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Cd-저항성 *Arabidopsis thaliana*의 생화학적 특징

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Arabidopsis thaliana (WT Columbia)에 있어서 cadmium(Cd)에 저항성을 보여주는 개체(RT)들을 4세대까지 선별 육종한 후 유묘를 Cd에 노출시켰을 때 나타나는 여러 가지 산화적스트레스 변화들을 Cd에 감수성이 있는 개체(WT)들과 비교하여 조사하여 보았다. 생장에 독성을 보여주는 농도(최대 300 M)의 Cd에 유묘를 노출시켰을 때 WT에 비해 RT의 유묘는 높은 생존력과 함께 낮은 lipid peroxidation과 과산화수소 형성이 관찰되어 더 낮은 산화적스트레스 현상을 나타냈으며, 이와 더불어 RT-PCR, 효소활성도 측정 및 native activity gel 분석에 있어서도 더 높은 superoxide dismutase (SOD), catalase(CAT), ascorbtae peroxidase (APX) 활성이 RT에서 관찰됨으로 보아 더욱 활발한 활성산소화합물들의 제거현상이 나타남을 알 수 있었다. 또한 RT는 WT에 비해 잎과 뿌리 모두에 있어서 더욱 높은 Cd를 축적함도 관찰되었는데, 본 실험결과로 미루어보아 Cd에 의한 독성효과는 적어도 활성산소화합물 형성 증가와 lipid perpxidation를 통한 산화적 스트레스 증가에 의해 유도되며 이들 화합물들을 제거하는 항산화적 효소들의 활성 및 항산화물질 형성능력이 Cd독성에 저항성을 갖고 더 많은 Cd를 축적할 수 있게 만들어 줄 수 있음을 보여준다. (본 연구는 한국과학재단 R05-2000-000-00110-0[2002]에 의해 지원되었음)

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Differential Expression of Six Novel Peroxidase cDNAs Derived from Sweetpotato Cell Cultures in Response to Stress

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Six peroxidase (POD) cDNAs were isolated from suspension cultures of sweetpotato (*Ipomoea batatas*) by cDNA library screening, and their expression were investigated with a view to understand the physiological functions of each POD in relation to the environmental stress. They could be divided into two groups, anionic PODs (*swpa4, swpa5, swpa6*) and basic PODs (*swpb1, swpb2, swpb3*) on the basis of pI values of mature proteins. The six POD genes showed diverse expression patterns in various tissues of intact plants, growth stages of suspension cultures, and stress conditions on leaf tissues by RT-PCR analysis. The six genes from which they were derived are predominantly expressed in cultured cells of sweetpotato. Transcripts of *swpa4* were not detected in any tissues of the intact plant. *Swpa6* and *swpb1* genes were highly expressed in root tissues, whereas *swpa6* and *swpb3*genes were highly expressed in stem tissues. During suspension cultures, the expression patterns of the six genes were different from each other. The level of *swpa4, swpa5, swpb2* and *swpb3* transcripts progressively increased during the cell growth, whereas *swpa6* and *swpb1* showed high expression levels regardless of the cell growth. Six POD genes responded differently in leaf tissues to various abiotic stresses. Especially, *swpa4* was highly induced by many treatments of abiotic stress including hydrogen peroxide (440 mM), NaCl (100 mM) and wounding on leaf tissues.

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Effect of Ca^{2+} on Malformin A1-induced Gravitropic Response in Primary Roots of Maize

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The malformins, produced by the fungus *Aspergillus niger*, induce striking disfigurements during growth in higher plants. These highly active compounds comprise a small family of cyclic pentapeptides (Takahashi and Curtis, 1961). Malformin causes epinasty, swelling and reduced growth rates in shoots, curvatures and reduced growth rates in roots, and leaf abscission (Curtis, 1958a, 1958b). It hasbeen known that Malformin A1 regulates the physiological responses in plants. Recently, we reported that malformin A1 regulated the gravitropic response in primary roots of maize (Kim et al., 1999). In addition we found that malformin A1 stimulated the ethylene production in maize roots. Based on these results, we tried to explain the effect of malformin A1 on gravitropic response in maize roots in view of Calcium ion.Calcium ion regulators such as EGTA, A23187, and verapamil inhibited the grvitropic response in 10-5 M malformin A1 treated roots. However, in the 10-7 M malformin A1 treated roots, both EGTA and A23187 stimulated gravicurvature, and verapamil inhibited gravi-curvature.We discuss the role of calcium ion in the gravi-tropic response, which was regulated by malformin A1.

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Effect of TIBA on the Gravitropic Response in BL-treated Roots of Maize

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Brassinolide, purified from pollen of *Brassica napis*, has been known to regulate the physiological response in plants. There are many reports that BL regulate the ethylene biosynthesis in plants.We reported that BL stimulated the ethylene production and gravitropic response in maize roots. These effects increased in the presence of IAA synergistically. Therefore, we explore the role of TIBA, an auxin transport inhibitor, in the gravitropic response of the BL-treated roots of maize.To examine the relationship between BL and IAA in the ethylene production and gravitropic response, we measured the ethylene production with the various concentrations of IAA in the presence of BL. The ethylene production and gravitropic response were inhibited by the treatment of 10-4 M TIBA. Lower concentrations of TIBA stimulated the ethylene production, but inhibited gravicurvature. However, the treatment of TIBA with IAA showed more inhibition of ethylene production and gravitropic response than that of TIBA without IAA.These data suggested that the action of BL might be mediated with auxin transport, and BL-induced gravitropic curvature might be due to the asymmetric distribution of IAA in maize roots.