

Efficacy of Ozone Against *Salmonella* Newport and *Escherichia coli* O157:H7 in Non-Traditional Sources of Irrigation Water at Room Temperature and 4°C

Richard Park¹, Libin Zhu¹, Govindaraj Dev Kumar² and Sadhana Ravishankar^{1*}

¹School of Animal & Comparative Biomedical Sciences, University of Arizona, 1117 E. Lowell Street, Tucson, AZ

²Department of Food Science & Technology, University of Georgia, 350 Woodroof Drive, Griffin, GA

Introduction

The food and agricultural industries use large volumes of water. The upcoming drought conditions necessitate exploration of alternate irrigation water sources.

Purpose

Investigate the efficacy of ozone against *Salmonella* Newport and *Escherichia coli* O157:H7 in non-traditional water sources.

Methods

Five water samples were collected across Arizona: Tucson reclaimed (RW), Tucson reverse osmosis reject (ROR), Yuma return flow (Y-RF), Tucson rain catchment (T-RC) and Oracle rain catchment (O-RC). The water sources were inoculated with either *S. Newport* or *E. coli* O157:H7 and a pre-treatment sample was taken. The inoculated water at room and refrigeration (4°C) temperatures was treated with ozone at different times until target pathogens were below detectable levels (<1 log CFU/ml). Pre-treatment and post-treatment samples were plated on xylose lysine desoxycholate agar with antibiotics and cefixime tellurite sorbitol MacConkey agar. Post-treatment water was enriched in tetrathionate broth and R&F *E. coli* broth for enrichment of *Salmonella* and *E. coli* O157:H7, respectively.

Results

The minimum treatment times needed to inactivate *S. Newport* at both room and refrigeration temperatures in various water types ranged 2-4 min, while for *E. coli* O157:H7 the inactivation times ranged 30 sec-1 min. *Salmonella* consistently needed higher treatment times for inactivation below detection levels than *E. coli* O157:H7. The lowest treatment time for *Salmonella* at both temperatures was 2 min for ROR. Y-RF, T-RC and O-RC needed the lowest treatment times of 0.5 min for *E. coli* O157:H7 at both temperatures and 0.5 min for ROR at room temperature. The highest treatment time for *Salmonella* and *E. coli* O157:H7 was for RW at 4 and 1 min, respectively. *E. coli* also needed a 1 min treatment time in ROR at 4°C. Enrichments of post-treatment samples showed presence of *Salmonella* in ROR water at room temperature.

Significance

Ozone could potentially be used as an effective treatment for decontaminating non-traditional water sources.