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Effect of ROS on ethylene biosynthesis in transgenic potatoes carrying Cu/Zn SOD Gene

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Objectives

We try to investigate the expression of genes related in ethylene biosynthesis from transgenic potatoes carrying lily Cu/Zn SOD gene.

Materials and Methods

1. Material

Plant - *Solanum tuberosum* L. cv. Desiree

HWC - *Pytophthora infestans*

2. Methods

Potatoes were cultivated in vitro on MS medium, and tubers were harvested in green house. O₂⁻ was measured by ESR. H₂O₂ was detected by Luminol test. We treated with various treatments, such as sealed microenvironment, ethephon (25ppm), ACC (50μM), AgNO₃ (10mM), and AVG (5μM), respectively. Northern analysis was advanced with ACS and ACO gene from transgenic potatoes

Results and Discussion

SS4 and SA1 plants are transgenic potatoes carrying lily Cu/Zn SOD genes by sense and antisense expression. Changes of phenotype of transgenic plants of SS4 and SA1 were investigated. The level of produced ethylene in vial culture system was highest in SS4 plant, but little ethylene was detected in control and SA1 plant using gas chromatography. When oxidative burst was generated by elicitor, high level of H₂O₂ and low level of O₂ radical production were detected in SS4 plant. But high level of O₂ radical and low level of H₂O₂ production were detected in SA1 plants by antisense expression of introduced lily SOD gene in potato plants. Transgenic potatoes exhibited normal growth pattern by treatment of scavenger or inhibitor of ethylene gas. We carried out Northern blot analysis by using tomato ACC synthase and ACC oxidase genes as probes. The expression of ACC synthase was highest on SA1 plant, but the expression of ACC oxidase gene was highest on SS4 plant. These results indicate that the high hydrogen peroxide production in SS4 plant activates ACC oxidase gene, and eventually produces more ethylene gas to culture environment.

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