Title Reduction of bacteria on spinach, lettuce, and surfaces in food service areas using neutral electrolyzed oxidizing water

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Abstract

Food safety issues and increases in food borne illnesses have promulgated the development of new sanitation methods to eliminate pathogenic organisms on foods and surfaces in food service areas. Electrolyzed oxidizing water (EO water) shows promise as an environmentally friendly broad spectrum microbial decontamination agent. EO water is generated by the passage of a dilute salt solution (~1% NaCl) through an electrochemical cell. This electrolytic process converts chloride ions and water molecules into chlorine oxidants (Cl_2, HOCl/ClO^-). At a near-neutral pH (pH 6.3–6.5), the predominant chemical species is the highly biocidal hypochlorous acid species (HOCl) with the oxidation reduction potential (ORP) of the solution ranging from 800 to 900 mV. The biocidal activity of near-neutral EO water was evaluated at 25 °C using pure cultures of *Escherichia coli*, *Salmonella typhimurium*, *Staphylococcus aureus*, *Listeria monocytogenes*, and *Enterococcus faecalis*. Treatment of these organisms, in pure culture, with EO water at concentrations of 20, 50, 100, and 120 ppm total residual chlorine (TRC) and 10 min of contact time resulted in 100% inactivation of all five organisms (reduction of 6.1–6.7 $\log_{10}$ CFU/mL). Spray treatment of surfaces in food service areas with EO water containing 278–310 ppm TRC (pH 6.38) resulted in a 79–100% reduction of microbial growth. Dip (10 min) treatment of spinach at 100 and 120 ppm TRC resulted in a 4.0–5.0 $\log_{10}$ CFU/mL reduction of bacterial counts for all organisms tested. Dipping (10 min) of lettuce at 100 and 120 ppm TRC reduced bacterial counts of *E. coli* by 0.24–0.25 $\log_{10}$ CFU/mL and reduced all other organisms by 2.43–3.81 $\log_{10}$ CFU/mL.