Postharvest physiology, storage quality and physiological disorders of 'Gem' pear (*Pyrus communis* L.) treated with 1-methylcyclopropene

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Abstract

'Gem' is a crisp, juicy European pear (*Pyrus communis* L.) that can be consumed immediately at harvest or directly from cold storage. Alternatively, 'Gem' pears can ripen (5 d of 20 °C) to a soft, buttery, juicy texture once fruit accumulate 30 to 60 d of low temperature chill. In either condition, 'Gem' has a relatively short postharvest storage life of 5 months in regular air (RA). The purpose of this work was to evaluate two concentrations of 1-methylcyclopropene (1-MCP), 0.15 and 0.3 μL L^{-1}, to maintain crisp, juicy textural properties and extend the postharvest storage life of 'Gem'. Fruit were treated with 1-MCP, held in −1.1 °C RA and evaluated monthly (+1 d at 20 °C) for 7 months. Only minor differences were observed between 0.15 and 0.3 μL L^{-1} 1-MCP for any of the response factors assessed. The respiration (Rs) and ethylene production rates of non-treated fruit increased ~2- and 30-fold, respectively, between 2 and 7 months. Fruit firmness (FF), peel chlorophyll content (I_{AD}), and titratable acidity (TA) all decreased linearly over the 7-month storage period. Treatment with 1-MCP completely inhibited internal ethylene production for the first four months. Ethylene production increased linearly between 5 and 7 months to a maximum value ~15% of non-treated fruit. 1-MCP similarly suppressed Rs. FF, I_{AD}, and TA were all significantly higher for 1-MCP-treated fruit than non-treated fruit. 1-MCP maintained the crisp and juicy textural properties of non-ripened fruit throughout the entire 7-month experiment by inhibiting ripening, despite a five-day 20 °C ripening treatment. In contrast, non-treated 'Gem' ripened after 2 months; however, the eating quality of non-treated fruit decreased after 5 months. Poor eating quality was associated with mealiness and insufficient softening after ripening. Internal browning and scald were first observed in non-treated fruit following five months of RA and reached levels of 26% and 85%, respectively, after seven months. The development of scald

was closely associated with the accumulation of α-farnesene and conjugated trienols (CTols) in the fruit skin. 1-MCP significantly reduced the incidence of internal browning and completely inhibited the development of scald. Overall, 0.15 μL L^{-1} 1-MCP maintained texture and fruit quality for 7 months RA and reduced the incidence of physiological disorders.