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Transgenic sweetpotato plants expressing spike protein of porcine epidemic diarrhea virus

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Objectives

Porcine epidemic diarrhea virus (PEDV) causes enteritis in swine of all ages, and is fatal in neonatal piglets. Hence, it is important to develop an effective vaccination against PEDV infection. The spike protein of PEDV is a primary target antigen for developing an effective vaccine against coronaviruses, since it mediates essential biological functions. Sweetpotato [*Ipomoea batatas* (L.) Lam.] ranks the seventh among food crops in annual production in the world and is one of the most important crops to secure a staple food supply in 21st century. Furthermore, sweetpotato is an attractive plants producing plant-based vaccine in storage roots. In this study, in order to develop the transgenic sweetpotato plants that produce an effective antigen protein against PEDV, we constructed the transformation vectors expressing antigen from the spike protein of PEDV and generated transgenic sweetpotato plants.

Materials and Methods

1. Material
   - Plant materials: Sweetpotato (cv. Yulmi) embryogenic callus
   - Expression Vectors: CaMV 35S pro::PEDV P1/pCAMBIA2300/EHA105 (35S-P1 vector)
     Sporamin pro::PEDV P1/pCAMBIA2300/EHA105 (Spo-P1 vector)
2. Methods: *Agrobacterium*-mediated transformation, PCR analysis, Southern blot analysis

Results and Discussion

To develop transgenic sweetpotato plants expressing antigen against PEDV, we constructed the transformation vectors that using P1 fragment of PEDV spike protein under the control of a CaMV 35S promoter or sporamin promoter with high expression specifically in the storage root of sweetpotato (referred to as 35S-P1 vector and Spo-P1 vector, respectively). Transgenic sweetpotato plants were successfully developed by *Agrobacterium*-mediated transformation. Kanamycin-resistant embryogenic calli were selected on MS medium containing 400 mg/L claforan and 100 mg/L kanamycin. Embryogenic calli transferred to hormone-free MS medium with kanamycin gave rise to somatic embryos and then converted into plantlets in the same medium. The putative transgenic plants were selected by PCR with nptII or PEDV-specific primer. Southern blot analysis of PCR-positive regenerants confirmed that the foreign genes were inserted into genome of regenerated plants. The further characterization of transgenic sweetpotato plants and activities of the plant-derived antigen are under study.

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