

Abstract:

'Starking' and 'Ralls' apples (*Malus ×-domestica*), harvested at different times and treated with diphenylamine (DPA) were used to study the changes of α -farnesene, conjugated trienes (CTs), the ratio of α -farnesene to CTs (RFC), and the relationships between RFC and scald development during cold storage. For late-harvested apples of both cultivars, the time of scald development and severity was delayed, and accumulation of α -farnesene increased. Accumulation of CTs in early- and late-harvested 'Starking' apples was similar, but markedly increased in 'Ralls' apples after 15 weeks of storage. α -Farnesene was delayed and CTs decreased in apples treated with DPA (2.0 g*L⁻¹). DPA-treated apples did not develop scald while 86% of control apples did after 35 weeks of storage. It was shown that CT concentrations were not always correlated positively with scald development, whereas RFC values were strongly correlated with scald. RFC values of late-picked apples were much higher than those of early-harvested fruit. DPA inhibited α -farnesene oxidation and gave much higher RFC values during apple storage. Oxidation of α -farnesene increased linearly with the rapid decline of RFC values, which corresponded to the changes in antioxidant activity. Superficial scald developed with the accumulations of CTs and when the RFC value declined to about 10. After several years of study, it was shown that the relationship between scald development and RFC values fitted the equation $y = -5.76 + 173.71/x$ ($R^2 = 0.93$) for 'Starking' apples, and $y = 133.34 - 17.04x + 0.57x^2$ ($R^2 = 0.94$) for 'Ralls' apples. RFC may be a reliable and an easy predictor of scald development on apples during storage.