the changed light spectrum of the solar irradiation at the understorey microenvironment to utilize more efficiently the reduced amount of the available light. And also have less efficient protection from the shorter wavelength solar radiation. The disturbance of these adaptations and photoreceptor systems may explain to some extent the observed trends. However further research is needed to determine the precise underlying physiological and molecular mechanisms and processes.

**Key words:** *Goodyera repens*, hemispherical imaging analysis, canopy effects, orchids.

P03\_09

### Effect of vitamins and plant growth regulators treatments on caffeoylquinic acids in *Inula britannica* shoot cultures

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The **aim** of the present work was to elaborate the effect of tissue culture media optimization on the production of different caffeoylquinic acid (CQA) derivatives in a model system of shoot cultures of the medicinal plant *Inula britannica*.

For this purpose the combined effect of Murashige and Skoog (MS) vs. Gamborg (G5) vitamin supplementations with low (0.2 mg/l) and high (0.7 mg/l) concentrations of benzyl adenine (BA), applied alone or in combination with 0.1 mg/l naphthylacetic acid (NAA) were studied. The content of caffeoylquinic acids was studied by means of HPLC analysis of the methanol extract of the plant material.

The different vitamin supplementations affected differentially the content of total CQAs in relation to the plant growth regulators (PGR) applied. Thus, while in the PGR-free control and in media, in which BA was applied alone, MS vitamins stimulated CQA production. On the contrary, application of NAA in combination with BA reversed this dependency. In all treatments chlorogenic and 3,5-dicaffeoylquinic acid were the predominant components. The 0.2 mg/l BA supplementation was most favorable in stimulation of 3,4-dicaffeoylquinic acid in both vitamin supplementations. MS vitamins favored the production of 1,5- and 4,5- dicaffeoylquinic acid in the PGR-free control and media, supplemented with BA.

Recent studies reveal the potential of the 3,5- and 1,5- dicaffeoylquinic acids in the treatment of neurodegenerative diseases. The obtained results are of interest in understanding the factors affecting the biotechnological delivery of selected CQA-derivatives with pharmacological potential in *in vitro* culture model system of *Inula britannica*.

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**Keywords:** *Inula britannica* shoot cultures, Caffeoylquinic acids, plant growth regulators, vitamin supplementation.

## P03\_10

### Content of heavy metals and toxic elements in the soils from the park zone of Nature Monument “Mladezhki Halm” (Plovdiv, Bulgaria)

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Natural Monument “Mladezhki Halm” is situated in the real center of Plovdiv (Bulgaria) and is one of its most easily recognized symbols. Situated along one of the main road arteries in Plovdiv (Hristo Botev Boul.), The protected area is subjected both to the strong impact of the automobile traffic and anthropogenic pressure.

**Aim:** Urban soils are well-known as a suitable matrix for assessment of the anthropogenic load, so we aimed to analyze the content of some heavy metals and toxic elements in the soils of the park zone of the hill.

**Material and methods:** Soil samples are taken in June 2017 from south and west park zone of the hill along a pollution gradient using the transect method. Transects have begun from the road and samples were collected at the 7.5 m, 25 m, and 50 m distance, on the depth of 0-20 cm. Soil physico-chemical properties and content of toxic elements were analyzed following standard procedures.

**Results:** Cluster analysis of soil contamination showed some different relationships between heavy metals and toxic elements in the two investigated park zones.

**Conclusion:** The studied soils from the eastern and western park areas of the Natural monument “Mladezhki Halm” have different characteristics that are probably due to the complex impact of natural and anthropogenic factors. In the soils from the western side of the hill, the content of vanadium, manganese, chromium, copper, zinc and lead is noticeably reduced, leaving from Hristo Botev Boul. and reaching the middle of the park zone.

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**Keywords:** urban soils, heavy metals, toxic elements, pollution