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(22nd SPPS Meeting)

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Potassium iodide promotes bud regeneration from the apical root sections of shallot plants

PP1-29

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The apical root sections of *Allium ascalonicum* plants respond to a callus inducing treatment by forming callus from the root apical meristem. It has been shown in *Arabidopsis thaliana* that balance between superoxide and hydrogen peroxide (H_2O_2) in the root tip determines root meristem size by controlling the transition from cell proliferation to differentiation. Hence, the increased size of root meristem may affect callus formation and subsequent bud regeneration from the root-tips. To test this hypothesis, *in vitro*-grown shallot plants were pretreated with aqueous solutions of H_2O_2 (100, 500 or 1000 μM) or potassium iodide (KI, 1 or 10 mM) for 24h. Plants incubated in water were used as a control. The apical root sections (1 cm) isolated from these plants were cultivated on callus induction medium, supplemented with 5 μM 2,4-D + 5 μM BA, for 8 weeks and then on regeneration induction medium, containing 5 μM BA, for 4 weeks. Obtained results indicate the significant impact of KI on *de novo* bud regeneration. Explants treated with 1 mM KI regenerated buds with significantly higher frequency (83.6% vs. 25.2%) and the mean bud number (6.19 vs. 0.21) compared to the control. The frequencies of bud regeneration and the mean bud numbers obtained for H2O2-treated explants were significantly lower compared to KI-treated explants (43.5% 52.0% and 1.0-2.3, respectively). Assuming that H_2O_2 decreases size of the root meristem, as was shown in *Arabidopsis*, the results obtained in this work suggest that KI, a H_2O_2 scavenger, increased bud-forming capacity presumably by increasing the size of root meristem.

Keywords: *Allium ascalonicum*, bud regeneration, hydrogen peroxide, potassium iodide, shallot

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Combination of high sucrose concentration with exogenuous cytokinins affects endogenous phytohormone profiles of kohlrabi seedling explants during *de novo* organogenesis

PP1-30

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Fluctuations in local phytohormone levels are considered to be important for initiation of developmental events in the process of plant organogenesis. Simultaneously, sugars as signaling molecules affect plant metabolism and growth, potentially interacting with hormonal regulation. Thus, the aim of the presented study was to see whether there were any changes in cytokinin (CK) homeostasis in 4 different stages (T1-T4) during *de novo* shoot organogenesis of kohlrabi (*Brassica oleracea* var. *gongylodes* cv. Vienna Purple) seedlings under the influence of exogenous CKs, *trans-*

zeatin (*trans*Z) and thidiazuron (TDZ), combined with high sucrose concentration. Explants grown on CK-free medium with 3% sucrose were used as control. Generally, analysis of variance showed statistically significant impact of CK treatment and sucrose concentration, as well as their interaction in all investigated stages, including seedling development before calli formation (T1 and T2), calli formation (T3) and when *de novo* shoots occurred (T4). The obtained CK profiles exposed remarkable increase in total CK levels in samples treated with *trans*Z, particularly when 9% sucrose was used in nutrition medium, reaching up to 50,000 pmol g^{-1} FW. This trend was observed for all CK physiological and structural groups. On the other hand, application of a synthetic urea-type CK, TDZ, contributed to little or no increase in the endogenous CK levels regardless of the sucrose concentration. Our results demonstrated that phytohormones metabolism may be triggered by sucrose signaling in kohlrabi shoot organogenesis.

Keywords: kohlrabi, seedling, sucrose, cytokinin, *de novo* shoot organogenesis

This work was supported by the Ministry of Education, Science and Technological Development of Serbia (Grant No. 173015) and the Czech Science Foundation (16-14649S).

Cytokinin *N*-glucosides: occurrence, metabolism and biological activities in plants

PP1-31

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Cytokinins (CKs) are essential hormones for plant growth and development. One of the mechanisms controlling homeostasis of CKs in plants is their glucosylation at the *N7*- and *N9*-positions of the purine ring, generally regarded as irreversible and down-regulating CK pathway. The products of this metabolic pathway, CK-*N7*- and *N9*-glucosides, are known to have widespread distribution in higher plant species, representing even the major CK metabolic forms in most of them. In our comprehensive screening, however, only very low levels or a total absence of CK-*N7*- and *N9*-glucosides were found in fungal kingdom and non-vascular plants such as algae and mosses. These data together with predominance of *cis*-zeatin-type CKs in these species indicate a close interconnection between CK-*N*-glucosyltransferase pathway and formation of *cis*-zeatins in the evolutionary context.

The levels and quantitative ratios of CK-*N7*- and *N9*-glucosides differed during ontogenesis in selected plant species. While CK-*N9*-glucosides exhibited mild antisenescent activities expressed by chlorophyll retention in detached oat leaf segments in the dark, CK-*N7*-glucosides were essentially inactive. This may be due to stronger metabolic conversions demonstrated in the same experimental system for *trans*-zeatin-*N9*-glucoside leading to the formation of some storage forms of bioactive CKs such as *trans*- and *cis*-zeatin-O-glucosides compared to its *N7*-glucoside.

Our data substantially question the tenacious notion of biological inactivity and irreversibility of CK-*N*-glucosides, namely those glycosylated at *N9*-position, and will be discussed with respect to arguing against the general image of CK-*N*-glucosides as inactive and irreversible compounds.

Keywords: cytokinin, *N*-glucoside, glucosyltransferase, zeatin, phytohormone

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