

Title Dynamics of ascorbic acid in 'Braeburn' and 'Gala' apples during on-tree development and storage in atmospheres conducive to internal browning development

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Abstract

The underlying causes as well as chemical and biochemical alleviation for CO₂-induced browning in apple fruit are poorly understood. Ascorbic acid (AsA) dynamics in 'Braeburn,' a susceptible cultivar, and 'Gala', a resistant cultivar, were evaluated during on-tree development and storage at 0.5 °C in air or controlled atmospheres (CA) containing 1 kPa O₂ and 1, 3 or 5 kPa CO₂. 'Braeburn' fruit treated with diphenylamine (DPA) was also stored for 1 month to determine effects on browning incidence and AsA concentration. 'Braeburn' apples had significantly higher ($p \leq 0.05$) AsA levels than 'Gala' during on-tree development, and storage. No correlation between AsA and maturity/ripening indices for 'Braeburn' or 'Gala' was apparent. Histochemical localization of fruit AsA showed a staining intensity consistent with the quantity analytically determined, and showed that AsA is diffusely distributed throughout the cortex in both cultivars during on-tree development. During storage, AsA was localized to the periphery of brown tissue in 'Braeburn' and to the coreline and cortex proximal to the peel in 'Braeburn' and 'Gala' tissues. DPA decreased browning development during storage, however, no correlation between DPA treatment and AsA quantity in healthy or brown cortex tissue was observed. The results indicate AsA quantity alone is not an indicator of CO₂ sensitivity in these two cultivars.