

Title Superficial scald susceptibility and α -farnesene metabolism in 'Bartlett' pears grown in California and Washington

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Abstract

Bartlett' pears grown in northern California (CA) consistently show development of the physiological storage disorder superficial scald, particularly after prolonged storage of 4–5 months in air. In contrast, fruit of this cultivar grown in central Washington (WA) are typically less susceptible to scald, exhibiting mild or no symptoms. Conjugated triene (CT) oxidation products of the sesquiterpene α -farnesene are thought to play a key role in scald induction in apples and pears. This study compared accumulation of α -farnesene and its CT products in peel tissue of CA- and WA-grown 'Bartlett' pears during air storage at -1 °C in relation to scald development after transfer to 20 °C. Pears were harvested from commercial orchards in 2006 and 2007 and stored under nearly identical conditions for up to 24 weeks. Peel tissue samples taken at harvest and at 2–4-week interval during storage were analyzed by HPLC to determine concentrations of α -farnesene and CTs. Measurements of flesh firmness, respiration, and ethylene production were also made at harvest and/or from 1 to 8 d after removal from storage to 20 °C. WA fruit from the second harvest in 2006 developed light superficial scald after 20 weeks of cold storage plus 5 d at 20 °C; all others were scald-free. By contrast, all CA fruit from both seasons showed light scald after 12–14 weeks, and moderate scald after 20–24 weeks, plus shelf life. Correspondingly, α -farnesene and CTs accumulated more rapidly and on average reached about twofold higher concentrations in CA compared with WA fruit over the first 8–12 weeks of storage. CA fruit also had an earlier rise in ethylene production, higher respiratory rates, and lower flesh firmness at harvest than WA fruit. These suggest advanced maturity, which may have contributed to the increased rates of α -farnesene synthesis and oxidation, and higher incidence of scald.