

IFSH Seminar Series

Thursday, September 4, 2014

1:00PM – 2:00 PM

Room 100, Moffett Campus

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“Behavior of Shigatoxigenic *Escherichia coli* (STEC) Relevant to Lettuce Washing Processes”

Biosketch

Dr. Kaiping Deng is currently a Senior Scientist at the Institute for Food Safety and Health (IFSH) at IIT. She received her Ph.D. in Biochemistry and Molecular Biology, from Oklahoma State University. She has been working on microbiology research projects for fifteen years and generated more than thirty publications. Since 2009, she has extended her research direction to food safety. At IFSH, she is actively involved in developing validation strategies for post-harvest processes of fresh produce, co-chairing the Sprout Safety Alliance, and supervising graduate students on their research projects.

Abstract

Post-harvest processes for fresh produce commonly include washing in water containing antimicrobial chemicals, such as chlorine; however if the antimicrobials are not present in sufficient levels, washing can promote the spread of contamination that might be present. To understand cross-contamination risk during washing, we tested a collection of Shigatoxigenic *Escherichia coli* (STEC), including O157:H7 and other non-O157 strains, for certain traits during washing of fresh-cut lettuce, i.e., sensitivity to sublethal chlorine levels and ability to cross-contaminate (detach from and attach to) lettuce in the presence of sublethal chlorine levels. Non-pathogenic *E. coli* Nissle 1917 (EcN) and *Pediococcus pentosaceus* (LAB) were included as potential washing process validation surrogates. As measured by extension of the lag phase of growth in media containing 0.15 ppm chlorine, chlorine sensitivity varied among the STECs. Cross-contamination was assessed by evaluating transfer of bacteria from inoculated to uninoculated leaves during washing. Without chlorine, similar transfer to wash water and uninoculated leaves was shown. In 1 ppm chlorine, cross-contamination was not detected with most strains, except for the substantial transfer by a STEC O111 strain and EcN in some replicates. O111 and EcN showed less inactivation in 0.25 ppm chlorine water compared to O157 ($p < 0.05$). LAB showed similar transfer and similar chlorine inactivation to O157. Considering the sublethal chlorine sensitivity and detachment/attachment traits, neither EcN nor LAB displayed optimal characteristics as washing process surrogates for the STEC strains, although further evaluation is needed. This work demonstrated a range of behaviors of STEC strains during lettuce washing and may be helpful in hazard characterization, identifying factors to consider for evaluating washing process efficacy, and identifying phenotypic traits to select surrogates to validate washing processes.