# BOOK OF ABSTRACTS

# 3rd International Conference on Plant Biology

## (22nd SPPS Meeting)

**9-12 JUNE 2018**
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**Serbian Plant Physiology Society**

**Institute for Biological Research "Siniša Stanković", University of Belgrade**

**Faculty of Biology, University of Belgrade**

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## Thermodynamic properties of isothermal dehydration process of two maize hybrids under the influence of 24-epibrassinolide

PP2-21

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In this paper, the influence of different concentrations of 24-epibrassinolide (24-EBL) on thermodynamic quantities during dehydration process of two maize hybrids (ZP434 and ZP704) was analyzed. Analyses were conducted on control samples (not treated with 24-EBL) and samples treated with 24-EBL. It was established that seedling parts (radicle, plumule and rest of the seedling (RoS)) related to ZP704 hybrid, in comparison with those related to ZP434 hybrid, show higher tolerance (in terms of energy) to impact of 24-EBL during dehydration process. Based on performed glass transition temperature analysis of control samples for both hybrids, it was concluded that the formation of tight glass matrices increases the glass transition temperature of a glassy matrix made of carbohydrates and reinforced H-bonding network. Obtained results showed that this phenomenon is more favored in the case of ZP434 control sample. Also, based on enthalpy-entropy compensation theory, it has been found that water desorption mechanism in tested hybrids is controlled by entropy, where the results demonstrated that the molecular re-arrangements are at high levels. Based on BET (Brunauer-Emmett-Teller) and modified BET approaches, it has been found that adaptation of ZP704 hybrid treated with 24-EBL is more acceptable than in the case of ZP434 hybrid.

*Keywords:* 24-epibrassinolide, maize hybrids, dehydration, thermodynamic properties, sugar-protein matrix

## Effect of low concentrations of NaCl on accumulation and distribution of Na, K, Ca and their ratios in different plant species

PP2-22

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Uneven distribution of precipitations during vegetative season, periods of drought, inappropriate quality of irrigation waters and particularities of soil composition are the main factors leading to salinization of agricultural soils. The area of salt-affected soils is increasing worldwide, leading to yield losses and deterioration of plant-derived food and feed.

To assess the extent to which the steady presence of sodium chloride in relatively low concentrations (0.1-1.2 g $L^{-1}$) affects plants, an experiment was set in semi-controlled conditions of a greenhouse. Safflower (*Carthamus tinctorius* L., Asteraceae), coriander (*Coriandrum sativum* L., Apiaceae) and oilseed rape (*Brassica napus* L., Brassicaceae) were grown in water cultures, on half-strength Hoagland's nutrient solution, to which NaCl was added 2 weeks after planting. Plant growth, ash content, accumulation and distribution of Na in relation to K and Ca were analyzed 3 weeks following the beginning of the treatment.

The percentage of ash significantly increased in roots of safflower, leaves, stems and roots of coriander and leaves and stems of oilseed rape, whereas the percentage of dry matter significantly declined in coriander and oilseed rape. Concentration of Na increased in all plants and organs, to different extents. Ratios of concentrations Na/K, Na/Ca and (Na+K)/Ca increased in all species; K/Ca significantly increased in roots of safflower and coriander and declined in leaves of coriander. Even though dry weight of plants did not significantly change in the presence of NaCl at applied concentrations, significant changes in their composition were evident.

***Keywords:*** salt stress, elemental composition, safflower, coriander, oilseed rape

## Total antioxidant activity in wheat and pea seedlings treated with uncoated and polysaccharide coated $CeO_2$ nanoparticles

PP2-23

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$CeO_2$ nanoparticles ($nCeO_2$) are popular because of the unique redox property-transition between oxidation states ($Ce^{3+}$ and $Ce^{4+}$). Their tendency for agglomeration has led many researchers to coat $nCeO_2$ with different polymers, but little is known about the impact of coated nanoparticles on plant metabolism. Increased $nCeO_2$ application enhances risk for the environment due to their accumulation in soil, air and water. Metal toxicity causes abiotic stress and leads to overproduction of reactive oxygen species (ROS), damaging important biological molecules in plants.

In this research, we performed a three-week treatment of seedlings of two agricultural plants in hydroponics with 200 mg $L^{-1}$ of uncoated and glucose-, levan- and pullulan coated $nCeO_2$ (G-$CeO_2$, L-$CeO_2$ and P-$CeO_2$). Our aim was to study the effect of nanoparticle coating on Ce uptake, and on changes in total antioxidant activity (TAA), the indicator of oxidative stress in monocotyledonous and dicotyledonous crop species. Concentration of Ce in shoots of treated seedlings was determined using ICP-OES.

The uptake of Ce differed in the treated plant species. Coating of $nCeO_2$ increased Ce uptake in pea, but decreased in wheat. However, Ce content was 20-fold higher in wheat compared to pea plants, regardless of the nanoparticle coating. Extremely high Ce content measured in wheat coincided with the decrease in TAA. On the other hand, low Ce content measured in pea coincided with no changes in TAA.

Presented results suggest the difference in $nCeO_2$ uptake and its physiological effects between monocotyledonous and dicotyledonous plant species, but further research is necessary.

***Keywords:*** coating, CeO2, nanoparticle, plant, stress