

Title On the induction of cold acclimation in carrots (*Daucus carota* L.) and its influence on storage performance

Author Federico Gómez Galindo, Luisa Elias, Vassilis Gekas, Werner B. Herppich, Maggie Smallwood, Marianne Sommarin, Dawn Worrall and Ingegerd Sjöholm

Citation Food Research International, Volume 38, Issue 1, January 2005, Pages 29-36

Keywords Carrots; Cold acclimation; Antifreeze protein; Storage performance

Abstract

We investigated the role of cold acclimation in carrot plants with respect to its influence on the storage performance of the harvested taproots. The induction of cold acclimation was followed in plants cultivated in a growth chamber under strict climate control and in taproots harvested from two separate field cultivations where the plants had been exposed to the natural variations in climate. Under controlled growth conditions, levels of antifreeze protein (AFP) mRNA were used as a marker for cold acclimation in carrot taproot tissue. Expression of this gene was induced by cold in discs excised from harvested taproots and this induction was clearly affected by the growth temperature of the plants from which the taproots were taken. These in vitro data were consistent with those from field-grown plants. In the cell wall of taproots harvested in year 2000, where the intact plants had frequently been exposed to temperatures below 6 °C, a 36 kDa AFP accumulated to higher levels during storage than in the taproots harvested from plants grown in year 2001, where cultivation temperatures had rarely dropped below 6 °C. The taproots from 2001 exhibited poor storage performance as shown by an earlier increase in relative electrolyte leakage and decrease in dry matter compared to taproots harvested in 2000. The capacity of the AFP to accumulate during storage was consistent with a high storage performance.