Title α-Farnesene, conjugated trienols, and superficial scald in 'Rocha' pear as affected by 1-methylcyclopropene and diphenylamine

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Abstract

Diphenylamine (DPA) has been used for decades to prevent superficial scald, but the presence of DPA residues and the need for safer fruit warrant the search for alternative strategies to control superficial scald. The effect of DPA and 1-methylcyclopropene (1-MCP) on the levels of α-farnesene and conjugated trienols was examined in 'Rocha' pear in relation to the development of superficial scald. Fruit were harvested at three maturity stages and stored at 0 °C in air or in 2.5 kPa O_2 + 0.7 kPa CO_2. At 0.5 and 1.0 μl l^{-1}, 1-MCP strongly reduced α-farnesene and conjugated trienols accumulation during storage. α-Farnesene levels in fruit treated with 1-MCP at 0.1 μl l^{-1} did not significantly differ from those in untreated controls in fruit from the early and normal harvest dates, but were lower in late harvested fruit. At 0.1 μl l^{-1}, 1-MCP reduced the levels of conjugated trienols in comparison with untreated controls, but the effect was not as pronounced as with 0.5 or 1.0 μl l^{-1} of 1-MCP. α-Farnesene levels in fruit treated with DPA were similar to or higher than those in untreated controls throughout the storage period, but the conjugated trienols resulting from the oxidation of α-farnesene were reduced by DPA treatment. 1-MCP was very effective in reducing scald. 1-MCP at 0.1 μl l^{-1} was as effective as DPA in reducing scald, and had no effect on fruit ripening after a 4-month storage period. At 0.5 or 1.0 μl l^{-1}, 1-MCP nearly eliminated superficial scald and also delayed post-storage ripening. We conclude that 1-MCP can be used to replace DPA as a postharvest treatment to control scald in 'Rocha' pear, although ripening after storage is delayed by relatively high concentrations.