Assessing potential microbiome alterations due to sanitizer treatment of agricultural water

Authors: Victoria Obergh, Madison Goforth, Natalie Brassill, Zoe Scott, Jessica Dery, Hannah Crean, Braden Smith, Ban Saber, Amandeep Singh, Harris Jebrini, Cassidy Hiener, Manuel Pagen, Shane Sieckenius, Channah Rock, Veerachandra Yemmireddy, Craig Parker, Kerry Cooper

Presenting Author: Victoria Obergh

Following the 2018 *Escherichia coli* O157:H7 outbreak associated with an Arizona growing region that was suggested to be caused by contaminated irrigation water, the Leafy Greens Marketing Agreement (LGMA) established guidelines for its members to apply sanitizers to agricultural water twenty-one (21) days prior to harvesting product. However, this raised the question of what impact could these sanitizers have on the phyllosphere, rhizosphere, and soil microbiomes. The goal of this study was to assess potential microbiome alterations due to the use of sanitizers in agricultural water in leafy greens fields prior to harvesting. Phyllosphere, rhizosphere, and soil samples were collected prior to using treated water, seven (7) days after administrating treated water, and soil was also collected 90 days after administrating treated water to assess the microbiome of each in different types of leafy greens fields across Arizona and Texas. Samples were either treated with propidium monoazide (PMA) prior to DNA extraction to detect only living bacterial cells, or not treated with PMA to detect both living and dead bacterial cell DNA to give overall bacterial community of the sample. There were statistically significant changes in the phyllosphere and rhizosphere microbiome of spinach, but these same changes were not as evident in romaine lettuce grown in Yuma, AZ. However, we did not detect any significant changes in the soil microbiome of these fields even after 90 days. Furthermore, peracetic acid (PAA) treatment of the agricultural water had a significantly bigger impact on the bacterial diversity of the phyllosphere and rhizosphere compared to chlorine treatment in the spinach fields. Overall, the study found that sanitizer treatment of agricultural water could have an impact on the microbiome of the fields, but additional analysis is needed to determine the functional changes of the microbiome and impact on plant health due to these alterations.