Title Scrutinizing the sanitizing process involving aqueous chlorine from field to fresh-cut iceberg lettuce

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Abstract

The most commonly used sanitizers for numerous procedures in the postharvest industry are chlorine based. However, the impact this sanitizer has on the reduction of pathogenic microorganisms differs depending on the microorganism and produce in question, although it is generally limited to a 1-2 log reduction, when using concentrations permitted for produce. An investigation of the impact of aqueous chlorine sanitization on generic *E. coli* during postharvest and fresh-cut processing of iceberg lettuce was conducted at The University of Arizona, Yuma Agricultural Center, USA. Common commercial practices were simulated using a high bacterial load (10^8 cfu/ml) culture to contaminate a harvesting tool to assess the number of heads affected from one contamination and the effectiveness of approved sanitizers. Results showed that as many as 75 heads of lettuce could be contaminated with the continued use of a contaminated harvest tool quitar used to core the heads. The concentration of bacterial contamination is reduced if the cored region is sprayed with a sanitizer immediately after coring. While using water alone on the cored region produced 10^5 cfu/g, using either chlorine or peroxyacetic acid (PAA) showed only a decrease to 10^4 cfu/g. The use of the sanitizers in different frequency and in combination as an alternative to the common triple treatment with chlorine, showed the latter as the treatment with the most effective reduction on generic *E. coli*. The level of reduction was still insufficient to ensure the safety of the lettuce if a high microbial contamination were to occur. This work reveals the high risks associated with the lack of a continuous system for decontaminating harvesting tools and equipment, and highlights the need for further research to identify a better multiple-rinse sanitation system, than the predominant chlorine washes and the emerging approved alternatives.