

**Title** Interactive effects of CA storage, 1-methylcyclopropene and methyl jasmonate on quality of apple fruit

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### Abstract

The present study evaluated how post-harvest treatments with 1-methylcyclopropene (1-MCP) or methyl jasmonate (MJ) impact 'Fuji' and 'Braeburn' apple fruit tolerance to controlled atmosphere (CA) storage conditions. Fruit harvested from a commercial orchard in north central Washington were cooled to 0.5°C within 36 h of harvest and then stored in air or CA with 2 kPa O<sub>2</sub> + 0.05 kPa CO<sub>2</sub>; 0.25 kPa O<sub>2</sub> + 0.05 kPa CO<sub>2</sub> or 2 kPa O<sub>2</sub> + 3 kPa CO<sub>2</sub> for up to 6 months. Fruit were treated with 2 mM MJ or 1 µl·L<sup>-1</sup> 1-MCP at harvest. Both CA conditions and 1-MCP treatment reduced ethylene production, improved maintenance of firmness and titratable acidity and reduced incidence of core flush during long-term storage compared with untreated fruit stored in air. Treatment with 1-MCP was as or more effective than low CO<sub>2</sub>-CA storage for reducing ethylene production and preservation of firmness and acidity for both cultivars. 'Fuji' apples stored in 3 kPa CO<sub>2</sub> developed internal browning (CO<sub>2</sub>-injury) while fruit stored in 0.25 kPa O<sub>2</sub> with 0.05 kPa CO<sub>2</sub> or air did not, regardless of 1-MCP treatment. 'Braeburn' apples also developed internal browning during air- or CA-storage, regardless of CO<sub>2</sub> concentration. Severity of browning in 'Fuji' and 'Braeburn' apples stored in 3 kPa CO<sub>2</sub> was not altered by previous 1-MCP treatment. However, browning severity increased by the 1-MCP treatment when 'Braeburn' fruit were stored in air or low CO<sub>2</sub> CA. Treatment with MJ reduced severity of CO<sub>2</sub>-injury in fruit of both cultivars stored in high CO<sub>2</sub> CA. The treatment with 1-MCP and storage in air or CA with 2 kPa O<sub>2</sub> and low (≤0.05 kPa) CO<sub>2</sub> may be a practical strategy for maximum retention of firmness and acidity with minimum development of CO<sub>2</sub>-injury in susceptible cultivars.