

The efficacy of plant-based microemulsions against *Salmonella* Newport and *Lactobacillus casei* on Iceberg lettuce during 28-day storage at 4°C

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ABSTRACT

The produce industry commonly uses chlorine to wash vegetables post-harvest. However, chlorine is disadvantageous because it is not sustainable to the environment, not user friendly, is corrosive to equipment, and loses efficacy with organic matter. Consumers prefer natural over chemical sanitizers. Alternatives for wash sanitizers must be employed to better suit the needs of consumers and for improving food safety. Plant-based antimicrobials in the wash water were evaluated for their efficacy against *Salmonella enterica* serovar Newport and *Lactobacillus casei* on Iceberg lettuce. Plant-based microemulsions that were assessed included oregano oil, lemongrass oil, and cinnamon oil along with a plant emulsifier for improved solubility of the oil in water. Iceberg lettuce (10 g) was washed thoroughly and inoculated with either *Lb. casei* (6.0 log CFU/g) or *S. Newport* (6.0 log CFU/g). The leaves were treated with 0.1%, 0.3%, or 0.5% of one of the treatment solutions, 50 ppm chlorine and 3% hydrogen peroxide, stored at 4° C, observed, and analyzed for surviving populations of *Lb. casei* and *S. Newport* on days 0, 3, 7, 10, 14, 21, and 28. The efficacies of the antimicrobials were concentration- and storage-time dependent. The microemulsions exhibited a 2.3-4.37 log CFU/g reduction in *S. Newport* population throughout various time points during days 0-28. The microemulsions were also effective against *Lb. casei* resulting in 0.11-4.25 log CFU/g reduction during storage at days 0-28. The visual observation of treated leaves indicated that the 0.1% oregano microemulsion showed the best visual appeal in Iceberg leaves inoculated with *S. Newport*. However, 0.5% lemongrass microemulsion showed improvement in the quality of the Iceberg leaves inoculated with *Lb. casei*. This study demonstrates the potential of essential oil microemulsions to inactivate *S. Newport* and *Lb. casei* on Iceberg lettuce while providing natural and effective alternatives to chemicals for produce decontamination and shelf-life extension.