Thermal and non-thermal *Cantaloupe* melon juice pasteurization: Assessment of the impact of ozone exposure on microbiological, physicochemical and bioactive characteristics

Sengly Sroy, Joana F. Fundo, Fátima A. Miller, Teresa R. S. Brandão, Cristina L. M. Silva*

Universidade Católica Portuguesa, CBQF - Centro de Biotecnologia e Química Fina – Laboratório Associado, Escola Superior de Biotecnologia, Rua Arquiteto Lobão Vital, 172, 4200-374 Porto, Portugal

Abstract

Thermal treatments are traditionally used in fruit juice processing. However, the biological activity of the most health-related compounds are intensely reduced. Alternatively, ozone-based processes have been exploited due to their potential for inactivating spoilage and pathogenic microorganisms, while being effective in products' overall quality retention.

The aim of this study was to evaluate the impact of ozone and conventional pasteurization processes on microbiological decontamination and some quality attributes of *Cantaloupe* melon (*Cucumis melo* L var. *reticulatus*) juice.

Melon juice samples were artificially inoculated with *L. innocua* (non-pathogenic surrogate of *L. monocytogenes*), used as indicator of the ozone treatment efficacy (initial concentration ≈ 10^7 CFU/mL). Samples were exposed to gaseous ozone at a concentration of 7.7 g/L for 10 minutes. Intrinsic microflora (mesophylls and yeasts and molds), some physicochemical characteristics (pH, color and soluble solids content) and bioactive compounds (total phenolics and vitamin C) were evaluated. A thermal treatment at 72 °C for 15 seconds was also performed seeking comparison of ozone exposure impact.

In terms of mesophylls (initial loads of 5.8±1.0 log-cycles), ozone did not affect significantly microbial loads (5.6±0.6 log-cycles), while pasteurized samples reduced significantly to 3.8±1.0 log-cycles. For yeasts and molds (initial loads of 4.3±0.4 log-cycles), both treatments affected significantly the results, being the pasteurization more effective (3.4±1.2 and 0.9±0.2 log-cycles after ozone and thermal treatment, respectively). After ozone exposure, *L. innocua* was not detected in juice samples; pasteurization allowed a reduction of 5.2±0.2 log-cycles.

Ozone and thermal treatments did not affect soluble solids content, pH and total phenolics content, when compared to fresh juice samples. However, distinct color differences were

observed in juices after application of both treatments. Vitamin C was highly retained in ozone treated juices (68%), when compared to pasteurized ones (39%).

Since ozone treatment was effective on *L. innocua* inactivation and allowed a retention of most of quality parameters analyzed, this technology can be considered as a promising alternative to traditional pasteurization of fruit juices.

Keywords: Ozone treatment, thermal pasteurization, *Cantaloupe* melon juice, preservation, quality