

Title Innovation in controlled atmosphere technology

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Abstract

Purpose of review: Controlled atmosphere (CA) technology has been adopted worldwide as a sustainable postharvest technology which is not damaging to the environment and presents no risk to humans. This review offers guidance on the latest developments in CA technology which have been adopted or are likely to influence the future use of CA technology.

Findings: The goal of having a dynamic CA environment which is controlled by the stored product has been achieved with the discovery and development of a chlorophyll fluorescence-based technology. The rapid adoption of 1-methylcyclopropene (1-MCP) as a postharvest chemical is likely to change the role of CA. CA will remain the pre-eminent choice for storage of 'organic' fruits and vegetables but for 'non-organic' products, a combination of 1-MCP and CA is more likely. There are interesting results from CA research on humidity, decay control with organic volatiles, hyperbaric storage and 'novel' gases such as nitric and nitrous oxide. The combination of CA with one or more complimentary techniques, although challenging, has been attempted with some promising results.

Limitations/implications: Adoption of chlorophyll fluorescence is limited to plant organs that contain chlorophyll. 1-MCP can have no effect or a negative influence on some commodities. There may be benefits demonstrated with humidity control, use of organic volatiles, hyperbaric storage and 'novel' gases, but adoption may not occur due to limited benefit and unacceptable risks or costs.

Directions for future research: In the developed world, the increased consumption of 'organic' foods provides an incentive for future research and development of CA. Dynamic CA, either with chlorophyll fluorescence or with another approach, will attract research. Combining CA with complementary strategies, e.g. decay or humidity control, delayed CA, high temperature CA, 1-MCP and other 1-cyclopropenes, is another promising research direction. Research on the

role of cytoplasmic acidosis in senescence and how it is affected by CA will yield useful wide-ranging information.