Title Variation in water, osmotic and turgor potential in peel of 'Marsh' grapefruit during development of postharvest peel pitting

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Abstract

Postharvest peel pitting at non-chilling temperatures is a physiological disorder that affects fruit of several citrus cultivars worldwide. Although causes of the disorder are not fully understood, evidence indicates that altered water relations in fruit peel is a major factor inducing peel pitting during postharvest storage. In this work, the effect of commercial packingline and manual processing and subsequent storage under low and high RH regimes on water, osmotic and turgor potentials in three layers of 'Marsh' grapefruit peel (flavedo and internal and external albedo) was investigated. At the end of the storage period at 45% RH, peel water potential was lower in fruit processed on a commercial packingline compared to those processed manually. Transfer of dehydrated fruit to 95% RH increased water potential of flavedo at the expense of albedo cell layers, which underwent subsequent water loss. Water potential of flavedo in packingline-processed fruit did not recover by transferring to high RH. Osmotic potential in peel tissues did not change as significantly as water potential. As a consequence, turgor pressure decreased in all three peel tissues of fruit stored at 45% RH, this decrease being more pronounced in packingline-processed fruit. In manually wax-coated fruit stored at 45% RH, transfer to 95% RH induced a recovery of turgor potential. In contrast, turgor pressure did not recover in packingline-processed fruit similarly treated, and severe peel pitting developed. The results suggest that the inability to properly carry out water adjustments after prolonged water stress leads to cell collapse and peel damage. Together, the data link alterations in water, osmotic and turgor potential in flavedo and albedo with the induction of postharvest peel pitting in citrus fruit.