(05-1-28)

Ectopic expression of MAP kinase inhibits germination and seedling growth in transgenic rice

Da-Eun Lee, Kyoungwhan Back

Department of Biotechnology, Chonnam National University, Gwangju 500-757, South Korea

Objectives

We generated transgenic rice plants that overexpressed the wound-inducible MAP kinase (MK1) from pepper. The MK1-transgenic rice plants produced three times more jasmonic acid than did wild-type rice, and exhibited enhanced pathogen resistance against rice blast. In this paper, homozygous T_2 MK1-transgenic rice plants were selected and used to investigate whether seed germination and seedling growth are affected in the transgenic rice plants producing more JA.

Materials and Methods

Transgenic rice plants harboring transferred DNA (T-DNA) with the wound-inducible MAP kinase (MK1) from pepper under the control of the maize ubiquitin promoter were generated. Mature seeds of japonica rice (*Oryza sativa* cv. Nackdong) and MK1-transgenic rice were stored at 4°C after harvest and 50 mature seeds of each were used for a germination and seedling growth test.

Results and Discussion

Jasmonic acid (JA) inhibits seed germination and post-germination growth. We previously generated transgenic rice plants that overexpress wound-inducible MAP kinase from pepper. The transgenic rice plants accumulated about three times more jasmonic acid than did the wild type. The transgenic rice seeds required two more days to germinate, as compared to the wild type, and shoot and root growth was inhibited. The root and shoot length of transgenic plants were comparable to those of the wild type treated with 10 μM JA. In addition, the transcription level of storage proteins, such as prolamin and glutelin, decreased more slowly in transgenic lines than in the wild type during germination. MAP kinase activity was clearly enhanced in the embryos of transgenic rice plants during germination. The inhibition of the germination and growth of transgenic rice plants was attributed to the overexpression of the MAP kinase transgene, which resulted in a subsequent increase in both MAP kinase activity and JA synthesis.

*Corresponding author : Kyoungwhan Back, Tel : 062-530-2165, E-mail : kback@chonnam.ac.kr