

Title Effects of temperature and packaging atmosphere on total antioxidants and colour of walnut (*Juglans regia* L.) kernels during storage

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Abstract

The effects of cultivar and storage conditions (time, temperature and O₂ availability) on total phenolics (TP), total antioxidant capacity (TAC) and colour in walnut kernels of three cultivars (Chandler, Hartley and Ioli) were investigated. Harvested walnuts were dried at 36 °C for 24 h, packaged in polyethylene||polyamide pouches flushed with dry air or N₂ or CO₂ and stored at 1 °C or 20 °C for up to 12 mo. Before storage, dried kernels exhibited the highest values of L^* , h° and whiteness index (WI) colour parameters, as well as the highest TP content and TAC assessed either with FRAP or DPPH assays. Chandler and Hartley exhibited much higher antioxidant levels than Ioli during the whole experiment, while Ioli exhibited the highest h° at least before storage. During storage, browning (decreases in L^* , h° , WI) and antioxidant losses were observed by advanced time. After 12 mo, the greatest losses of TP, FRAP and DPPH in all studied cultivars were observed in kernels stored at 20 °C under air, and averaged approximately 48%, 38% and 40%, respectively. Low temperature and packaging under N₂ or CO₂ prevented additively both antioxidant losses and browning. Pairwise correlation and Principal Component Analyses revealed strong relationships among TP, FRAP and DPPH values, as well as, between TP and colour parameters (L^* , h° and WI). These relationships indicated that the decreases in antioxidants of stored walnut kernels are responsible not only for the nutritional loss, but also for the quality deterioration in relation to consumer visual perception.