

Title Ozonation: A Biosecurity Technology for the Control of Stored Product Pests and Pathogens
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Abstract

Based on laboratory research, field trials were conducted at the pilot bin facility of the Purdue University Post-Harvest Education & Research Center in July 2003 with corn, an organic rice storage facility in California in September 2003, and a barley farm storage facility in Idaho in December 2003. The basic setup for ozonation at these sites consisted of generating ozone gas from generators using electricity, introducing it at top of the bin, drawdown with a suction fan, and re-circulating ozone back into the bin headspace. Ozonation was done to attain an ozone concentration of 50 ppm in the plenum and maintained for a period of 3 days to achieve insect-mortality comparable to phosphine fumigation. The concept of two phases of ozonation and the airflow rates needed to achieve treatment levels of 50 ppm were confirmed by field trials utilizing commercially available ozone generators. The primary objective was to determine the efficacy of ozonation to control insects and inhibit the growth of fungal spores, bacteria and other pathogens. Inhibiting or eliminating fungal spores reduces production of mycotoxins that can be toxic to humans or mammals when ingested. Pre and post ozonation tests on grain samples were also conducted to determine the effect on end-use parameters like popping volume, fatty and amino acid composition, milling characteristics, and stickiness. Field trial results demonstrated that ozonation effectively controlled stored product pests (like maize weevil, red flour beetle, Indianmeal moth) and also addressed biosecurity issues of by cotoxins and pathogens by inhibiting or eliminating growth of fungal spores and pathogens without affecting the end-use quality of grain.