

Title Quality of fresh-cut apple slices stored in solid and micro-perforated film packages having contrasting O₂ headspace atmospheres

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Abstract

This research explored the quality differences for fresh-cut apple slices packaged in two packaging systems having contrasting steady-state headspace O₂ atmospheres. The first film was a solid multi-layered polyolefin film (SF) which established a steady-state headspace atmosphere of high CO₂ and low O₂. The second was an ultra micro-perforated (MP) film which produces a headspace atmosphere consisting of high CO₂ and high O₂. The resultant fruit quality was assessed in fresh-cut ‘Gala’ apple slices for fruit sourced from the northern hemisphere (NH) (British Columbia, Canada) and southern hemisphere (SH) (Chile). Fruit were washed, sliced and dipped in an anti-browning solution, prior to packaging and storing at 5 °C, for up to 21 d. Package headspace compositions were determined using ethylene, CO₂, and O₂ concentration. Volatile analyses (straight chain esters, branched esters, terpenes, alcohols, estragole, other-volatiles, total-volatiles) were conducted on the headspace for the SH slices by gas chromatography. Quality attributes (soluble solids concentration, titratable acidity, color, and relative juice loss) were assessed at 0, 4, 7, 14, and 21 d. Sensory analysis was conducted on day 14. Ten experienced judges evaluated 5 sensory attributes (fruit aroma, fruitiness-by-mouth, sweetness sourness, hardness) and 1 visual attribute (degree-of-browning); whereas, 20 judges assessed overall preference. Apple slices in the MP packages had less juice loss and higher concentrations of estragole, straight chain esters, total and other-volatiles. MP apple slices had significantly ($p \leq 0.05$) higher fruity aroma, fruitiness-by-mouth, perceived sweetness and better textural characteristics, as perceived by the sensory panel. These superior fruit quality characteristics were attributed to lower ethylene concentrations and high CO₂ and high O₂ levels generated from the MP film.