

**Title** Suppression of ethylene perception after exposure to cooling conditions delays the progress of softening in 'Hayward' kiwifruit

**Author** Natalia Ilina, Hubert J. Alem, Eduardo A. Pagano and Gabriel O. Sozzi

**Citation** Postharvest Biology and Technology, Volume 55, Issue 3, March 2010, Pages 160-168

**Keywords** *Actinidia deliciosa*; 1-Methylcyclopropene; Cold storage; Ethylene; Firmness; 1-Aminocyclopropane-1-carboxylic acid synthase and oxidase gene expression

### Abstract

To investigate the physiological effect of ethylene and 1-methylcyclopropene (1-MCP) in the progress of 'Hayward' kiwifruit softening, fruit were treated with ethylene or 1-MCP right after harvest, or with 1-MCP at different ripening stages after 40, 80 or 120 d of cold (0 °C) storage. Treatment with ethylene right after harvest stimulated flesh softening, increased and advanced the ethylene production peak and the expression of the genes *KWACSI* and *KWACOI* involved in ethylene biosynthesis. In contrast, treatment with 1-MCP at the same stage markedly retarded softening, and inhibited ethylene production. Ripening-related increases in *KWACSI* and *KWACOI* transcript abundance were largely blocked by 1-MCP treatment thus indicating that these genes are positively regulated by ethylene. Nevertheless, ethylene and 1-MCP effect was highly dependent on the growing region that may influence kiwifruit constitution, quality, storage potential and subsequent responsiveness to postharvest technologies. Kiwifruit stored for 40, 80 or 120 d of cold storage and then treated with 1-MCP before rewarming to 20 °C for further ripening displayed a reduced flesh softening rate and an extended 'eating ripe' stage. These results clearly indicate that the application of 1-MCP can play a significant role in both the initiation and progress of the kiwifruit softening process. 1-MCP inhibited or severely decreased autocatalytic ethylene production at every ripening stage. *KWACSI* and *KWACOI* gene transcription was inhibited by 1-MCP treatment after 40 and 80 d of cold storage thus suggesting that there is a positive feedback regulation for ethylene production even after cold storage. In contrast, *KWACS2* transcript levels did not show a clear response to 1-MCP in every experiment. This work provides evidence that kiwifruit softening can be delayed by inhibiting ethylene perception, even when fruit have reached advanced stages of ripening. These findings point to the commercial usefulness of 1-MCP in 'Hayward' kiwifruit postharvest conservation and consumer acceptance.