

Title: Microbiological Assessment of Conventionally and Organically grown Leafy Greens in the Mid-Atlantic Region

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ABSTRACT

Introduction: Leafy greens (LG) carry a high risk of foodborne illness. A large portion of LG in the mid-Atlantic is cultivated on small- and medium-sized farms that do not test produce for pathogens and indicators of fecal contamination.

Purpose: This study aimed at analyzing samples from conventional and organic LG cultivation areas in central Maryland, Maryland Eastern Shore, Delaware and New Jersey.

Methods: Twenty one farms were visited three times each in the fall of 2012 for collection of LG; source and end-of-line irrigation water; soil and compost. Quantitative data on *E. coli*, total coliforms (TC) and aerobic mesophilic bacteria (APC) were obtained from solid samples using appropriate 3M petrifilms, and from water samples by standard membrane filtration and MI agar. Qualitative data on *Salmonella* and shiga toxin-producing *Escherichia coli* (STEC) were obtained by enrichment and PCR.

Results: In all, 295 samples (192 LG) were analyzed. Almost all LG samples were positive for APC: average 5.8 logCFU/g. The highest prevalence for *E. coli* and TC was detected in samples from the Maryland Eastern Shore (n=64) (12.8% and 94.9% respectively) and the lowest in central Maryland and New Jersey (n=64) (0% and 56.3%, respectively). The average counts for *E. coli* and TC were 0.1 logCFU/g and 2 logCFU/g respectively. Sample type was a significant factor for *E. coli*, TC and APC ($p < 0.0001$), and region was a significant factor for TC and APC ($p < 0.05$). End-of-line water samples accumulated higher counts of APC and TC than source samples. Two LG samples were positive for shiga toxin genes, 4.2% (n=8/192) of LG and 3.2% (n=2/63) of water samples were presumptively positive for *Salmonella*.

Significance: This extensive survey of LG grown on mid-Atlantic farms shows low pathogen prevalence. Microbiological quality varies by region, potentially implying that region is a risk factor for LG contamination.