

Title            Effect of aqueous chlorine dioxide treatment on the microbial growth and quality of minimally processed lettuce

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### **Abstract**

Minimally processed vegetables are widely used due to their health benefit as a functional food. However, microbial hazard has been a threat during storage and marketing. Recently, aqueous chlorine dioxide treatment has been used as a sterilization method instead of chlorine treatment in food industry since its sterilization effect of chlorine dioxide is 5 times stronger than chlorine treatment and it did not produce THM or chlorophenol. Our objectives were to evaluate the sterilization effect of aqueous chlorine dioxide treatment on the microbial growth of minimally processed lettuce and to examine the inactivation of polyphenol oxidase (PPO) and polygalacturonase (PG) that affect the sensory quality. Fresh cos lettuce samples were cut into 2x2 cm and treated using aqueous chlorine dioxide under various concentrations and treatment time. Aqueous chlorine dioxide was produced using a chlorine dioxide generator. Treatment condition were from 1 ppm to 25 ppm for its concentration and from 1 min to 10 min for treatment time, respectively. As a comparison, ozonated water treatment was performed. After treatment, the numbers of total bacteria, yeast and mold and *Pseudomonas* were determined and PPO and PG activities were measured. Aqueous chlorine dioxide treatment reduced 2 log cycle population of total bacteria, yeast and mold, and *Pseudomonas* in lettuce and was definitely better than the control as well as ozonated water treatment. D-value against *E. coli* O157:H7 at chlorine dioxide concentration of 1 ppm was 2.04 min. Chlorine dioxide treatment decreased the activities of PPO and PG in lettuce by 30% and 40%, respectively. This study clearly indicated that aqueous chlorine dioxide treatment extended the shelf-life of minimally processed lettuce and improved the quality by decreasing PPO and PG activities. Therefore, aqueous chlorine dioxide treatment is recommended for pretreatment of minimally processed vegetables.