Penetration of ozone into columns of stored grains and effects on chemical composition and processing performance

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Previous investigations have indicated the effectiveness of ozonation to control insects and fungi in stored grain. To further evaluate the efficacy of ozone for pest control, the current study investigated the flow characteristics of ozone through a less porous grain than maize such as wheat, and the effects of long exposure to a high ozone concentration (50 ppm) on grain quality for end-users of the grain. The flow of ozone through a 3-m column of wheat was similar to that previously observed for maize, having a Phase 1 in which the ozone rapidly degraded as the ozone front moved through the grain and a Phase 2 in which the ozone moved freely through the grain with little degradation. Increasing the velocity of ozone flow from 0.02 to 0.04 m/s facilitated deeper penetration of wheat in a Phase 1 state. Treatment of grains with 50 ppm ozone for 30 d had no detrimental effect on popping volume of popcorn, fatty acid and amino acid composition of soybean, wheat, and maize, milling characteristics of wheat and maize, baking characteristics of wheat, and stickiness of rice. These data indicate that, if repeated ozone treatments are needed, such treatment should not decrease the quality of grain for end-users.

Keywords: Fumigation; Ozone; Grain quality; Pest management

PHOTO CAPTION:
Linda Mason, an associate professor of entomology,

and other members of Purdue University's Post Harvest Grain Quality Research team used mesh bags filled with corn and other grains and infested with insects to test ozone as a fumigant alternative. They found that the gas effectively kills grain-damaging bugs without harming grain quality or the environment. (Purdue Agricultural Communications photo/Tom Campbell)

A publication-quality photograph is available at ftp://ftp.purdue.edu/pub/uns/mason.ozone.jpeg.

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