(05-1-64)

Pathogen Induced Regulation of Ascorbate Peroxidase (APX) Gene in Pepper

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Objectives

The rationale of this study was the establishment of enhanced protein expression system in infected plants. By using pathogen inducible promoter, the expression of a gene could be up-regulated in the infected area when/where the pathogen invade. In this way, the transgenic plants could be efficiently protected from pathogen invasion.

Materials and Methods

1. Material

Arabidopsis thaliana

Agrobacterium tumefaciens GV 3101 carrying pBI121-pAPX

Alternaria brassicicola

2. Methods

In order to isolate the promoter of pathogen inducible gene, the genomic fragment corresponding to APX was amplified by PCR in pepper. The promoter of APX was fused to GUS reporter gene. Then, its expression profiles were analyzed in the transgenic *Arabidopsis* to confirm the pathogen inducible expression.

Results and Discussion

In response to pathogen attack, one of the earliest reactions of plants is the production of active oxygen species (AOS). The AOS are extremely reactive molecules, which are leading to the oxidative destruction of the cells. To elucidate antioxidant system upon oxidative damage resulted from the pathogen invasion, the expression of superoxide dismutase (SOD), ascorbate peroxidase (APX) and catalase (CAT) was examined in the unripe pepper fruits infected with anthracnose fungus. The expression of SOD and APX was increased in the infected fruits so that the genomic DNA of APX gene was cloned from pepper and characterized to provide pathogen inducible expression system. To elucidate the expression system, histochemical assay was conducted in transgenic *Arabidopsis* carrying GUS gene driven by APX promoter. In the absence of fungal infection, GUS activity was detected weakly and invariably in the shoots and the roots of *Arabidopsis*. When the transgenic plants were infected with a fungus, *Alternaria brassicicola*, GUS activity was strongly enhanced in the infected area.

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