

Title Postharvest ripening regulation and innovation in storage technology

Author C.B. Watkins

Citation ISHS Acta Horticulturae 796:51-58. 2008.

Keywords controlled atmosphere; chlorophyll fluorescence; dynamic controlled atmosphere; 1-methylcyclopropene; quality; HarvestWatchTM

Abstract

Two postharvest technologies have become available to researchers and storage industries in the last decade. The first of these is dynamic controlled atmosphere (DCA) storage in which stress-associated metabolic responses of fresh produce to low O₂ levels is detected and the storage atmosphere can then be adjusted to relieve this stress. Using DCA it is possible to maintain O₂ at lower levels and better maintain product quality compared with 'safer' atmospheres necessary for standard or ultra low O₂ CA. The technology based on chlorophyll fluorescence measurement of stress has been patented and commercialized as HarvestWatchTM. The second technology based on 1-methylcyclopropene (1-MCP), an inhibitor of ethylene perception, has been commercialized as SmartFreshTM for use on fruit and vegetables. Most research on the commercial application of DCA and 1-MCP is available for apples. In this paper, the application requirements of these two technologies, and the effects of each on product quality, are compared. In contrast to 1-MCP, DCA is a non-chemical treatment that meets requirements for organic produce or when postharvest chemical use is not permitted. However, DCA storage requires highly airtight CA rooms and electronic atmosphere control, and is less flexible than 1-MCP, which can be applied in rooms, tents and containers. DCA- and 1-MCP-based technologies slow softening, including during shelf life periods, resulting in better quality produce for the consumer and both technologies inhibit development of superficial scald. However, the degree of effectiveness on softening and scald control by DCA and 1-MCP is affected by cultivar. DCA and 1-MCP can decrease the incidence of other storage disorders, but an increased risk of CO₂ injury and flesh browning has been noted in some apple cultivars when treated with 1-MCP. Application of either technology is likely to be region-specific, based on available infrastructure and market demands. More research is required to fully evaluate the strengths and weaknesses of each technology.