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Transgenic sweetpotato plants with enhanced tolerance to ozone

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Objectives

Sweetpotato [*Ipomoea batatas* (L.) Lam.] is one of the most important crops to secure a staple food supply in 21st century. The application of the molecular genetic techniques would contribute to enhance the novel potentials of sweetpotato including an enhanced tolerance to environmental stress. In previous reports, we developed transgenic sweetpotato plants expressing both CuZn superoxide dismutase (CuZnSOD) and ascorbate peroxidase (APX) in chloroplasts under the control of an oxidative stress-inducible *SWPA2* promoter (referred to as SSA plants). SSA plants showed the enhanced tolerance to multiple stresses such as methyl viologen-mediated oxidative stress, SO₂, low temperature and drought. In this study, we evaluated the tolerance of SSA plants to ozone (O₃), an important air pollutant.

Materials and Methods

1. Material

- SSA transgenic sweetpotato (cv. Yulmi) plants grown for 6 weeks on the pot.

2. Methods

- Ozone treatment: 150 ppb O₃ (8 hr per day for 8 days in a chamber).

- Analysis: Photosynthetic efficiency (Fv/Fm), RT-PCR

Results and Discussion

When exposed to 150 ppb ozone for 8 days in growth chamber, SSA plants showed enhanced tolerance to non-transgenic (NT) plants in terms of photosynthetic efficiency (Fv/Fm). After ozone treatment, photosynthetic efficiency of NT plants reduced to 40%, whereas SSA4 plant reduced to 12%. The further characterization of SSA sweetpotato plants exposed to ozone is under study in terms of expression of various antioxidant enzymes. The results suggested that SSA plants with enhanced tolerance to multiple environmental stresses will be useful for cultivation in the harsh area including air polluted area. In addition, SSA plants will be useful for the breeding material to produce various useful materials in the storage tubers in the harsh area.

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