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(22nd SPPS Meeting)

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Fructan accumulation in the internodes and photosynthetic performance during development of two barley cultivars

PP1-15

Lidija Begović[1], Tomislav Pospihalj[1], Paula Lončarić[1], Ivana Štolfa Čamagajevac[1], Vera Cesar[1], Dunja Leljak-Levanić[2]
(lbegovic@biologija.unios.hr)

[1] Department of Biology, Josip Juraj Strossmayer University of Osijek, Ulica cara Hadrijana 8/A, HR-31 000 Osijek, Croatia

[2] Division of Molecular Biology, Department of Biology, Faculty of Science, University of Zagreb, Horvatovac 102a, HR-10.000 Zagreb, Croatia

Fructans represent the major temporary stem carbon storage compounds which accumulate in the stem and leaves. In barley (*Hordeum vulgare* L.) stem, accumulated fructans can be easily mobilized in the grain after flowering, which significantly affects the overall yield. The aim of this study was to reveal the dynamics of remobilization of the fructan reserves in the three lower internodes with transcription levels of the genes involved in their synthesis and degradation as well as the efficiency of photosystem II during development in two spring barley cultivars Astor and Jaran. Cultivar Jaran with better photosynthetic efficiency, as opposed to cultivar Astor, had lower fructan content. These results can be explained by coordinated expression pattern of the sucrose: sucrose 1-fructosyltransferase (*1-SST*), sucrose: fructan 6-fructosyltransferase (*6-SFT*) involved in the synthesis and the expression of fructan-1-exohydrolase (*1-FEH*) gene involved in fructan remobilization leading to better sink strength and generally lower fructan content in the stem of cultivar Jaran. Fructan synthesis and remobilization are under a strong influence of genotype and enzyme activities were directed towards synchronized synthesis of fructans and their mobilization to the grain. The obtained results will contribute to the selection and breeding processes of spring barley cultivars.

Keywords: fructans, internode, *1-SST*, *6-SFT*, *FEH*

Enhanced gibberellin catabolism promotes somatic embryo induction from spinach apical root sections

PP1-16

Maja Milić, Nina Devrnja, Dušica Ćalić, Snežana Zdravković-Korać, Jelena Milojević
(mmilic0905@gmail.com)

University of Belgrade, Institute for Biological Research "Siniša Stanković", Despot Stefan Boulevard 142, 11 060 Belgrade, Republic of Serbia

Gibberellins (GA) are essential for induction of somatic embryogenesis from spinach apical root sections. To elucidate the role of GA in this process, expression of genes encoding enzymes that catalyze the final step of GA_{20} oxidation to bioactive GA, GA3-oxidase (GA3-ox), and GA degradation, GA2-oxidase (GA2-ox), was assessed. In spinach, there is only one GA3-ox and three GA2-ox (GA2ox 1, GA2 ox2, GA2 ox3). Expression of these genes was tested in the explants cultivated on noninductive medium (NM), supplemented with 20 μM NAA, inductive medium (IM), containing 20 μM NAA + 5 μM GA_3, or plant growth regulator (PGR)-free medium during a 28 d induction period. Root-tips isolated from seedlings and immediately frozen for RNA isolation were used as a control. In the explants cultivated on PGR-free medium, expression of GA3-ox increased gradually up to 10-fold and was constantly higher than in control. GA2-ox1, with an increase of up to 60-

fold, was the most highly expressed GA2-ox, while the expression of GA2-ox2 and GA2-ox3 only slightly increased compared to the control. In the explants cultivated on NM, expression of GA3-ox decreased slightly until the 7th day of cultivation and then increased up to 2-fold until the end of the experiment, while the expression of GA2-ox1 and GA2-ox2 was only slightly higher than in control. However, explants cultivated on IM showed the constant and significant decrease of GA3-ox (down to 7-fold) and increase of GA2-ox2 (up to 20-fold) expression. Here, we propose that continuous decrease in GA3-ox and increase in GA2-ox2 expression were favorable conditions for somatic embryo induction.

Keywords: gene expression, gibberellins, somatic embryogenesis, spinach

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Bud regeneration from root-tips of *Allium atropurpureum* Waldst. & Kit.

PP1-17

Maja Milić[1], Goran Anačkov[2], Dušica Ćalić[1], Nina Devrnja[1], Ružica Igić[2], Jelena Milojević[1], Snežana Zdravković-Korać[1]

(mmilic0905@gmail.com)

[1] University of Belgrade, Institute for Biological Research "Siniša Stanković", Department of Plant Physiology, Despot Stefan Boulevard 142, 11 060 Belgrade, Serbia.

[2] University of Novi Sad, Faculty of Sciences, Department of Biology and Ecology, Trg Dositeja Obradovića 3, 21 000, Novi Sad, Serbia

A. atropurpureum is a natural rarity of Serbia, growing only in the area of Vojvodina. The vulnerability of its habitat by fragmentation and frequent and uncontrolled chemical treatment of surrounding agrarian areas, affects its status and the impoverishment of natural populations. Therefore, establishing a protocol for efficient *de novo* regeneration of this species for *ex situ* conservation was the aim of the present study. For callus induction, the apical root sections of axenic seedlings were cultivated on medium supplemented with 5 μM 2,4 D + 5 μM BA for 8 weeks. The obtained calli were friable, pale beige, without regeneration capacity. However, within these calli, a compact yellowish callus formed, and this type of callus had the capacity for bud formation when cultivated on media containing 0, 1, 5 or 10 μM TDZ, Kin or BA for 8 weeks. Calli cultivated on medium supplemented with 10 μM Kin exhibited the highest bud forming capacity, with the lowest level of hyperhydricity and albinism. Shoot bunches were further hardened on plant growth regulator-free medium for 8 weeks, and then single plants were detached and subcultivated on media with 0, 1, 5 or 10 μM GA_3 and grown at 12 °C, for bulblet induction. All plants formed bulblets, but bulblets cultivated on GA_3-containing media multiplied by setting up to 10 secondary bulblets. Obtained bulblets are suitable propagules, as they easily develop into plants. This protocol is convenient for clonal propagation of this endangered plant species, as well as for other applications in its research and improvement.

Keywords: *Allium atropurpureum*, buds, bulblets, roots, tissue culture

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