

Title Survival and distribution of *Escherichia coli* on diverse fresh-cut baby leafy greens under preharvest through postharvest conditions

Author Alejandro Tomás-Callejas, Gabriela López-Velasco, Alex B. Camacho, Francisco Artés, Francisco Artés-Hernández and Trevor V. Suslow

Citation International Journal of Food Microbiology, Volume 151, Issue 2, 2 December 2011, Pages 216-222

Keywords Produce safety; Microbial quality; Minimal processing; Baby leaves; Mini-greens; Chlorine dioxide

Abstract

Escherichia coli O157:H7 has been associated in multiple outbreaks linked to the consumption of whole produce and fresh-cut leafy vegetables. However, plant-based foods had not been traditionally recognized as a host for enteric pathogens until the elevated incidence of produce-related outbreaks became apparent. The survival dynamics of two cocktails of generic *E. coli* (environmental water, plant and soil isolates) and *E. coli* O157:H7 within the phyllosphere of Mizuna, Red Chard and Tatsoi during their production, harvest, minimal processing, packaging and storage over two greenhouse production cycles were studied. Genotyping of applied generic *E. coli* strains to evaluate their comparative survival and relative abundance in the phyllosphere by REP-PCR is also reported. The Mizuna, Red Chard and Tatsoi shoots were grown under standard greenhouse conditions and fertility management. Both *E. coli* cocktails were spray-inoculated separately and determined to result in an initial mean population density of $\log 4.2$ CFU/cm². Leaves were harvested as mini-greens approximating commercial maturity, minimally processed in a model washing system treated with 3 mg/L of ClO₂ and stored for 7 days at 5 °C. Rapid decline of generic *E. coli* and *E. coli* O157:H7 populations was observed for all plant types regardless of the leaf age at the time of inoculation and the irrigation type across both seasonal growth cycle trials. The decline rate of the surviving populations for the fall season was slower than for the summer season. The minimal processing with 3 mg/L of ClO₂ was not sufficient to fully disinfect the inoculated leaves prior to packaging and refrigerated storage. Viable populations of *E. coli* and *E. coli* O157:H7 were confirmed throughout storage, including the final time point at the end of acceptable visual leaf quality. In this study, the ability of low populations of *E. coli* to survive during production and postharvest operations in selected mini-greens has been demonstrated. However, further field-based trials are needed to expand understanding of the post-contamination fate of enteric bacterial pathogens on leafy vegetables. In summary, this research work provides baseline data upon which to develop food safety preventive control guidance during the production and minimal processing of these crops.