

Title: Evidence of Microbial Transfer from Furrow Water to Leafy Greens during Irrigation.

Authors: Natalie Brassill, Jessica Dery, Ban Saber, Channah Rock

Abstract:

Agricultural surface water used for irrigation can become contaminated and has potential to transfer pathogens onto crops through furrow irrigation. Harvested crops can transfer that contamination onto equipment causing cross contamination and risk to public health.

The purpose of this study was to evaluate commercial scale produce production practices in order to provide evidence of microbial transfer from contaminated furrow irrigation water to crops and then into the harvesting chain.

Irrigation water spiked with *E. coli* TVS353 was applied to axial leaves of the first three heads of romaine on each line of a one-acre plot at a concentration of $1 \times 10E5$ CFU/100mL. Standard "S" and "Z" pattern pre-harvest sampling of n=60 was conducted 7 days after contamination. Four 100g sub-samples were enriched then spread plated onto ChromAgar ECC + 80ug/mL Rifampicin. On harvest day, five sampling teams swabbed workers gloves, knives, cutting table, conveyer belt, and elevator/down spout. Crews stopped every 15 minutes (5 stops per acre).

Results indicate "Z" pattern samples 4/4 (100%) positive and "S" pattern 0/4 (0%) positive. Commercial Harvest Stop #2 show *E. coli* TVS353 contamination on gloves, knife and table indicating furrow contaminated romaine can transfer *E. coli*. Stop #3 had no contamination on gloves or table and Stop #4 & #5 no *E. coli* TVS353 was detected. Post-harvest bin sampling resulted in zero detectable bacteria.

Contamination simulations were detectable through harvest and point to the ability of furrow contaminated water to transfer to harvestable romaine lettuce. Resulting best management practices (BMPs) include raised bed height, omission of harvest at the head of the field, and improved or increased frequency in knife cleaning practices. Based on these suggested BMPs research is being conducted currently, funded by Arizona Department of Agriculture, to investigate these practices potential to reduce risks from contaminated furrow irrigation water.