Center for Food Safety, University of Georgia, Griffin, GA (http://www.griffin.uga.edu/cfs)
2004 Highlights

BIOSECURITY

SURVEY OF BIOSECURITY PRACTICES IN PRODUCE OPERATIONS IN THE SOUTHEAST (M. A. Harrison, K. Simmons, W. C. Hurst, and J. A. Harrison)

Fresh produce is potentially vulnerable to tampering because it is usually eaten raw or in a minimally processed state. It is grown, harvested and packed literally "in the open" and there is typically no kill step to destroy microbial pathogens prior to consumption. In a collaborative effort with researchers from Georgia, South Carolina and Florida, this study was undertaken to assess the current status of security at fresh produce facilities in these states. Security audit forms were prepared and used to survey growers, packers, and fresh-cut processing operations. A total of 25 farms, 25 packinghouses and 7 fresh-cut produce processing operations were surveyed. Practically all of the fresh-cut processors have a written security plan, conduct security training for their employees, and have restricted access to their facilities. However, only about half of the farm and/or packinghouse operations provide employee security training, and only one farm and one packinghouse surveyed have written security plans. About half (52%) of the packinghouses surveyed have perimeter fencing and only half have locks on the cooler doors. Documentation of any sort of security practice is lacking among both growers and packers. Survey data collected to date indicates that while fresh-cut processing facilities are dealing with current security challenges, farm and packing operations in the tri-state region are lagging behind. More training programs and assistance to increase awareness and to facilitate incorporation of feasible, preventative measures are needed by segments of the industry.

LETHALITY OF CHLORINE, CHLORINE DIOXIDE, AND A COMMERCIAL FRUIT AND VEGETABLE SANITIZER TO VEGETATIVE CELLS AND SPORES OF *BACILLUS CEREUS* AND SPORES OF *BACILLUS THURINGIENSIS* (L. R. Beuchat, C. A. Pettigrew, M. E. Tremblay, B. J. Roselle, and A. J. Scouten)

Concerns about international bioterrorism have rekindled an interest in developing and refining technologies to kill *Bacillus anthracis* spores in urban environments and in foods. While spores of several *Bacillus* species known to cause spoilage of foods and foodborne disease have been studied extensively to determine conditions affecting growth and sporulation, as well as their sensitivity to physical treatments and sanitizers, comparatively little is known about conditions affecting survival and growth of *B. anthracis* in foods and the effectiveness of sanitizers in killing spores of the organism on food-contact surfaces and in foods. *Bacillus anthracis* is closely related to *Bacillus cereus* and *Bacillus thuringiensis,* the principle distinguishing difference being the presence of virulence genes on plasmids in *B. anthracis*. Direct comparisons of the sensitivity of spores of *B. anthracis* and spores of other *Bacillus* species to sanitizers used to decontaminate food-contact surfaces and foods have not been described. Information on the sporicidal activity of chemical treatments using *B. cereus, B. thuringiensis,* and perhaps other *Bacillus* species as potential surrogates for *B. anthracis* would provide insights to the relative sensitivity of *B. anthracis* spores to the same treatments.

We conducted a series of experiments to determine the effectiveness of chlorine, ClO_2, and a commercial raw fruit and vegetable sanitizer in killing vegetative cells and spores of *B. cereus* and *B. thuringiensis*. The goal is to eventually test the sensitivity of vegetative cells and spores of *B. anthracis* to treatments causing the highest reductions in populations of these potential surrogates. Insights to the sensitivity of *B. cereus* and *B. thuringiensis* to these sanitizers will be valuable in achieving that goal. Treatment with alkaline (pH 10.5 - 11.0) ClO_2 (200 µg/ml) produced by electrochemical technologies reduced populations of a five-strain mixture of vegetative cells and a five-strain mixture of spores of *B. cereus* by >5.4 and > 6.4$\log_{10}$ cfu/ml, respectively, within 5 min. This compares to respective reductions of 4.5 and 1.8 log_{10} cfu/ml resulting from treatment with 200 µg/ml chlorine. Treatment with a 1.5% acidified (pH 3.0) solution of Fit® powder product (FPP) was less effective, causing 2.5 and 0.4 log_{10} cfu/ml reductions in the number of *B. cereus* cells and spores, respectively. Treatment with alkaline ClO_2 (85 µg/ml), acidified (pH 3.4) ClO_2 (85 µg/ml), and a mixture of ClO_2 (85 µg/ml) and FPP (0.5%) (pH 3.5) caused reductions in vegetative cell/spore populations of >5.3/5.6, >5.3/5.7, and >5.3/6.0 log_{10} cfu/ml, respectively. Treatment of *B. cereus* and *B. thuringiensis* spores in a medium (3.4 mg of organic and inorganic solids/ml) in which cells had grown and produced spores with an equal volume of alkaline (pH 12.1) ClO_2 (400 µg/ml) for 30 min reduced populations by 4.6 and 5.2 log_{10} cfu/ml, respectively, indicating high lethality in the presence of materials other than spores that would potentially react with and neutralize the sporicidal activity of ClO_2.