

Title Relationships of cold acclimation and antioxidative enzymes with chilling tolerance in cucumber (*Cucumis sativus* L.).

Authors Kuk, Y. I., Lee, J. H., Kim, H. Y., Chung, S. J., Chung, G. C., Guh, J. O. and Lee, H. J.

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Abstract

To determine whether chilling tolerance is related to cold acclimatization, the changes in physiological responses and activity of antioxidative enzymes were investigated in the leaves of cucumber grown in controlled environments. The plants were exposed to 15 deg C (cold-acclimatized) or 25 deg C (nonacclimatized) for 3 days, under 50 micro mol m⁻² s⁻¹ photosynthetic photon flux and 70% relative humidity. The plants were then exposed to 8 deg C chilling temperature for 3 days, and allowed to recover in a growth chamber at 25 deg C for 3 days. Measurements of leaf water content, cellular leakage, lipid peroxidation, chlorophyll a fluorescence, and quantum yield showed that cold-acclimatized leaves were less affected by chilling compared to nonacclimatized leaves. Cold-acclimatized leaves recovered faster than nonacclimatized leaves with regard to all variables examined. The catalase and ascorbate peroxidase activities were induced in cold-acclimatized leaves, but not in nonacclimatized leaves. These data indicate that cold acclimatization increased chilling tolerance of cucumber in association with antioxidative enzymes.