Ozonation as a Non-chemical Stored Product Protection Technology

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Abstract

Scale-up and demonstration trials were conducted at the pilot bin facility of the Purdue University Post-Harvest Education & Research Center in June 2005 with conventional maize, at a popcorn facility in July 2005, and at an organic maize storage and processing facility in September 2005. The primary objective of these trials was to determine the efficacy of ozonation to control insect pests. The basic setup for ozonation at these sites consisted of generating ozone with commercially available generators, introduction in the headspace, drawdown to the plenum with a suction fan, and re-circulation of 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 mortality of insects comparable to phosphine fumigation. The trials were performed using insect bioassays with adults of maize weevil, red flour beetle and larvae of Indianmeal moth that were placed 0.6 m below the grain surface and in the plenum of silos. The concept of two phases of ozonation and the airflow rates needed to achieve the required treatment levels of 50 ppm were confirmed. The trials proved the efficacy of ozonation in achieving stored product insect mortality comparable to phosphine fumigation. The trials at the popcorn and organic maize facilities confirmed that end-use parameters like popping volume of popcorn and milliability of organic maize were not affected.

Key Words:

Ozonation, Organic, Maize, Stored-Product Pests, Molds, Mycotoxins, IPM.