

Title Inactivation of *Escherichia coli* O157:H7 during storage or drying of apple slices pretreated with acidic solutions

Author Elizabeth Derrickson-Tharrington, Patricia A. Kendall and John N. Sofos

Citation International Journal of Food Microbiology, Volume 99, Issue 1 , 1 March 2005, Pages 79-89

Keywords *E. coli* O157:H7; Apples; Ascorbic acid; Citric acid; Lemon juice; Drying

Abstract

Inactivation of *Escherichia coli* O157:H7 was evaluated on inoculated apple slices without pretreatment or pretreated by immersing in water or acid solutions commonly used to help retain apple color during dehydration, then stored at ambient temperature or dried for 6 h. Half-ring slices (0.6 cm thick) of peeled and cored Gala apples were inoculated by immersion for 30 min in a three-strain composite inoculum of *E. coli* O157:H7 (7.8–8.0 CFU/g). Inoculated slices received (1) no pre-drying treatment (control); or a 10-min immersion in solutions of (2) sterile water, (3) 2.8% ascorbic acid, (4) 1.7% citric acid, (5) 50% commercial lemon juice, or (6) 50% commercial lemon juice with preservatives. Drained slices were placed in sterile plastic bags and stored at room temperature (25±2 °C) for up to 6 h or dehydrated (62.8 °C) for up to 6 h. Samples were plated on tryptic soy agar (TSA) and sorbitol MacConkey agar (SMAC) for direct enumeration of surviving bacteria at various time intervals. Immersion in sterile water or acidic solutions caused initial bacterial reductions of 0.9–1.3 log CFU/g on apple slices. Between 0 and 6 h of storage at room temperature, slices dipped in acidic solutions showed minor changes in bacterial populations (−0.2 to +0.6 log CFU/g) compared to a 1.1 log CFU/g increase for slices dipped in sterile water. The no treatment samples (control) showed an increase in bacterial populations of 1.3–1.5 CFU/g over the 6-h holding time. For apple slices dried at 62.8 °C, bacterial populations were reduced by 2.5 (SMAC) and 3.1 (TSA) log CFU/g in the control (no pre-drying treatment) samples following 6 h dehydration. The slices immersed in sterile water showed a 5.8 (SMAC) and 5.1 (TSA) reduction after 6 h of dehydration. In contrast, after 6 h of dehydration bacterial populations on the four acid-pretreated products were reduced by 6.7–7.3 log CFU/g. The results showed that acidic treatment alone was not effective in destroying *E. coli* O157:H7 on apple slices but did inhibit growth of the organism during holding before drying. However, pretreatment of the apple slices with common household acidulants enhanced destruction of *E. coli* O157:H7 during drying compared to slices dried without treatment.