

Title Possible mechanisms of warming effects for amelioration of superficial scald development on 'Fuji' apples

Author Xingang Lu, Shunfeng Li, Xiaojiao Wang and Lihua Zhang

Citation Postharvest Biology and Technology, Volume 62, Issue 1, October 2011, Pages 43–49

Keywords Superficial scald; Warming treatment; Ethylene; Antioxidant; Conjugated trienols

Abstract

Warming of fruit during storage has been shown to decrease scald development, but the mechanisms involved in this effect are poorly understood. The effects of a single warming of 5 days at 20 °C after 2, 4, 6 and 8 weeks storage at 0 °C on development of superficial scald of 'Fuji' apples in relation to ethylene, α -farnesene and conjugated trienol (CTol) concentrations have been studied. Malondialdehyde (MDA) and hydrogen peroxide (H_2O_2) concentrations, catalase (CAT) and peroxidase (POX) activities, total phenolic contents and total antioxidant activity were measured in order to assess the effects of the treatments on membrane damage and oxidant and antioxidant activity. Warming after 4 weeks storage reduced scald to the lowest level among all treatments. Warming greatly stimulated internal ethylene concentrations (IECs) and in turn, increased α -farnesene and CTol accumulation. Scald resistance, indicated by CAT and POX activities, total phenolic contents and total antioxidant activity, was higher in fruit in early than in late storage. The warming treatment after 4 weeks of storage resulted in higher concentrations of CTols and H_2O_2 , as well as MDA, compared with the control fruit when kept at 20 °C after 6 and 12 weeks of storage, but lower than after 20 and 28 weeks. These results suggest that warming could inhibit scald development by modifying CTol accumulation as well as by affecting generation of accompanying active oxygen species (AOS), and reducing oxidative damage. These changes may cause a shift from a scald-sensitive metabolism to a resistant stage during storage.