Serbian Plant Physiology Society

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

1st International Conference on Plant Biology

20th Symposium of the Serbian Plant Physiology Society

Programme and Abstracts

Hotel PATRIA, Subotica, June 4-7, 2013

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.s) were resequenced, labeled as CeAGP1 through CeAGP5, annotated and uploaded to the GenBank (ac-
ssions KC733882 through KC733886). Searching GenBank protein database using translated centaury se-
ences as queries revealed that CeAGP1, 2 and 4 are fasciclin-like proteins with the FAS1 domains, belong-
g to the Fasciclin superfamily. CeAGP3 and CeAGP5 also have homology with other plant AGPs, but have
known conserved domains. While CeAGP2, 3 and 5 appear to be complete coding sequences with 461,
and 202 amino acids respectively, CeAGP1 and 4 are partial sequences with more than 225 and 335 ami-
acids respectively. The sequenced transcripts differ in the degree of homology with other known plant
iPs. The alignments of novel putative AGPs with published plant AGPs, as well as recognized protein do-
ains are presented. Expression of all 5 genes was confirmed in both leaves and roots by RT-PCR. The se-
enced centaury AGPs will be evaluated as potential molecular markers for early developmental stages of
matic embryogenesis in centaury.
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ector construction for promoter analysis in chicory and uorescence evaluation by agroinfiltration

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Chicory (*Cichorium intybus* L.) is rich in sesquiterpene lactones, compounds known for their bitter taste
id medicinal properties. Most enzymes involved in the biosynthetic pathway of these secondary metabo-
es have recently been discovered and characterized. The first step in their biosynthesis is catalyzed by ger-
acrene A synthase (GAS), in chicory present in two forms – long and short, and several P450 mono-oxyge-
ases. So far, promoters of these genes have not been studied, and little is known about the spatial and tem-
oral regulation of their expression. To address this issue, four vectors for plant transformation containing pro-
oter-reporter gene fusions were designed and constructed by Gateway cloning, including one for GAS long,
vo for GAS short, and one for the cytochrome P450, germacrene A oxidase. As a marker for co-transforma-
on, DsRED, a red fluorescent protein, was used, while the studied promoters were inserted to drive GFP/GUS
sion, to allow for visualization of promoter activity. Integrity and function of the constructs were checked by
groinfiltration in lettuce (*Lactuca sativa* Cv. Olof) – a transient transformation assay. Infiltration was performed
ith *Agrobacterium tumefaciens*, carrying the promoter constructs. Transformation success was checked five
ays after infiltration by fluorescent stereomicroscopy, and both DsRED and GFP were detected, indicating
iat the chicory promoters were active in lettuce. DsRED had strong and uniform fluorescence in all samples,
ut GFP fluorescence varied among plants infiltrated with different constructs. The GAS long promoter had
rongest expression, followed by the P450 and the two rather weak GAS short promoters. The fluorescence
as visible only in the infiltrated parts of the leaves, in tissues between leaf veins, but not in the veins them-
elves. Both abaxial and adaxial leaf sides were fluorescing. There were no differences observed between spa-
al distribution of DsRED and GFP: all infiltrated parts showed both markers. Since these vectors were con-

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Application of CdSe nanoparticles in plant biology research

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Quantum dots (QDs) are semiconductor nanoparticles that are widespread in biology as fluorescent mark-
ers. The application of QDs as markers of the cells or their cell walls (CW) for plant bio-imaging would be ad-
vantageous because of their small size, brightness, independence of emission on the excitation wavelength,
and stability under relatively harsh environments. They also have excellent photo stability [1].
In a plant cell the CW is a first target place for external agents. We studied interaction of CdSe QDs with CWs
isolated from a conifer – *Picea omorika* (Panč) *Purkyne* branch. Binding of CdSe QDs was followed by using flu-
orescence microscopy, fluorescence and FT-IR spectroscopy. The aim of the study was to see whether the QDs
induce structural changes in the CW, and to find out which kind of interactions between QDs and CWs occur.
The isolated CW is an appropriate object for study of the interactions with nanoparticles.
The results obtained in this study show that the CdSe QDs linked primarily to cellulose and lignin in the cell
wall of *P. omorika*. QDs are linked with lignin mainly through interaction with the C-C and C = C branched
chains. The interaction of QDs with cellulose is accomplished through OH groups. Structural redistribution in
the cell wall, as a result of interaction with QDs, is significantly dependent on the presence of water in the cell
wall. The presented results also show that the QDs are suitable for homogeneous labeling of CW structure.
The results have an implication on the use of the QDs in plant bioimaging.
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velopment of the Republic of Serbia. This work was also supported by the University of Miami, College of Arts
and Sciences Bridge funding.

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The role of DIMBOA in maize biotic stress resistance – presence of DIMBOA biosynthesis *bx1* gene in NS inbred lines

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DIMBOA (2-4-dihidroksi-7-metoksi-1,4-benzoksazin-3-on) is a secondary metabolite in grasses which be-
longs to benzoxazinoid class of chemical compounds and have a protective role against bacteria, fungi, in-
sects and other pests. It is present in many species of *Poaceae* family, including maize, wheat and rye. In maize,

this benzoxazinoid has proved to possess allelopathic activity and provide resistance against aphids (*Rapalosiphum padi, R. maydis*), corn borers (*Ostrinia nubilalis, O. furnacalis, Sesamia nonagrioides, S. exigua, Diatraea grandiosella*) and fungi (*Diplodia maydis, Setosphaeria turcica*). DIMBOA is formed only when plant tissues are damaged by interaction of benzoxazinoid glucosides from vacuoles with specific enzymes glucosidases released from plastids. The concentration of DIMBOA decreases during the vegetative growth and as plants mature, hence the greatest resistance against pests and diseases in early developmental phases. Biosynthesis of DIMBOA is regulated by nine *bx* genes (*bx1-bx9*), however, the polymorphism within *bx1* has the largest effect of DIMBOA content. The dominant allele form of *bx1* gene provides plants with resistance against pest, whereas plants with the recessive allele are susceptible. To assess the presence and variability of *bx* gene in maize breeding material, a set of 96 divergent maize inbred lines developed at the Institute of Field and Vegetable Crops in Novi Sad was screened with a functional SSR marker. The fragment size of PCR products was obtained by capillary electrophoresis using Applied Biosystems 30130 Analyzer. The aim of the study was to identify the source of disease and pest resistance in early development phases of maize and examine the possibility of application of the microsatellite for selection of genotypes in maize breeding process.

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Antioxidative enzyme activities during *in vitro* morphogenesis from leaf explants of *Centaurium erythraea* Rafn.

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In this study we examined changes in activities of antioxidative enzymes, superoxide dismutase (SOD), catalase (CAT) and peroxidase (POD) during *in vitro* morphogenesis in leaf culture of *Centaurium erythraea* Rafn. Enzyme activities were estimated during somatic embryogenesis and organogenesis at weekly intervals up to four weeks, using both gel and spec enzyme assays. Somatic embryogenesis and organogenesis were achieved on Murashige and Skoog (MS) basal medium supplemented with 2,4 -dichlorophenoxyacetic acid 2,4 D (0.2 mg/l) and N-(2-chloro-4-pyridil)-N'-phenylurea CPPU (0.01 and 0.5 mg/l) in 16 h light and dark conditions. Measurement of SOD, CAT and POD activities during morphogenesis in light and dark conditions demonstrated that there were differences in isoenzyme patterns and activities. The excision of the leaf explants and their subsequent cultivation in the induction culture medium resulted in the tissue oxidative stress and increase in SOD and CAT activity. Our data suggest the involment of antioxidative enzymes during morphogenesis from leaf explants of *C. erythraea*.

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