

**Title** 1-methylcyclopropene (1-MCP) affects physiological disorders in 'Granny Smith' apples depending on maturity stage

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### Abstract

'Granny Smith' apples (*Malus domestica* Borkh.) are very susceptible to various physiological disorders, superficial scald being the most important. Application of 1-methylcyclopropene (1-MCP) to 'Granny Smith' apples may extend storage life by reducing storage scald, loss of firmness and acidity. However, other skin disorders may be enhanced by 1-MCP. The effect of 1-MCP on the incidence of disorder development and ripening during storage and subsequent shelf life was investigated in 'Granny Smith' apples from different maturity stages (38, 42 and 52% starch degradation). Fruits were exposed to 0 (control) and 0.6  $\mu\text{l}\cdot\text{L}^{-1}$  1-MCP at 1°C during 24 hours. The fruit was evaluated after 120, 180, 210 and 240 days in regular air at 0.5°C, upon removal from storage and after 7 and 14 days at 20°C. Application of 0.6  $\mu\text{l}\cdot\text{L}^{-1}$  1-MCP effectively delayed the ripening rate of the fruit harvested at different times, as indicated by better retention of firmness and titratable acidity. 1-MCP treatment significantly reduced superficial scald. Treated fruit developed scald after 240 days of cold storage, while controls developed scald after 120 days. Core flush incidence was also reduced by 1-MCP treatment, even in the fruit from the latest harvest (52% starch degradation), which was the most affected by this disorder. There was fruit affected by physiological disorders related to calcium deficit, such as bitter pit and lenticel blotch in every evaluation. In early-harvested fruit (38% starch degradation), 1-MCP treated fruit developed less bitter pit and more lenticel blotch, but the incidence of both disorders combined was higher in 1-MCP treated fruit than in control fruit. No significant differences between treatments were detected in optimum- (42% starch degradation) and late-harvested fruit. We conclude that the effect of 1-MCP on different physiological disorders differs with fruit maturity stage. Calcium-related disorders were enhanced in early harvested fruit, especially in the 1-MCP treated fruit and as the length of storage increased.