

Title Managing physiological processes in fruits and vegetables with inhibitors of ethylene biosynthesis and perception

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Abstract

The role of ethylene in managing pre- and post-harvest ripening processes has been widely exploited by horticultural industries. The beneficial roles of ethylene are used when color development, uniform and/or enhanced ripening are desired, whereas its detrimental effects have been reduced by avoidance, ventilation and other handling and storage strategies. Understanding of the ethylene biosynthetic pathway and ethylene perception has led to exciting development of new tools for many fruit and vegetable crops. These tools include: aminoethoxyvinylglycine (AVG), known commercially as ReTain, for preharvest use; and 1-methylcyclopropene (1-MCP) known commercially as Ethylbloc and SmartFresh for postharvest use, and Harvista and Invinsa for preharvest use. 1-MCP has provided an especially valuable postharvest tool to understand the effects of ethylene on many physiological processes that affect product quality, including those that affect pigment development, softening, flavor, aroma and nutrition, as well as physiological and pathological disorders. Managing these processes can be difficult for many products, especially those requiring a delay rather than an inhibition of ripening. However, the apple has been an excellent candidate for 1-MCP use because, in general, premium quality in the market is close to that perceived at harvest. 1-MCP also has effects on many physiological disorders; the susceptibility of many horticultural products to various disorders can be increased or decreased by inhibition of ethylene production. The impact of these effects has been significant for several crops including the apple and results of 1-MCP on senescent breakdown, superficial scald, carbon dioxide injury, and chilling related disorders show that these effects are directly related to whether ethylene production inhibits or enhances the disorder.