

Serbian Plant Physiology Society

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

# 19<sup>th</sup> SYMPOSIUM

of the Serbian Plant Physiology Society

*Programme and Abstracts*



Banja Vrujci, 13-15 June 2011

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VI

Environmental Stress  
and Ecophysiology

## Ecophysiological characteristics of two shrub species growing on fly ash deposits of „Nikola Tesla-A“ thermoelectric plant (Obrenovac, Serbia)

Miroslava Mitrović, Snežana Jarić, Lola Đurđević, Branko Karadžić, Olga Kostić, Gordana Gajić, Ljiljana Oberan, Dragana Pavlović, Pavle Pavlović

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Two shrub species, *Tamarix tetrandra* Pallas (planted) and *Amorpha fruticosa* L. (naturally colonised), were studied at two fly ash deposit lagoons, weathered 5 and 13 years, in relation to their natural habitat. Both species were assessed in terms of their photosynthetic efficiency (Fv/Fm) of photosystem II, trace elements accumulation (B, As, Mo, Se, Cu, Mn, Zn), and damage symptoms, while the characteristics of the habitat were assessed in terms of trace element content, and the pH and EC of the ash. In both lagoons, B concentrations in ash were within normal range for soils, while As, Mo, Mn and Cu concentrations were higher than the normal range concentrations in soils ( $P < 0.001$ ). The Zn, Mn and Cu concentrations in the tissues of both species from the fly ash lagoons were within the normal range for plants, while the concentrations of B, As and Mo were above the mean values for plants or within the excessive or toxic level. In tissues of *A. fruticosa* there were higher concentrations of B (levels of above 100  $\mu\text{g/g}$ ,  $P < 0.001$ ) and Mo (levels of above 9  $\mu\text{g/g}$ ,  $P < 0.001$ ) in relation to *T. tetrandra*. Excessive accumulation of B and Mo did not cause any visible damage symptoms, or the difference in the Fv/Fm (ns) of the *A. fruticosa* populations at the different-aged ash lagoons and the control habitat. However, differences were found between the populations of *T. tetrandra* ( $P < 0.001$ ), proved by a discriminant analysis (DA) with a clear distinction between the populations from the natural site (unpolluted), and populations from the ash deposit lagoons (polluted). Also, *T. tetrandra* displayed damage symptoms, in the form of leaf tip chlorosis and necrosis, and dried brunches - a result of heavy metal accumulation in toxic concentrations.

The data suggest that ecophysiological characteristics of naturally colonised species *A. fruticosa* can be used for modelling future actions of biological restoration of fly ash deposits.

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## Responses of chamomile (*Matricaria chamomilla*) to excessive cadmium concentrations

Nataša Nikolić, Milan Borišev, Zorana Vujin, Milan Župunski, Slobodanka Pajević, Borivoj Krstić

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The influence of excessive cadmium (Cd) concentration on morphological and physiological characteristics in chamomile was studied. A pot experiment was conducted under semi controlled conditions. Plants were exposed to cadmium stress directly (germination and growth under Cd stress) or indirectly (germination without Cd and growth under Cd stress). Leaf mass and area, total biomass, rates of photosynthesis and transpiration, and stomatal conductivity were decreased at both treatments. Accumulation of proline in leaves and roots, and concentration of chlorophylls and carotenoids tended to increase in treated plants. Cd accumulated preferentially in roots. The tolerance index based on plant fresh mass indicated higher susceptibility of directly treated plants to Cd stress.