

**Title** Viscoelasticity, texture and ultrastructure of cut apple as affected by sequential anti-browning and ultraviolet-C light treatments

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### **Abstract**

The aim of this work was to analyze the effect of UV-C radiation (fluence:  $11.2 \text{ kJ/m}^2$ ), with or without an anti-browning pretreatment containing 1% (w/v) ascorbic acid plus 0.1% (w/v) calcium chloride, on the linear viscoelastic properties (oscillatory shear and creep/recovery), instrumental texture (TPA), sensory texture and ultrastructure (ESEM, TEM) of cut apple. Changes in structural features and viscoelastic parameters were mainly evidenced after refrigerated storage. All samples showed a viscoelastic solid behavior with the storage modulus ( $G'$ ) dominating the viscoelastic response. Overall, both dynamic moduli decreased, and instantaneous compliance ( $J_0$ ), decay compliances ( $J_1$  and  $J_2$ ) and fluidity significantly increased after treatments and storage at  $5^\circ\text{C}$ , while retardation times were in general constant. Fracture properties proved to be the most highly correlated with sensory texture. The test panel only significantly differentiated stored untreated apple from the other samples regarding fracturability and juiciness. Mechanical spectra and creep parameters showed ability to evidence ultrastructural differences (rupture of membranes, swelling of cells, alteration of cell walls) in the surface of cut apples subjected to the different treatments.