

Title Effects of 1-methylcyclopropene and heat treatments on ripening and postharvest decay in 'Golden Delicious' apples.

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Abstract

Prestorage heat, CA storage, and pre- and poststorage treatments with the ethylene action inhibitor, 1-methylcyclopropene (MCP), were tested for their efficacy at inhibiting fungal decay and maintaining quality in 'Golden Delicious' apples [*Malus sylvestris* (L.) Mill. Yellow Delicious Group] stored 0 to 5 months at 0 deg C and 7 days at 20 deg C. Before storage in air at 0 deg C, preclimacteric fruit were treated with either MCP at a concentration of 1 micro L.L-1 for 17 hours at 20 deg C, 38 deg C air for 4 days, MCP plus heat, or left untreated. Some sets of untreated fruit were stored in a controlled atmosphere of 1.5 kPa O₂ and 2.5 kPa CO₂ at 0 deg C while other sets were removed from cold storage in air after 2.5 or 5 months, warmed to 20 deg C, and treated with 1 micro L.L-1 MCP for 17 hours. Prestorage MCP, heat, MCP plus heat treatments and CA storage decreased decay severity caused by wound-inoculated *Penicillium expansum* Link, *Botrytis cinerea* Pers.:Fr., and *Colletotrichum acutatum* Simmonds (teleomorph *Glomerella acutata* J.C. Guerber & J.C. Correll sp. nov.). Poststorage MCP treatment had no effect on decay severity. Both prestorage MCP treatment and CA storage delayed ripening as indicated by better retention of green peel color, titratable acidity, and Magness-Taylor flesh firmness, and the reduced respiration, ethylene production rates, and volatile levels that were observed upon transferring the fruit to 20 deg C. The prestorage MCP treatment delayed ripening more than CA storage. Following 5 months cold storage, the prestorage MCP treatment maintained the shape of the compression force/deformation curve compared with that of fruit at harvest, as did CA storage, but at a lower force profile. The heat treatment had mixed effects on ripening: it hastened loss of green peel color and titratable acidity, but maintained firmness and delayed increases in respiration, ethylene production and volatile levels following cold storage. The MCP plus heat treatment inhibited ripening more than heat treatment alone but less than MCP treatment alone. In one of 2 years, the MCP plus heat treatment resulted in superficial injury to some of the fruit. Results indicated that MCP may provide an effective alternative to CA for reducing decay severity and maintaining quality during postharvest storage of 'Golden Delicious' apples. Prestorage heat to control decay and maintain quality of apples needs further study, especially if used in combination with MCP.