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## Differential response of sweetpotato peroxidase genes to heavy metals

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### Objectives

Heavy metal is one of the major oxidative stressor during plant growth and development. We have focused our research on understanding the antioxidative mechanism in plant cells and adaptation of plant in environmental stresses. In previous studies, 10 peroxidase (POD) genes (*swpa1-6*, *swpb1-3*, *swpn1*) were isolated from suspension cells of sweetpotato (*Ipomoeas batatas*) and characterized in terms of various environmental stresses. In this study, we have analyzed changes of total POD activities and expression of 10 POD genes in various tissues of sweetpotato in terms of heavy metal stresses.

### Materials and Methods

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

2. Methods:

- Treatment of heavy metal:

CdSO<sub>4</sub> (0, 0.05, 0.5 and 1 mM) and CuSO<sub>4</sub> (0, 0.1, 0.5 and 1 mM) for 2 days in a test tube.

Fe-EDTA (0, 0.1, 0.5 and 1 mM) and ZnSO<sub>4</sub> (0, 0.5, 2 and 10 mM) for 3 days in a test tube.

- Determination of metal ion contents: atomic absorption spectroscopy (AAS)

- Enzyme activity: total POD activity, native gel assay

- RT-PCR analysis

### Results and Discussion

Total POD activities in leaves treated with 1 mM CdSO<sub>4</sub>, 1 mM CuSO<sub>4</sub> and 1 mM Fe-EDTA were increased by 4.3, 4.1 and 4.9 times, respectively. In stem, it's activities were increased about 8 and 8.5 times by 1 mM CdSO<sub>4</sub> and 1 mM CuSO<sub>4</sub> treatments. Particularly total POD activities in fibrous roots on 1 mM CdSO<sub>4</sub> and 1 mM CuSO<sub>4</sub> treatments were increased by 10 and 20 times, respectively. The POD isoenzyme patterns analyzed by native gel assay were similar to changes of POD activities. Ten POD genes were showed diverse expression patterns by kinds and concentrations of heavy metals. *Swpa1*, *swpa2*, *swpa4* and *swpb3* were strongly expressed by all metal treatments in leaf, stem and root. Expressions of *swpa6* and *swpb1* were strongly induced in root by CdSO<sub>4</sub> treatment. Interestingly, *swpa4* gene was markedly expressed in response to heavy metal stress in various tissues. These results indicated that specific POD genes might be involved in overcoming oxidative stresses caused by heavy metals.