(05-3-01)

Changes of Antioxidant Enzyme Activity in Sweetpotato by SO_2 and UV Treatment

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Objectives

Sweetpotato (*Ipomoea batatas*) is quite a tolerant plant to harsh environmental stresses including drought. To understand its adaptability to environmental stress in terms of antioxidative mechanism, we investigated levels of antioxidant enzymes such as superoxide dismutase (SOD), ascorbate peroxidase (APX) and peroxidase (POD) in the leaves of sweetpotato treated with SO_2 and UV light. In addition, transcription levels of 10 POD genes from cultured cells of sweetpotato in response to both stresses were also analyzed.

Materials and Methods

1. Material: Sweetpotato (*Ipomoea batatas* L. *Lam.* cv. Yulmi) plant

2. Methods:

- SO_2 treatment: 500 ppb for 8 h/day for 5 days to whole plants in a chamber
- UV treatment: leaf explants in vitro
- Enzyme activity: Total SOD, APX and POD activity, native gel assay, RT-PCR analysis

Results and Discussion

In sweetpotato leaves, 500 ppb SO_2 treatment increased levels of SOD (1.4 folds), APX (3 folds) and POD (5.3 folds). UV-B treatment increased levels of of SOD (1.5 folds), APX (2.1 folds) and POD (4.0 folds). Isoenzyme patterns of three antioxidant enzymes by native gel assay were similar to changes of total enzyme activity. Ten POD genes showed a diverse expression in response to SO_2 and UV treatment. SO_2 treatment increased expression of all POD genes except *swpa5*. *Swpa1*, *swpa2*, *swpb1* and *swpb2* were strongly expressed. UV-B treatment increased expression of *swpa1, swpa2, swpa4* and *swpb3* genes. These results indicated that antioxidant enzymes including several POD are involved in the antioxidative mechanism against oxidative stress by SO_2 and UV treatment.

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