THERMOSONICATION APPLIED TO KIWI JUICE PROCESSING: ANTI-LISTERIAL EFFECT AND QUALITY RETENTION

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Fruit juices are healthy beverages as a consequence of their beneficial micronutrients, such as minerals, vitamins and phytochemicals. It is of the utmost importance the production of safe and stable juices, which are also highly nutritious and with characteristics associated with natural products. Novel technologies that avoid the negative impact of high temperatures on the quality characteristics of pasteurized juices are emerging.

The objective of this study was to evaluate the influence of power level ultrasounds and thermosonication at different temperatures, on *Listeria innocua* survival in kiwi juices, used as a surrogate of the pathogenic *L. monocytogenes*. The Weibull model was used to describe the microbial survival kinetics in all processes applied.

Some physicochemical characteristics (color, soluble solids content and pH), bioactive compounds (total phenolics and chlorophylls) and total antioxidant activity were also analyzed.

Kiwi fruits (*Actinidia deliciosa*) were acquired in a local market at commercial maturity stage. They were peeled and squeezed using a domestic centrifuge. The obtained juice was artificially inoculated with the bacterium (~10^7 CFU/mL). Sonication was carried out in an ultrasonic bath (35 kHz; 120-480 W) at room temperature and at 45, 50 and 55 ºC for different times. Thermal treatments at the same temperatures were performed as a control. The characteristics above mentioned and target microorganism were evaluated before and at the end of the treatments applied.

Sonication had no significant effect on *L. innocua* inactivation. However, when applied at 50 ºC, it allowed 2.5 log-cycle more of inactivation when compared to the thermal treatment at the same temperature and at the end of the process. For the remaining temperatures, ultrasounds coupled with temperature did not reveal a synergetic effect. The Weibull model satisfactorily fitted *L. innocua* survival data in thermal treated and thermosonicated kiwi juices.

Antioxidant activity of thermosonicated juices at 45 and 50 ºC were equivalent to the one observed in fresh juice (130.9 ± 158.2 µg/mL), being 2.7 times higher at 55 ºC. However, thermosonication affected total phenolics content, since a decrease of 72, 46 and 23 % was observed at 45, 50 and 55 ºC, respectively, when compared to the ones detected in fresh squeezed juice (793.9 ± 105.4 µg/mL). In terms of total chlorophylls content, thermosonicated juices at 45, 50 and 55 ºC retained 12, 23 and 20 %, respectively.

Juice color was not significantly affected by thermosonication treatments, neither pH nor soluble solids content (pH=3.60 ± 0.01 and 9.4 ± 0.1 ºBrix in fresh juices).

It can be concluded that ultrasounds applied at 50 ºC was the best process with a high impact on *L. innocua* survival (5 log-cycles reduction for 15 min of exposure) with a satisfactory retention of the quality indicators analyzed.

Key words: ultrasounds, pasteurization, microbial survival, Weibull model