NONTHERMAL APPROACHES TO PROCESS FRUIT PRODUCTS

Abstract

by José Ángel Guerrero Beltrán, Ph.D.
Washington State University
December 2004

Chair: Gustavo V. Barbosa-Cánovas

High hydrostatic pressure (HHP) processing and ultraviolet (UV) light processing were the two new promising nonthermal technologies utilized in this research for obtaining microbiologically safe and chemically stable semisolid and liquid fruit products.

Semisolid fruit products such as peach and mango purees were studied using combinations of some obstacles for increasing storage appearance and to delay spoilage due to growth of the remaining microorganisms. Antibrowning agents, such as ascorbic acid and cysteine along with the application of HHP and storage at low temperature were the obstacles used for accomplish this purpose. Mango and peach are fruits that can darken very fast after cutting, blending or bruising due to inappropriate handling during harvesting and distribution to their final destination. The darkening effect due to reaction of enzymes, substrates, oxygen, or coenzymes, has to be delayed in some way to avoid losses of the raw product. Hence, the combination of HHP, antibrowning agents and low temperature delivered peach and mango purees microbiologically safe with extended shelf life and good appearance.

Liquid fruit products such as juices and nectars can be UV light treated to inactivate foodborne and/or surrogate microorganisms as substitutes for some pathogenic microorganisms. UV light can affect microorganisms at their DNA level, injuring them delaying growth and finally leading to death. Apple juice and mango nectar, being different in consistency and appearance, were UV light treated to inactivate yeasts (*S. cerevisiae*) and bacteria (*Escherichia coli* and *Listeria innocua*). Since each microorganism is different in shape, size and metabolism, the sensitivity to UV light is differently absorbed by their nuclei. Inoculated and non-inoculated liquid products were passed though the annular section of a UV light disinfection system. Each type of microorganism was affected differently. Even though yeasts are larger than bacteria in size, they were less affected by UV light. UV light processing for apple juice and mango nectar can be designed to achieve some final characteristics since Duv and Zuv values can be obtained for the studied microorganisms. In addition, Duv values were obtained for the remaining polyphenoloxidase activity after UV light processed mango nectar.