

# Pathogen tolerance conferred by H<sub>2</sub>O<sub>2</sub>-generating glucose oxidase in transgenic tobacco

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## ABSTRACT

Kazan et al. demonstrated that expression of a fungal glucose oxidase (GO) gene in the plants improves disease resistance to pathogens. However, constitutive expression of GO results in the accumulation of hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>) in the transgenic plants that causes the plants developmental and reproductive abnormalities. In this study, a transgenic tobacco with fungal GO was constructed under the control of an inducible promoter, PR1-a promoter, and was used to examine the growth and disease resistance to fungal pathogens. The PR-GO transgenic plants can be induced to express GO after application of 100 μM salicylic acid (SA) and then produce H<sub>2</sub>O<sub>2</sub>. Western analysis demonstrated that the line 3-3-2 exhibits higher level of GO protein than others, even expresses slightly without induction. It is consisted with that, with or without SA-induction, the line 3-3-2 contains higher level of H<sub>2</sub>O<sub>2</sub> than the level of wild type (WT) and other transgenic lines. Moreover, the transgenic tobacco lines which can be induced to express GO and then to produce H<sub>2</sub>O<sub>2</sub> showed significantly increasing in the resistance to *Rhizoctonia solani* and *Sclerotium rolfsii*. To evaluate the effect of the GO transgene on the plants, the height of seedlings, the number of flowers and seed pods, the weight of seed pods and individual seeds, and the germination rate were compared between transgenic plants and WT. Except the line 3-3-2, growth pattern of all the transgenic lines showed no difference with that of the WT. Damages occurring in the line 3-3-2 may be due to the basal level expression of GO in the plants. Overall, the PR-GO transgenic plants are induced to express GO protein by pathogen attack and then boost their pathogen resistance by the production of H<sub>2</sub>O<sub>2</sub>. The level of H<sub>2</sub>O<sub>2</sub> did not increase in these plants until SA- or pathogen-induction. Therefore, with the inducible promoter, these transgenic plants are more disease-resistant but with normal growth as WT.

Keywords : pathogen、glucose oxidase、hydrogen peroxide、resistance、inducible promoter、PR1-a promoter

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