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3rd International Conference on Plant Biology

(22nd SPPS Meeting)

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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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Conservation physiology of bryophytes

IT3-2

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The new scientific discipline of conservation physiology has arisen recently (2006), with the aim to incorporate physiological knowledge into ecological models, and improve predictions of organism responses to environmental change and human activities and provide tools to support management decisions in conservation science. Since 2006 most investigations in this field were dedicated to the higher animals, and less than 10% could be considered in flowering plants. There was almost no research in invertebrates, spore-bearing organisms, and flagellate plants (including bryophytes). However, the Belgrade Bryophyte Biology Group (BBGB) is working on these problems and here we present the results on the European bryophyte species of conservation interest. The phenomena like apospory, endophyte, biotic and abiotic factor effects, breaking spore dormancy, reintroduction, endoreduplication, recent hybridization, alloploidy and endopolyploidy in target bryophyte species will be discussed linking the physiological responses and conservation issues. All these phenomena were documented, induced, or reduced in the laboratory and field tests in different target species. Thus, this concept of conservation physiology emphasizes the basis, importance, and ecological relevance of physiological diversity at a variety of scales, and gives insights in the latest approach to conservation of different biological entities in rapidly changing environments. The importance of multidisciplinary approach to bryophyte conservation issues will be documented by concrete case studies.

Keywords: conservation, *ex situ*, *in vitro*, mosses

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Biomonitoring: Plants' (in) perspective

IT3-3

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Anthropogenic pollution has been an ever-present threat, even in natural areas protected under state legislations. Timely protection and prevention through continuous biomonitoring is therefore a necessity.

Communities, organisms or their parts should detect the quality of the environment reliably enough and at an early stage in order to be referred to as bioindicators, biomonitors, biomarkers or biosensors. Such model organisms include animals and plants, with invertebrates, lichens and mosses as the most frequent. Nevertheless, the use of higher plants in terrestrial ecosystems may be even more feasible.

Plants as sessile organisms are considerably influenced by different environmental factors, as well as by pollution. Reaction to different pollution types in higher plants could depend on whether it was monocotyledon or dicotyledon, annual or perennial, woody or herbaceous. Changes in the environment could reflect in altered physiology, anatomy, morphology or development. In order to determine the 'normal state' of a given monitoring model system, we have to determine specificities of every single reaction. Developmental instability, measured by estimates of fluctuating and radial asymmetry, is an exception, because an optimal level *i.e.* perfect symmetry is predefined.

In our research we are testing biomonitoring potential of different vegetative and reproductive traits, as well as of developmental instability measures in invasive woody species with broad distribution - *Robinia pseudoacacia*, in widely planted ornamental *Iris germanica* and in natural populations of Dwarf Bearded Iris - *Iris pumila* that inhabits protected natural areas.

Keywords: anthropogenic pollution, biomonitoring, developmental instability

SELECTED TALKS

Morphological diversity of functionally distinctive floral organs in *Iris pumila*: Does the flower color matter?

ST3-1

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Flowers are complex phenotypic structures composed of four functionally distinct organs arranged in concentric floral whorls: sepals in the first, petals in the second, and two inner whorls consisting of reproductive structures: stamens in the third whorl and tricarpellary gynoecium, in the centre. Color, size and shape of these floral organs are considered to be important signals that can attract the pollinators, advertising the plants' floral reward (commonly nectar and pollen). Here we use the methods of geometric morphometrics to compare size and shape variation of three functionally different floral organs: falls, standards and style arms, among five distinct color morphs (blue, violet, dark blue, dark violet and yellow). Pairwise comparisons of the centroid size means showed that all floral organs differed significantly among the analysed color phenotypes. The mean shape of falls, standards and style arms appeared to be flower color-specific as well, but most noticeably between yellow - on one side, and blue/violet morphs - on the other. Procrustes ANOVAs revealed the significant presence of directional and fluctuating asymmetry for falls and standards among all five color morphs, with the exception of style arms. The observed morphological diversification of floral organs among distinctive *I. pumila* color phenotypes could be the adaptive outcome of the interactions with their pollinators.

Keywords: shape, flower color, morphological diversity, *Iris pumila*, floral organs