



Quinto
Congreso Nacional
de Riego y Drenaje
COMEII-AURPAES 2019

Septiembre 2019 | Mazatlán, Sinaloa



Artículo: COMEII-19014

Mazatlán, Sin., del 18 al 20

de septiembre de 2019

APPLICATION OF MICROBIAL RISK ASSESSMENT OF *Escherichia coli* IN IRRIGATION WATER ON LETTUCE CROP

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Abstract

Contaminated water, soil manure, and wildlife are the main sources of contamination of leafy greens. Microbial contamination of lettuce plants, via contact with irrigation water was investigated to aid in the development of irrigation water quality standards for enteric bacteria. Surface irrigation was evaluated with the use of *Escherichia coli* O157:H7 transfer data to the plants. The concentrations of *E. coli* in irrigation water necessary to achieve a 1:10,000 annual risk of infection, the acceptable level of risk used for drinking water by the U.S. Environmental Protection Agency, were calculated with a quantitative microbial risk assessment approach. These calculations were based on the transfer of *E. coli* to fresh produce via irrigation water. The Beta-Poisson model was used to estimate the microbial risk of pathogen annual ingestion. The risk of infection was found to be variable depending on the *E. coli* concentration in water, and the pathogen transfer to the crop days post exposure. The worst-case scenario, in which produce could be harvested and consumed the day after the last irrigation event and maximum exposure is assumed, indicated that concentrations of 10⁴ CFU/ml in 30-day-old lettuce plants would result in an annual risk of 1:10,000 if the crop would be consumed. Similarly, concentrations of 10³ CFU/ml, and 10⁴ CFU/ml in 12-day-old lettuce would result in an annual risk of 1:10,000 if the crop would be ingested. It appears that bacterial growth continued for the first ten days after contamination so that the probabilities increased from 0.2 to 0.5 in the 10³ CFU/ml concentrations for the lettuce contaminated at 12 days.

Keywords: Risk assessment, *Escherichia coli*, irrigation, lettuce.