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Response of Antioxidant Enzymes to Reaeration Following Hypoxia in Roots of Barley Seedlings

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Objectives

To investigate and characterize responses of activities and isozyme profiles of antioxidant enzymes to re-aeration conditions following hypoxia, and to analyze relationship between the enzymes and wet-injury resistance mechanism in barley seedlings.

Materials and Methods

- Plant materials: Seedlings of barley cv. Naehanssal-bori and Duwonchapssal-bori.
- Culture Solution: Modified Kimura solution (91mM (NH₄)₂SO₄, 89mM MgSO₄, 274 mM KNO₃, 91mM KH₂PO₄, 63mM Ca (NO₃)₂, 10mM Fe-EDTA
- Assay: Seedlings at the 2nd leaf stage were treated with 1 ppm dissolved oxygen by sparging the solution with N₂ gas during

the growth period of 7d, and hypoxically treated plants were re-aerated for 20 min, 2h, and 16h. Activities and isozyme profiles of the enzymes were assayed.

Results and Discussion

POX activity per protein was little different between varieties and treatments. CAT activity per protein was decreased by the treatments in Naehanssal-bori and increased under hypoxia (47%), re-aeration for 20min (12%) and re-aeration for 2hr (95%) but decreased under re-aeration for 16h (53%) in Duwonchapssal barley.

APX activity per protein was increased by 22% under hypoxia, increased little under re-aeration for 16h but decreased by 29% under re-aeration for 20 min. The results indicate that there are genotypic and enzyme-specific differences in responses to hypoxia and subsequent reaeration in barley seedlings.

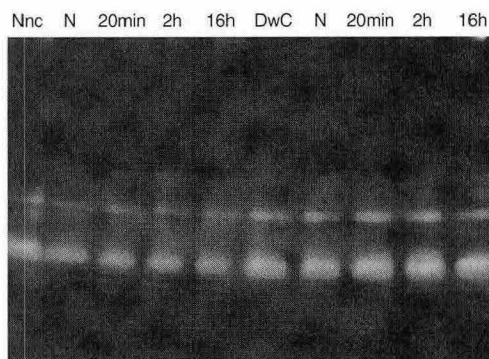
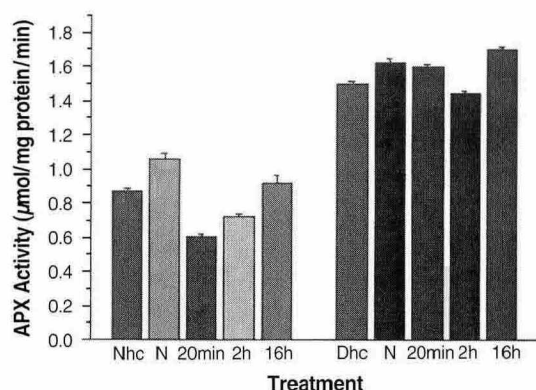


Figure 1. Effect of reaeration on APX activity and isozyme profiles. c: control, H: hypoxia, h: hour