

Serbian Plant Physiology Society

Institute for Biological Research „Siniša Stanković”, University of Belgrade

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of the Serbian Plant Physiology Society

Programme and Abstracts



Banja Vrujci, 13-15 June 2011

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Source to sink relations in heterotrophous root cultures and mixotrophous shoot cultures of spiked centaury (*Centaureum spicatum* (L.) Fritch): The role of acid invertases

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Plants are sessile photosynthetically active organisms constituted of tissues and organs which produce sugars (source) and those which import sugars (sink). However, the strict separation between source and sink organs under *in vitro* conditions is not quite appropriate. Exogenously applied sugars in culture medium are the main source of carbon and energy under *in vitro* conditions. The perturbed transport and allocation of sugars among tissues and organs and their modified metabolism and utilization were observed. The role of acid invertases during utilization of sugars from the culture medium in mixotrophous shoot cultures and heterotrophous root cultures of *Centaureum spicatum* (L.) Fritch was investigated. In both experimental model-systems, cell wall acid invertases (CW-Inv) hydrolyzed sucrose to reducing sugars in external medium. Regardless of the type of sugars present in the culture medium, and of the model system, significant amounts of CW-Inv proteins and their activity were detected in roots of spiked centaury. Regarding soluble acid invertases (SA-Inv), a significant amount of protein, with negligible activity in roots, was detected. Results indicate the possible post-translational regulation of SA-Inv activity in these plant organs. In above ground parts of *C. spicatum* shoots, significant activities of CW-Inv and SA-Inv were recorded. Generally, in our experimental systems, CW-Inv plays an important role in source to sink relations.

Antioxidant activity and phenolic contents of different root extracts of *Gentiana asclepiadea* L.

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Gentiana asclepiadea L. belongs to the genus *Gentiana* (fam. Gentianaceae). *Gentiana* species are widely used throughout the world as potential stomachic and hepatoprotective agents. *G. asclepiadea* is used in the traditional medicine as a bitter tonic, gastric stimulant and as medicine for hepatitis infections. The aim of this study was to evaluate the antioxidant and radical-scavenging activities of methanol extract, chloroform, ethyl acetate and *n*-butanol fractions obtained from the methanol extract of *G. asclepiadea* roots. Amount of total phenols, flavonoids and flavonols was also determined. The content of total phenolics in the extracts was determined according to the Folin-Ciocalteu procedure, while spectrophotometric methods with aluminium chloride were used for the determination of total flavonoids and flavonols. The extracts were investigated for antioxidant capacity using four different assays, including: total antioxidant capacity, DPPH assay, inhibitory activity toward lipid peroxidation and Fe³⁺-reducing power. The highest content of total phenols (146.6 mg GA/g) and flavonols (22.7 mg RU/g) was determined in the ethyl acetate extract, while the methanol extract contained the largest amount of flavonoids (52.0 mg RU/g). Among the tested extracts, ethyl acetate extract showed the highest total antioxidant activity of 401.3 mgAA/g and was found to be the most effective DPPH radical scavenger (IC₅₀=107.3 µg/mL). Additionally, it also showed the highest inhibitory activity toward lipid peroxidation (IC₅₀=40.9 µg/mL) and the strongest reducing power. The results show a significant antioxidant activity of the investigated extracts compared to referent antioxidant compounds, such as butylated hydroxytoluene (BHT), ascorbic acid (AA), gallic acid (GA) and α-tocopherol. This work was supported by the Ministry of Science and Technological Development of the Republic of Serbia (project No. III 43004).