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Changes in water potential, osmotic potential, and tissue electrolyte leakage during mass loss in carrots stored under different conditions

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Abstract

Mass loss, water potential (ψ), osmotic potential (ψ_{π}) and tissue permeability of carrots (*Daucus carota* L. cv. Eagle) stored for 30 days at 2 °C and 80% relative humidity (RH) (optimal shelf condition (OSC)), 13 °C and 79% RH (common shelf condition (CSC)), or 13 °C and 31% RH (poor shelf condition (PSC)) were monitored. Carrots at PSC lost the most mass followed by those at CSC and OSC. Total water potential (ψ) and osmotic potential (ψ_{π}) of the carrots at CSC and PSC did not change significantly for up to 6 days, but decreased thereafter. No statistically significant change in ψ and ψ_{π} occurred in carrots at OSC. Relative electrolyte leakage (REL) rapidly increased after 12 days at PSC and after 18 days at CSC, at which point mass loss had exceeded 8% of original weight, considered to be a threshold for quality loss. REL of carrots stored at OSC increased only slightly and the mass loss in these carrots did not exceed 8%. Regression analysis showed that mass loss in carrots was consistently associated with REL; changes in ψ and ψ_{π} were associated with mass loss only when carrots were kept at 13 °C. Thus, REL could be a good indicator of mass loss of carrots under a wide range of shelf conditions. The sharp rise in REL at CSC and PSC occurred when the mass loss exceeded 8%. © 2002 Elsevier Science B.V. All rights reserved.

Keywords: Relative electrolyte leakage; Osmotic potential; Shelf life; Water potential; Carrot