

Title Sucrose monolaurate improves the efficacy of sodium hypochlorite against *Escherichia coli* O157:H7 on spinach

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Abstract

It is well-recognized that chlorine has limited efficacy when applied to inactivate pathogens on fresh produce. One of the many factors limiting efficacy is the high interfacial tension of chlorine-based sanitizers that limits the access of chlorine to the microorganisms. In this work, we investigated the efficacy of sodium hypochlorite (200 ppm, pH 6.0) at 4 and 20 °C against *Escherichia coli* O157:H7 inoculated on baby spinach leaves as affected by the surfactant sucrose monolaurate (SML) at below (100 ppm), above (250 ppm), and well above (10,000 ppm) the critical micelle concentration (CMC) of ~ 200 ppm at 20 °C. The surfactant-containing chlorine treatments were compared to those with buffer only, surfactant only, and chlorine only. Significantly improved inactivation, as evidenced by survival of *E. coli* O157:H7 was achieved when 250 or 10,000 ppm SML was added with chlorine. This is attributed to the reduction of interfacial tension between the sanitizing solutions and spinach surface. Treatments at 20 °C resulted in greater mean inactivation than those at 4 °C but the difference was not significant. Comparisons of SML concentrations in treatment solutions before and after sanitization showed that SML decreased more at a lower temperature and when chlorine was present, resulting from adsorption of SML onto spinach matrix. Our work illustrates the importance of using surfactants at concentrations above the CMC to enhance the efficacy of chlorine sanitization.