

Title Comparative evaluation of the effect of storage temperature fluctuation on modified atmosphere packages of selected fruit and vegetables

Author Kablan Tano, Mathias K. Oulé, Gilles Doyon, Robert W. Lencki and Joseph Arul

Citation Postharvest Biology and Technology, Volume 46, Issue 3, December 2007, Pages 212-221

Keywords Modified atmosphere; Packaging; Temperature fluctuation; Respiration; Permeability

Abstract

Mushrooms (*Agaricus Bisporus* cv. U3 Sylvan 381), broccoli (*Brassica oleracea* L. cv. Acadi) and mature-green tomatoes (*Lycopersicon esculentum* cv. Trust) were packaged in Modified Atmosphere (MA) containers and steady-state atmospheres of 5% O₂–10% CO₂, 3% O₂–8% CO₂, and 5% O₂–5% CO₂ were maintained at 4, 3 and 13 °C, respectively. The packages were then subjected to a sequence of temperature fluctuations ($\Delta T = 10$ °C) during 12, 30 and 35 days for mushrooms, broccoli and tomatoes respectively to simulate storage and transport conditions. Temperature, relative humidity and atmospheric composition were followed throughout storage and quality attributes were evaluated at the end of the storage period. Temperature fluctuations had a major impact on the composition of the package atmospheres and on product quality. CO₂ concentrations increased rapidly, reaching maxima of 16%, 15.5% and 11% for mushrooms, broccoli and tomatoes, respectively. O₂ concentrations decreased to less than 1.5% for the three products. The quality of the products stored under the temperature fluctuating regime was severely affected as indicated by extensive browning, loss of firmness, weight loss increase, the level of ethanol in the plant tissue, and infection due to physiological damage and excessive condensation, compared to products stored at constant temperature. It was clear that temperature fluctuation, even if it should occur only once, can seriously compromise the benefits of modified atmosphere packaging and safety of the packaged produce. Major problems caused by temperature fluctuation must therefore, be addressed to improve the usefulness and reliability of modified atmosphere packaging technology.