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Enhanced Tolerance to MV-mediated Oxidative Stress in Transgenic Potato Plants Expressing Multiple Stress-tolerant Genes

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Objectives

To develop transgenic potato plants with enhanced tolerance to multiple environmental stresses, multiple stress-tolerant genes such as NDPK2 and SOD/APX genes were introduced under the control of a stress-inducible SWPA2 promoter (1-3). The protection effect of transgenic potato plants (cv. Superior and Atlantic) against methyl viologen-mediated oxidative stress were evaluated.

Materials and Methods

1. Materials

- Plant materials: potato (*Solanum tuberosum* L.) cv. Superior, Atlantic
- Vectors:
E35S pro::NDPK2/pCAMBIA2300/EHA105 (EN vector)
SWPA2 pro::NDPK2/pCAMBIA2300/EHA105 (SN vector)
SWPA2 pro::mSOD1+SWPA2::APX/pCAMBIA2300/EHA105 (SSA vector)

2. Methods: *Agrobacterium*-mediated transformation, Southern blot analysis, leaf disc, methyl viologen (MV) treatment

Results and Discussion

Three expression vectors such as EN, SN and SSA were used to generate transgenic potato plants (cv. Superior and Atlantic) by an *Agrobacterium*-mediated transformation system.

Transgenic potato plants were regenerated on MS medium containing 400 mg/L claforan and 100 mg/L kanamycin. The integration of foreign genes in transgenic plants was confirmed by Southern blot analysis. To investigate whether the transgenic plants have tolerance against MV-induced oxidative stress, we evaluated the visible damage on leaf disc at 10 μ M of MV. As expected, transgenic plants showed the tolerance to MV-mediated oxidative stress compared to non-transgenic control plants. The detail protection effects of each plant line on MV-mediated oxidative stress will be discussed.

References

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3. 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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