Title Maintaining quality with CA and MAP

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Abstract

Modification of the oxygen and carbon dioxide partial pressures in the atmospheres can alter the physiology of harvested fruits and vegetables in a desirable manner resulting in an improvement in quality maintenance relative to air storage. Oxygen and carbon dioxide have differing physiological activities. The primary desired physiological responses to low oxygen are inhibition of ethylene action and suppression of oxidative reactions associated with tissue browning. The suppression of global metabolic activity through respiratory inhibition may be beneficial for some tissues, but this has not been clearly demonstrated except under hypobaric conditions. The primary desired physiological responses to elevated carbon dioxide are decay suppression and inhibition of ethylene action. The determination whether oxygen and/or carbon dioxide modification is appropriate is dependent on the biology of the harvested plant organ and those components of physiology and pathology that comprise biological limiting factors. For example, the role of ethylene in the developmental processes such as ripening and senescence following harvest is clearly important for some commodities, making reduced oxygen and elevated carbon dioxide appropriate choices for quality maintenance. However, ethylene has little to no role in the development and decline of most harvested plant materials and low oxygen provides relatively little benefit. Further, the potential of either oxygen or carbon dioxide to damage plant tissues must be recognized. Thus, desirable or optimal gas concentrations can exist in a fairly narrow range. Atmosphere modification is accomplished primarily via controlled atmosphere (CA) storage and modified atmosphere packaging (MAP). Atmospheres are applied with great precision and accuracy in CA storage using an array of technologies that include nitrogen generators, ethylene and carbon dioxide scrubbers, computer sense-and-respond systems, and dynamic control systems. MAP employs a wide-range of films and film-perforation styles to achieve target atmospheres for the products enclosed in the packages. Mathematical models have been developed to predict the behavior of the product, the package film, and the environment as they affect the package atmosphere.