Comparing Levels of Viable Escherichia coli O157:H7, Listeria monocytogenes, and Salmonella enterica Cells Attached to Leafy Green Surfaces Before and After Exposure to BIOSAN 6151 Oxysan 1510 Peroxyacetic Acid

Executive Summary

The objective of this study was to compare a PAA antimicrobial wash (made with the 6151 Oxysan 1510 product) and a tap water wash in order to determine their efficacies in reducing the levels of viable Escherichia coli O157:H7, Listeria monocytogenes, and Salmonella enterica cells attached to leafy green produce surfaces.

Experimental Methods

Romaine Lettuce samples were inoculated with one of the three different types of challenge organisms. The inoculum for each of these challenge organisms consisted of a cocktail of five strains of the challenge organism. Following inoculation, samples were allowed to dry for 30 min to allow cells to attach. These inoculated samples were then exposed to either a 40 ppm PAA solution (made from the 6151 Oxysan 1510 product) or a tap water wash. All treatment solutions were kept at ambient room temperature during processing, and PAA concentrations were measured immediately after preparation, immediately prior to treatment of leafy green samples, and immediately following treatment of leafy green samples. The inoculated samples were submerged for treatment and then were immediately neutralized by immersion in Dey-Engley Neutralizing Broth. Each combination of treatment (tap water wash or 40 ppm PAA antimicrobial wash) and each challenge organism had a sample size of 10 assigned to it. Levels of surviving cells of each challenge organism were determined by plating an appropriate dilution level of the Dey-Engley Neutralizing Broth rinsate onto Cefixime-Tellurite Sorbitol MacConkey Agar for E. coli O157:H7, Modified Oxford Agar for L. monocytogenes, and Xylose Lysine Tergitol 4 Agar for S. enterica. After calculating the log10 CFU/ml value of the challenge organism for each sample suspended in the Dey-Engley Neutralizing rinsate, the data were statistically analyzed using either a non-parametric Mann-Whitney Test or an Unequal Variances Two-Sample t-Test.
Results and Discussion

Overall the study demonstrated that S. enterica was reduced by 2.7 log10 CFU/ml with the PAA antimicrobial wash as compared to the tap water wash (Mann-Whitney Test p-value of 0.0002), E. coli O157:H7 was reduced by 2.8 log10 CFU/ml with the PAA antimicrobial wash as compared to the tap water wash (Mann-Whitney Test p-value of 0.0003), and L. monocytogenes was reduced by 1.4 log10 CFU/ml with the PAA antimicrobial wash as compared to the tap water wash (Unequal Variances Two-Sample t-Test p-value of 0.001). Overall, this showed that the PAA antimicrobial wash had a high degree of efficacy against Gram Negative foodborne pathogenic bacteria attached to leafy green produce surfaces, while it had moderate efficacy against Gram Positive foodborne pathogenic bacteria attached to leafy green produce surfaces.

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