

Serbian Plant Physiology Society

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

2nd International Conference on Plant Biology

21th Symposium of the Serbian Plant Physiology Society

COST ACTION FA1106 QUALITYFRUIT Workshop



Petnica Science Center, June 17-20, 2015

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SELECTED TALKS

Population Scale Multi-year Monitoring of *Iris pumila* in Deliblato Sand: Flowering Phenology

OP6-1

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Population scale multi-year monitoring of flowering and fruiting of *Iris pumila* L. can shed light on various evolutionary issues such as mechanisms of flower color polymorphism maintenance as well as provide information on population structure and dynamics that is important for this species *in situ* conservation. In the monitoring process flowering is recorded each year in 35 experimental plots (more than 4000 m² in total) on two-day basis during flowering period (early spring) in population occupying undisturbed natural habitat in the Natural Protected Reserve of Deliblato Sands. That enables determination of spatial position, flowering date, flowering span, flower color, and pollination success for more than thirteen thousand individual flowering ramets per year. Preliminary findings indicate that in the second year of monitoring flowering started almost a month earlier and had almost two times greater flowering span compared to the first year. Number of flowering individual ramets was lower, but fruit to flower ratio was by the order of magnitude higher in the second year of the study.

Keywords: *Iris pumila*, natural populations, flowering seasons

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Light induces variation in size and shape of *Iris pumila* flower parts in two natural habitats

OP6-2

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We employed the technique of geometric morphometrics to study variation of geometric size and shape of *Iris pumila* flower parts (standard, fall and style) from plants growing in two natural habitats (exposed and shaded) in a protected natural reserve of the Deliblato Sands. We applied analysis of variance (ANOVA) for centroid size (CS) and multivariate analysis of variance (MANOVA) with all shape variables (Procrustes coordinates) as dependent variables, and with habitat as fixed and clone as a random factor. Landmarks and semi-landmarks of standards, falls and styles were positioned in MakeFan6 and TpsDig program. The CVA (Canonical discriminant analysis) was used to visualize the differences of shape between the habitats with contrasting ambient light conditions. The heterogeneity of light conditions affected the flower shape. The mean val-

ues of centroid size (as a measure of geometric size) of *I. pumila* standards and falls were lower in open habitat than in shaded environment. The results of ANOVA revealed a statistically significant effect of habitat for standards, fall and style ($p = 0.0009$, $p = 0.0223$ and $p = 0.0358$, respectively,) and between-clone variability in size of all flower parts was also observed (all $p < 0.0001$). According to the results of MANOVA analysis significant differences in shape between habitats and clones (all $p < 0.0001$) were observed. Considering that the light intensity is significantly different in open and shaded habitats, we can only assume that this is the key factor that influences the size and shape variation of *I. pumila* floral parts.

Keywords: shape of flower parts, light conditions, geometric morphometrics, *Iris pumila*

This study is supported by the Ministry of Education, Science and Technological Development of the Republic of Serbia (OI173025).

How do *Iris pumila* plants respond to photo-oxidative stress in the wild: the variation of leaf functional traits?

OP6-3

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Adaptive plastic responses to variable light conditions include all aspects of plant phenotype – morphology, physiology and biochemistry. To elucidate how ambient light intensity modulates the phenotypic expression of leaf functional traits in *Iris pumila*, twenty clonal genotypes inhabiting an exposed and a shaded site at the Deliblato Sands were selected and reciprocally transplanted between the two sites. Fifteen years later, one fully developed youngest leaf was harvested from each of these transplants during the summer, and analyzed for malondialdehyde (MDA) content (an environmental stress indicator), leaf morphophysiological traits (specific leaf area, SLA; leaf dry matter content, LDMC and succulence) as well as the total concentrations of leaf pigments (chlorophylls, Chl; carotenoids, Car; and anthocyanins, Anth). The MDA content was found to be about 20% greater in sun exposed leaves than in those developed under the vegetation canopy, indicating a stronger abiotic stress prevailing at the open compared to the shaded habitat. The leaf morphophysiological traits varied significantly between the alternative radiations environments. While LDMC and succulence increased with irradiance, SLA decreased. A higher succulence and LDMC, accompanied with a lower SLA in the exposed leaves compared to their shaded counterparts reflected greater, functionally advantageous, water conservation efficiency at open habitats. The total Anth content was elevated in leaves growing in full sunlight compared to those from the vegetation shade, acting as a light attenuator against the photo-oxidative damage of chloroplasts. The Car : Chl ratio was also increased in the sun-exposed leaves relative to the shaded ones, as an adaptive plastic response of thermal energy dissipation to stressful photo-oxidative conditions commonly occurring in natural habitats of *Iris pumila*.

Keywords: adaptive phenotypic plasticity, functional leaf traits, *Iris pumila*, photo-oxidative stress