Title Applications of chlorine dioxide gas for control of bacterial soft rot in tomatoes

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Abstract

Chlorine dioxide (ClO_2) gas was generated from a mixture of sodium chlorite and ferric chloride plus water (impregnated into zeolite) in a Tyvek sachet over a 2- or 24-h period. The gas was distributed by a fan over wound-inoculated tomato fruit (*Lycopersicon esculentum*) enclosed in a sealed aluminum pressure cooker. Within 24 h of inoculation with 6 $\log_{10}$ CFU of *Erwinia carotovora* subsp. *carotovora* per wound and storage at 22 to 24°C, bacterial soft rot was observed on >80% of the nontreated wounds (10 wounds/fruit and 4 or 6 fruit/treatment). By contrast, wounds that had been exposed to an atmosphere containing up to 99 mg ClO_2 during a 2- or 24-h period remained firm and dry with no evidence of bacterial activity or soft rot. After 72 h of incubation, wounds exposed to 88 mg ClO_2 produced over 24 h or 99 mg ClO_2 produced over 2 h were free of decay, whereas bacterial soft rot was observed in ca. 12% and less than 5% of wounds treated with 0.75 mg or 7.5 mg, respectively, for either 2 or 24 h. Wounds that had not been inoculated remained free of bacterial soft rot throughout the entire storage period. Wounds exposed to the highest doses of ClO_2, 88 mg/24 h or 99 mg/2 h, became bleached and sunken. Additionally, the stem scars on these fruit became cracked, sunken, and bleached. The intact cuticle was not visibly affected, and there was no observed change in overall fruit color. ClO_2 gas may be effective for controlling postharvest decays of fruit that have been inoculated prior to or during harvest.