

Serbian Plant Physiology Society

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

# 2<sup>nd</sup> International Conference on Plant Biology

## 21<sup>th</sup> Symposium of the Serbian Plant Physiology Society

### COST ACTION FA1106 QUALITYFRUIT Workshop



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## The intra-individual variability in germination and germination energy of oak (*Quercus robur* L.) pollen grains, tested on nutrient media with different percentage of sucrose

PP6-4

Branislava Batos<sup>1</sup>, Danijela Miljković<sup>2</sup>

(branislabatos@gmail.com)

<sup>1</sup> Institute of Forestry, Belgrade, Serbia

<sup>2</sup> Department of Evolutionary Biology, Institute for Biological Research “Siniša Stanković”, University of Belgrade, Bulevar despota Stefana 142, 11000 Belgrade, Serbia

The optimal substrate for the germination of pollen depends primarily on the plant species and then the composition of the nutrient medium. The intra-individual variability in the percentage of germination and germination energy (pollen tube length) was estimated at six nutrient media with different concentrations of sucrose (0, 5, 10, 15, 20, and 25%). The pollen was collected in late April and early May from eight trees in Ada Ciganlija. Trees were statistically significantly different in the percentage of germination and germination energy, according to the results of analysis of variance ( $p < 0.0001$ ). The effect of the nutrient media was also statistically significant ( $p < 0.0001$ ). The inter-individual difference (between the trees) depended on the concentration of sucrose in nutrient media. The maximum value of the germination percentage (%) was recorded in medium with 20% sucrose for the trees 1, 3, 4, 5, 6 (47.55, 25.13, 44.73, 11.09 and 37.66, respectively). The substrate with 15% sucrose was optimal for germination energy, the value's pollen tube length ( $\mu\text{m}$ ) for the trees 1, 2, 3, 5 and 6 were 113.5, 118.08, 78.72, 51.66 and 121.52, respectively. The biochemical processes for a the germination and growth of pollen tubes are different, so that the surface with 15% and 20% sucrose was more optimal for germination percentage, while the surface with 15% of sucrose in the medium was more optimal for germination energy. All of the above facts infer that pollen viability is a complex physiological process which, in addition to genotype effect, is also affected by nutrient media.

**Keywords:** pollen germination, pollen germination energy, pedunculate oak, nutrient medium.

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## The correlation patterns between *I. pumila* flower traits and between their developmental stability in two natural habitats with contrasting light conditions

PP6-5

Danijela Miljković, Stevan Avramov

(danijela.miljkovic@ibiss.bg.ac.rs)

Institute for Biological Research “Siniša Stanković”, Department of Evolutionary Biology, University of Belgrade, Bulevar despota Stefana 142, 11000 Belgrade, Serbia

Morphological variability and developmental stability of flower traits were examined in two natural habitats situated in the protected Deliblato Sands Special Natural Reserve. Pearson's correlation coefficients were calculated among flower morphological traits and among developmental stability of *I. pumila* flower traits in natural habitats with contrasting light intensity (full daylight and vegetation canopy). The most phenotypic correlations among the flower parts were found to be moderate or low in magnitude except for the strong positive correlation between the fall and standard length in both habitats (full daylight  $r = 0.88$  and vegeta-

tion canopy  $r = 0.92$ ). The correlations between the developmental stability of flower traits were low and statistically insignificant in both habitats. The congruence of the correlation matrix of *I. pumila* flower morphological traits (full daylight and vegetation canopy habitats) was strong and statistically significant ( $r = 0.83$ ,  $p < 0.05$ ). The correlation matrices of developmental stability of flower traits between the two habitats were not statistically similar. The correlation matrix of morphological traits and correlation matrices of developmental stability of the same characteristic differed between habitats. In the open habitats, these matrices were different while in shaded habitats were similar to each other ( $r = 0.56$ ,  $p < 0.05$ ), according to the results of Mantel test. The floral morphological variation in *I. pumila* appeared to be tightly integrated regardless of ambient light conditions. The strong correlation between the fall and standard in both habitats with alternative light intensity indicates close connection in their developmental process.

**Keywords:** flower trait correlations, developmental stability, *Iris pumila*

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## The pedunculate oak (*Quercus robur* L.) leaf shape variation between five natural populations in northern Serbia

PP6-6

**Danijela Miljković<sup>1</sup>, Vukica Vujić<sup>2</sup>, Branislava Batos<sup>3</sup>**  
(danijela.miljkovic@ibiss.bg.ac.rs)

<sup>1</sup> Institute for Biological Research "Siniša Stanković", Department of Evolutionary Biology, University of Belgrade, Blvd despota Stefana 142, 11000 Belgrade, Serbia

<sup>2</sup> Faculty of Biology, University of Belgrade, Studentski trg 16 11000 Belgrade, Serbia <sup>3</sup>Institute of Forestry, Kneza Višeslava 3, Belgrade, Serbia

The technique for multivariate shape analysis – geometric morphometrics was applied with the aim to evaluate an interpopulation variability of pedunculate oak (*Quercus robur* L.) leaf shape. A total of 500 leaves were collected in five natural populations in northern Serbia (Sombor, Subotica, Vršac, Bojčinska šuma and Ada Ciganlija). The eleven homologous landmarks (LM) were digitized on images of leaves using the tpsDig software. The Procrustes coordinates were computed using Morpho J software. Inter- and intrapopulation variation of oak leaf shape was tested by MANOVA using Procrustes coordinates data set. A principal component analysis (PCA) was carried out to quantify the shape variation associated with each shape dimension. The canonical variate analysis (CVA) was used to visualize the observed interpopulation differences in the leaf shape. The first two axes explained 85.34% of the variance in the data set (first = 60.22%, second = 25.12%). According to the first axis, there were intrapopulation differences. The leaves from Bojčinska šuma and Sombor were narrower and had longer leaf petiole in comparison to the leaves from Ada Ciganlija, Subotica and Vrsac populations. Second axis revealed differences in leaf shape between populations Vrsac and Subotica. Population Vrsac leaves were narrower with longer leaf petiole, while leaves from population Subotica were wider with shorter leaf petiole. According to the MANOVA analyses, the differences in the leaf shape between populations and between trees were significant ( $p < 0.0001$ ), while differences among leaves from an individual tree were not significant ( $p > 0.05$ ).

**Keywords:** leaf shape, geometric morphometrics, *Quercus robur*

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