Romaine Calm: Using a Phage-Enzyme Combination to Treat E. coli Contamination in Produce

Hummel, William (School: Brookings High School)

There are 5 outbreaks that have happened in 2019, which have been estimated to have caused over 400 illnesses and waste over 500,000 pounds of food in the US. The current system of treating E. coli in produce, sodium hypochlorite, is only effective in treating isolated cells of E. coli while the majority of E. coli outbreaks are due to biofilms forming on the surface of produce. The objective of the project was to develop a method to remove biofilms from produce via a phage-enzyme combination. While bacteriophages and enzymes have seen mild success on their own, it was hypothesized that when used together, they could become a useful tool used by the food industry to treat infected produce. The enzyme was extracted from a ripened avocado, because it allows for something that is thrown away to be made use of in a very important process of the food production. The project was conducted by taking samples, which consists of 0, 50, 250, and 500 ul of treatment on romaine lettuce fragments. from 24 and 48 hour treatment groups and quantifying them by CFU/mL on TSA and optical density using a 96 well plate. After all treatment groups had been tested, 250 ul concentrations of phage and enzyme were the most effective in treatment. Along with this, the enzymes from the avocado were more effective than commercial cellulase. In conclusion, phage-enzyme treatments pose as a viable method for biofilm removal in the industrial process of food treatment.

Awards Won: