

Title Evaluation of hypochlorous acid (electrolyzed water), lactic acid, and peroxyacetic acid as sanitizers for fresh vegetables

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Abstract

Scope and Method of Study: Our objectives were to determine the effectiveness of hypochlorous acid (i.e., electrolyzed water), lactic acid, peroxyacetic acid, and sodium thiocyanate against indigenous bacteria on a standardized surface treatment area (150 cm^2) of different types of vegetables, for their potential application as antimicrobial treatments for fresh produce. Vegetable samples were dipped in three concentrations of electrolyzed water (50, 100, or 200 ppm Cl⁻), lactic acid (1%, 2%, or 4%), and peroxyacetic acid (50 ppm) to control microbial populations at three dwell treatment times (1, 2, or 4 min). The effects of electrolyzed water (25 or 50 ppm) combined with lactic acid (0.5% or 1%), and electrolyzed water dip followed by sodium thiocyanate spray treatment were also tested. Samples were drained and rinsed with 50 ml buffer peptone water (BPW), and stomached to resuspend remaining viable cells. Serial dilutions were made in 0.1% BPW and plated on Plated Count Agar (PCA).

Findings and Conclusions: Our results suggest that, a standardized surface area of produce will better reflect the relative effectiveness of different antimicrobials on various types of produce than evaluation based on weight. All dipping solutions tested in our study were capable of reducing microbial populations to some extent, but, the antimicrobial effects were dependent on concentrations, treatment times, and types of produce. Electrolyzed water (50 ppm), with a 1 min dipping treatment time, may be effective in reducing microbial loads from some food produce surfaces whereas other types of produce may require higher levels and/or longer treatment times. Lactic acid was tested in combination with electrolyzed water and performed well in reducing bacteria on food produce surfaces at lower levels of LA or EW than if either were used alone. The bactericidal activity of electrolyzed water is more pronounced on firm "skin" (grape tomatoes) than rough "skin" (baby carrots) vegetables.