

Title Infrared heating for dry-roasting and pasteurization of almonds
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Abstract

The use of infrared (IR) heating for improving the microbial safety and processing efficiency of dry-roasted almonds was investigated. Almonds were roasted at 130, 140 and 150 °C with three different methods: IR roasting, sequential infrared and hot air (SIRHA) roasting, and traditional hot air (HA) roasting. The heating rate and pasteurization efficacy of almonds under different roasting methods and temperatures were evaluated. *Pediococcus* sp. NRRL B-2354 was used as a surrogate for *Salmonella enterica* Enteritidis PT 30 for evaluating the pasteurization efficacy of different processing methods and conditions. When SIRHA roasting at 130, 140 and 150 °C roasting temperatures was used to produce medium roasted almonds, 4.10-, 5.82- and 6.96-log, bacterial reductions were achieved with 38%, 39% and 62% time saving compared to HA roasting at each temperatures, respectively. The decimal reduction time of the bacteria at all roasting temperatures were calculated for SIRHA roasting as 8.68, 3.72 and 1.42 min, respectively, with a correlation coefficient greater than 0.92 and the thermal resistance constant was found as 25.4 °C. The total color change followed zero-order reaction kinetics and the activation energies were 73.58, 52.15 and 67.60 kJ/mol for HA, IR and SIRHA roasting, respectively. No significant difference ($p > 0.05$) was observed in sensory quality of medium roasted almonds processed with different roasting methods. We conclude that the SIRHA roasting is a promising new method for the production of dry-roasted pasteurized almonds.