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Transgenic Poplar Expressing both CuZnSOD and APX in Chloroplasts

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Objectives

To develop transgenic poplar plants with enhanced tolerance to multiple environmental stresses, SSA vector expressing both superoxide dismutase (CuZnSOD) and ascorbate peroxidase (APX) genes in chloroplasts (Kwon et al., 2002) under the control of a stress-inducible *SWPA2* promoter (Kim et al., 2003) was used to generate transgenic poplar plants by an *Agrobacterium*-mediated transformation.

Materials and Methods

1. Material: Stem explants of a hybrid poplar (*Populus alba* x *Populus glandulosa*) in *in vitro* culture
2. Methods:

- *Agrobacterium*-mediated trasformation (SWPA2pro::mSOD1+SWPA2pro::APX/pCAMBIA2300/EHA105)
- Callus induction: MS salt, 1.0 mg/L 2,4-D, 0.1 mg/L BAP, 0.01 mg/L NAA, 500 mg/L cefotaxime and 50 mg/L KA
- Shoot induction: WPM salt, 1.0 mg/L zeatin, 0.1 mg/L BA, 0.01 mg/L NAA, 500 mg/L cefotaxime and 50 mg/L KA

Results and Discussion

Transgenic poplar plants were successfully developed by an *Agrobacterium*-mediated transformation system. Transformed calli were selected on MS medium containing 1.0 mg/L 2,4-D, 0.1 mg/L BAP, 0.01 mg/ L NAA , 500 mg/L cefotaxime and 50 mg/L kanamycin. Shoots were regenerated in the presence of WPM medium containing 1.0 mg/L zeatin, 0.1 mg/L BA, 0.01 mg/L NAA, 500 mg/L cefotaxime and 50 mg/L kanamycin after 4 weeks of culture. The highest transformation efficiency was approximately 80%. Regenerated plantlets were grown to normal plants in pot. The presence of SOD and APX genes in transgenic plants was confirmed by PCR analysis. Further characterization of transgenic plants is under study in terms of multiple stresses including methyl viologen-mediated oxidative stress.

References

1. Kim KY et al. (2003) A novel oxidative stress-inducible peroxidase promoter from sweet potato: molecular cloning and characterization in transgenic tobacco plants and cultured cells. *Plant Mol Biol* 51: 831-838

2. Kwon SY et al. (2002) Enhanced tolerance of transgenic tobacco plants expressing both superoxide dismutase and ascorbate peroxidase in chloroplasts against methyl viologen-mediated oxidative stress. *Plant Cell Environ* 25: 873-882

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