

**Title** Effects of calcium ascorbate treatments and storage atmosphere on antioxidant activity and quality of fresh-cut apple slices

**Author** Encarna Aguayo, Cecilia Requejo-Jackman, Roger Stanley and Allan Woolf

**Citation** Postharvest Biology and Technology, Volume 57, Issue 1, July 2010, Pages 52-60

**Keywords** Minimally processed; 'Braeburn' slices; AOS; Phenolic compounds; Vitamin C; Ascorbic acid; Low oxygen; FRAP; DPPH

### Abstract

Fresh-cut 'Braeburn' apple slices were dipped in calcium ascorbate (CaAsc; 0, 2, 6, 12 and 20%, w/w) and stored in air or under modified atmosphere (MA) conditions for up to 28 d at 4 °C. Changes in antioxidant levels were measured using free radical scavenging activity (DPPH), reducing activity (FRAP), ascorbic acid content (AA) and polyphenolic content (by HPLC). Changes in browning, sensory quality and microbial counts were measured to indicate eating quality. CaAsc dips increased the initial levels of AA from 0.19 g kg<sup>-1</sup> in the untreated control to 3.8 g kg<sup>-1</sup> for the 20% CaAsc treatment. Ascorbic acid content of treated slices during storage decreased by more than 50% in CaAsc concentrations of 6, 12 and 20%. Similar patterns were observed for FRAP and DPPH activities. Untreated or 2% CaAsc treated slices stored in air or MA showed browning, microbial deterioration and poor sensory quality, thus resulting in a short shelf life (<7 d). However, apples dipped in 6 or 12% CaAsc and stored in MA packaging, or dipped in 20% CaAsc and packaged in air or MA had a shelf life of 21–28 d. Total antioxidant activity in these treatments was provided by both exogenous ascorbic acid and endogenous phenolic compounds; the latter varied in composition, but were relatively stable during storage compared with ascorbate in higher CaAsc concentration treatments. Thus, the antioxidant levels (as measured by FRAP and DPPH) were related to shelf life and it appears that an antioxidant activity remaining above 2 g kg<sup>-1</sup> (DPPH or FRAP) may be a minimum level to achieve long shelf life in 'Braeburn' apple slices.