

**Title** Inhibition of pear fruit ripening by 1-methylcyclopropene and recovery of ripening capacity

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### **Abstract**

Preharvest and postharvest treatments of 1-MCP were studied in California 'Bartlett' pears. Preharvest applications of 1-methylcyclopropene (1-MCP) were tested at rates ranging from 0 to 100 mg/L in 2006 and 2007. Premature fruit drop, maturity, ripening-associated changes, and physiological disorders were studied in fruit harvested 7 to 21d after application and either ripened at 20°C immediately after harvest or after 3.5 to 6 m storage at -1°C. Overall, 1-MCP reduced the incidence of premature fruit drop when compared with the untreated fruit, but to a lesser extent than 1-naphthaleneacetic acid (NAA). 1-MCP had a stronger effect on retarding ripening-associated changes, including softening than on changes in fruit maturation on the tree (loss of firmness). 1-MCP's effect on ripening was lost if fruit remained on the tree for longer than 14 d after application or after 3.5 m cold storage, regardless of treatment concentration. Shorter storage times were not evaluated. A reduction of superficial and senescent scald and especially internal breakdown incidence after cold storage was observed in fruit treated with 1-MCP.

The other component of the project involved using 1-MCP postharvest. Pears were treated with 0.3  $\mu$ L L<sup>-1</sup> 1-MCP for 12 h at 20°C immediately after harvest in two seasons and to pear fruit of four maturities. 1-MCP decreased rates of softening, ethylene production, respiration, and yellow color development, and reduced incidence of scald and internal breakdown. Ripening recovery induced by cold storage of 1-MCP treated fruit depended on maturity and season and was associated with stimulated ethylene production, including 1-aminocyclopropene carboxylic acid synthase (ACS) activity, 1-aminocyclopropene carboxylic acid oxidase (ACO) activity, and transcript levels of genes associated with these enzymes.