

Title Efficacy of chlorine dioxide gas against *Alicyclobacillus acidoterrestris* spores on apple surfaces
Author Sun-Young Lee, Genisis Iris Dancer, Su-sen Chang, Min-Suk Rhee and Dong-Hyun Kang
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Abstract

Alicyclobacillus acidoterrestris is a thermophilic spore-forming bacterium that spoils acidic juices. In the orchard, apples may be contaminated with spores which can potentially grow in the resulting juice and cause spoilage. This study was undertaken to evaluate the efficacy of gaseous chlorine dioxide against *A. acidoterrestris* spores on apple surfaces. *A. acidoterrestris* spores were inoculated onto apple surfaces and were placed at room temperature, in a tightly sealed chamber containing a chlorine dioxide generating sachet, low, medium, or high release, for 30 min, 1, 2, and 3 h. After exposure, surviving spores were enumerated on K agar. Chlorine dioxide treated apples were stored at 4 °C for 7 days to assess the effect on visual quality. Inoculated, untreated apples served as the visual quality control. After exposure to high and medium release sachets for 1 h, spores were reduced to an undetectable level, a 5 log₁₀ reduction; however, visual quality was compromised. After 1, 2, and 3 h of exposure to low release sachets, spore reductions were 2.7, 3.7, and 4.5 log₁₀, respectively. And, after 7 days of storage, there were no significant visual quality differences between the apples exposed to low release sachet for all treatment times when compared to the control. Gaseous chlorine dioxide can effectively reduce viable *A. acidoterrestris* spores on apple surfaces. Due to the efficacy and easy of use, chlorine dioxide gas sachets may be useful to maintain apple quality during storage and shipping.