

Abstract

The atmospheres obtained in perforated and non-perforated packages differ. Based on gas diffusion characteristics, CO₂ levels are elevated in the perforated packages relative to non-perforated packages for a given level of O₂. A higher level of CO₂ may be expected to improve quality retention by virtue of the inhibitory effect of CO₂ on ethylene action and chlorophyll degradation. Perforated (EPL Perforate films, Oswego, IL) and non-perforated packages composed of low density polyethylene (LDPE) film were used to create modified atmospheres for the storage of broccoli. Half of the broccoli was treated for 24 h at 10°C with 1 ppm 1-MCP. The patterns of O₂ and CO₂ differed markedly between perforated and non-perforated packages. When the package O₂ was regressed against package CO₂, distinctly different trends were apparent for the two package types. The curve fitting the data for non-perforated packages was linear with a negative slope such that for every 4 kPa decrease in O₂, there was 1 kPa increase in CO₂, the curve fitting the data for perforated packages was also linear and negative, but steeper, such that for every 4 kPa decrease in O₂, there was a 4 kPa increase in CO₂. At O₂ partial pressures greater than 3 kPa, broccoli quality was significantly better in the perforated packages than in the non-perforated packages. 1-MCP improved the color retention of broccoli so that the impact of perforations was more obvious for florets not previously treated with 1-MCP.