

Fruit Manufacturing: Scientific Basis, Engineering Properties, And Deteriorative Reactions Of Techno

CHAPTER

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Minimal Processing of Fresh Fruit, Vegetables, and Juices

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31.1 INTRODUCTION

There is an increase in fresh fruit and vegetable consumption around the world that is mainly motivated by the recommendations made by different organizations, such as the World Health Organization, the Food and Agricultural Organization, the US Department of Agriculture, and the European Food and Safety Authority, etc., because of their healthy properties (Allende et al., 2006; Warriner et al., 2009). Fruits and vegetables are important sources of a wide range of vital micronutrients, phytochemicals (e.g., anthocyanins and other phenolic compounds), and fiber of great importance from the human nutritional point of view (Tomatis-Barberan and Gil, 2008). In fact, human nutritional research has increasingly shown that a well-balanced diet that is rich in fruits and vegetables promotes good health, may reduce the risk of certain diseases, and protects against cancers and chronic illnesses (Meng and Doyle, 2002; CAC, 2010). Advances in agronomic handling, processing, preservation, distribution, and marketing technologies have enabled the produce industry to supply nearly all types of high quality fresh fruits and vegetables to those who desire and are willing to purchase them year-round. This also allows the agri-food industry to provide consumers with new and a more differentiated food product assortment (Gil and Allende, 2012). However, despite the benefits derived from eating raw fruits and vegetables, safety is still an issue of concern (Lynch et al., 2009). In the European Union (EU), in 2009 and 2010, respectively, 4.4% and 10% of foodborne verified outbreaks were linked to the consumption of vegetables, fruits, berries, juices, and the products thereof (EFSA, 2013).

Minimally processed fresh fruit and vegetables (MPFVs) are commonly defined as any fruit and vegetable that has been subjected to different processing steps (e.g., peeling, trimming, cutting, washing, disinfection, rinsing, etc.) to obtain a fully edible product while providing convenience and functionality to consumers and ensuring food safety. These commodities contain exclusively natural ingredients, and are bagged or pre-packed in polymeric films able to generate optimal modified atmosphere packaging (MAP) conditions, and they are kept under chilling until consumption. MPFVs have similar characteristics to the whole original fruit or vegetable, and they usually need no further processing before use, offering advantages for consumers because, in addition to convenience, they have high quality and they produce little waste at a reasonable price. However, although conventional food-processing methods extend the shelf life of fruits and vegetables, the minimal processing to which fruits and vegetables are submitted renders the products highly perishable, requiring chilled storage to ensure a reasonable shelf life. The preparation of MPFVs causes damage to plant tissue in which the natural protective layers are eliminated, promoting many physical and physiological disorders that accelerate produce decay, reduce shelf life compared with the intact fruits and vegetables, and provide an easy entry for microbial pathogens and chemical contaminants (Allende et al., 2004a; Artés and Allende, 2005a; Artés, 2008a; Artés et al., 2007, 2009, 2011, 2012; Kader, 2010).

The deterioration of MPFVs occurs mainly due to further physiological aging, biochemical changes, and microbial spoilage, which result from changes in respiration, ethylene (C₂H₄) emission, transpiration, and

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the basis of techno- economic feasibility.

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