Symposium Papers and Authors

Presiding: G.D. Blanpied

Introduction to the Symposium

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Shortly after the turn of the century, mechanical refrigeration was incorporated into the fresh produce marketing chain in industrialized countries to reduce losses that occurred when fresh fruits and vegetables glutted the market at harvest time. Forty years later, controlled atmosphere (CA) storage was put into commercial practice to lengthen further the marketing period for the expanding apple crops in Western Europe and North America. Later, CA technology was applied to other fruit and vegetable crops. Today, many producers of fresh produce again are faced with the problems associated with large crops. They turned to postharvest horticulturists for the technology needed to lengthen the marketing periods so that their products can be sold at a profit. Much research has been, and will continue to be, conducted to improve the condition of commodities held in CA storage for prolonged periods of time.

This symposium was organized to focus attention on current knowledge of factors that influence commodity responses to CA storage. The six papers are loosely organized into three groups of factors: prestorage factors; natural and artificial barriers to gas exchange between the internal and external environment; and factors of the storage environment—oxygen, carbon dioxide, ethylene, water vapor, and temperature.

In the past, the storage atmospheres and temperatures were tailored to meet the requirements of a specific cultivar grown in a specific region. Today, and, to a greater extent tomorrow, the mineral content, growing season temperatures, maturity, and handling practices will be integrated to determine which of several alternative storage regimes will be used. The first paper, by R.O. Sharples and D. Johnson, articulates this facet of CA storage management.

Yesterday and today we have been satisfied with controlling the oxygen, carbon dioxide, water vapor, and ethylene in the atmosphere surrounding the product, but the composition of gases in the intercellular spaces of fruits and vegetables is not the same as the composition of the gases in the atmosphere surrounding the product because fruits and vegetables are covered with a waxy skin, which is a barrier to gas diffusion. Two recent developments—CA storage at very low oxygen concentrations and artificial skin coatings and films—have stimulated our interest in describing the characteristics of the natural barriers to gas diffusion. The second paper, by T. Solomos, discusses the characteristics of these natural barriers to gas diffusion; the following two papers, by S.M. Smith et al. and S. Ben-Yehoshua, discuss artificial skin coatings and films to control the atmosphere inside harvested fruits and vegetables, where senescence and other forms of spoiling occur.

In the past, CA experiments were frequently quite simple because the number of experimental combinations of oxygen, carbon dioxide, ethylene, etc., was limited by the number of hours each day the researcher was willing to commit for gas analysis and control. Modern technology has taken much of the drudgery out of CA research and has greatly increased the number of CA chambers a researcher can easily manage. The increased number of CA treatments has revealed that some CA injuries are caused by interactions of oxygen, carbon dioxide, and temperature, and may be ameliorated or controlled by small changes in the storage environment. This aspect of CA is discussed in the final two papers by C.R. Little and E.C. Lougheed.