



208/B

Applicable non-thermal technologies to maintain quality of perishable juices

P N R J Amunugoda*, A M C U Binduhewa and W K S M Abeysekera

*Food Technology Section, Industrial Technology Institute, 363, Bauddhaloka Mawatha,
Colombo 07*

Thermal processing of perishable juices gives them a longer shelf life. However, many of the vitamins, minerals, and enzymes are removed due to oxidative reactions, thus decreasing the many benefits obtained from freshly squeezed. There are some delicate-flavoured juices that cannot tolerate gentle pasteurization resulting in quality loss. Non thermal technologies prove to be an alternate preservation technique to prevent these losses and meet upcoming consumer demand for value added juices with novel functional properties. The objective of this study was to review and rank non thermal techniques that are suited to produce perishable juices. Potent non thermal technologies of perishable juice include sanitation and refrigeration coupled with use of chemical preservatives, freezing, hyperbaric pressure, ultrasonic treatment and irradiation. Holding the temperature close to the juice freezing point (2 to 5 °C) combined with exceptional sanitation and packaging can extend storage life to longer than one month. Freezing of fresh juice and storage in a low oxygen environment can maintain freshness. This method is appropriate for large volumes of single strength juice. High pressure technology (pressure range:300-600 MPa) instantly transmits pressure throughout the system irrespective of size and geometry, causing microbial death whilst eliminating heat damage at even ambient or lower temperature. Bacterial spores are highly pressure resistant and therefore need extreme pressure for inactivation. High pressure using CO₂ causes the additional stress of reduced pH, thus, use of low pressure (100 MPa) can accomplish greater microbial destruction and enzyme inactivation than higher pressures alone. Inactivation of food microbes and non-destructive effects on chemical properties of juices were seen under a temperature controlled ultrasonic technique. Irradiation is an effective way of safely maintaining fresh juice quality under refrigeration. Although juice enzymes are quite resistant to irradiation and there is a possibility of free radical formation, elimination of pathogens is accomplished by reasonably low doses. Employing the hurdle approach, low storage temperature, an acid environment of pH less than 4.5 and exclusion of antimicrobial substances can lengthen shelf life of unpasteurized juices without affecting quality. Combined treatment of high pressure and temperature or high pressure with ultrasound are most appropriate for destroying bacterial spores. It can be concluded that combined non-thermal application with hurdle approach inactivate the total microbial content including bacterial spores and maintains the freshness of perishable juices.

Keywords: Fresh juices, thermal oxidation, non-thermal techniques, hurdle approach