

Title Ozone application in a modified screw conveyor to treat grain for insect pests, fungal contaminants, and mycotoxins

Author Marissa X. McDonough, Carlos A. Campabadal, Linda J. Mason, Dirk E. Maier, Adrian Denvir and Charles Woloshuk

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Abstract

Recent efforts have focused on improving the application of ozone technology as a pest management tool for stored grain. This study evaluated the efficacy of a modified screw conveyor to treat grain with ozone in a continuous-flow system. The ozone concentration delivered into the screw conveyor was 47,800 ppm and the average retention time for a corn kernel moving through the system was 1.8 min. Under these conditions, 100% mortality of adult red flour beetle (*Tribolium castaneum* (Herbst)) and adult maize weevil (*Sitophilus zeamais* (Motsch.)) was achieved after three passes through the screw conveyor, which equated to a concentration \times time (CT) product value of 258,120 ppm-min. The potential effectiveness of the continuous treatment to reduce mold on the surface of corn kernels was also explored. *Aspergillus flavus* counts were reduced by 96% in a single pass through the screw conveyor. Three passes through the screw conveyor reduced the mold count by more than 2-log units. Ozone treatment also reduced aflatoxin applied to the grain; however, the reduction was not sufficient enough to be of commercial value. The results of this study provide valuable information for estimating the parameters needed for effectively treating grain in a commercial scale continuous-flow treatment system.