

Title Effect of high oxygen atmospheres on quality of fruits and vegetables
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Abstract

Purpose of the review: This article addresses the use of high oxygen atmospheres (HOA) and high oxygen modified atmosphere packaging (HOMAP) storage for the preservation and maintenance of the postharvest quality of intact and fresh-cut fruits and vegetables. There have been significant technological advances during recent years, especially in improving the sensory and microbial quality and shelf-life of fresh-cut produce as well as inhibiting fruit decay in soft fruits. This review focuses on HOA and HOMAP technologies that have recently been published.

Main findings: Under HOA and HOMAP conditions, enzymatic browning and microbial growth on intact and fresh-cut produce are significantly inhibited. In addition, fruit firmness is maintained and antioxidant levels and antioxidant capacity are increased in certain crops in response to superatmospheric oxygen treatment. Therefore, HOA and HOMAP are helpful in maintaining the sensorial, nutritional and microbial quality of many intact and fresh-cut fruits and vegetables.

Limitations: HOAs (60-100 kPa O₂) could be difficult to maintain either in a package or on a commercial scale, as well as being dangerous due to its flammability and toxicity.

Directions for future research: More research is still needed to determine the mechanisms by which superatmospheric O₂ exerts its effects. Further research is required to clarify the effects of high O₂ on odour, flavour and sensory properties of fruits and vegetables. The effects of high O₂ levels alone and in combination with elevated CO₂ levels on antioxidant status, disease resistance and the development of physiological disorders merit further investigation. The interaction between high O₂ and ethylene, and their effects on the quality of fresh produce require further study. The influence of elevated O₂ levels on the sensitivity of tissues to chilling temperatures and other stresses warrant further research. The optimum concentration and duration of high O₂ treatment without inducing off-flavour or other adverse responses need to be determined for each individual commodity and condition. For HOMAP,

proper packaging materials with adequate permeabilities need to be selected in order to obtain maximum benefits.