Requirements for practical use of ozone in storage silos for control of all stages of internal and external feeders in stored products - Recent scientific results and their possible application

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DOI: xx.xxxx/xxx.2014.xxx.xxx.xxx

Abstract

Gaseous ozone (O_3) has potential for control of insects in stored grain. Previous studies have focused on freely exposed insects. Immatures of internal pests (e.g. *Sitophilus* spp. and most stages of *Rhyzopertha dominica* F.) are protected within kernels and probably require higher doses and/or longer treatment times for full control. A laboratory study determined the doses of ozone necessary for full control of freely exposed and internal stages of eleven stored-product pest species. Test insects were three species of *Sitophilus*, *R. dominica*, *Tribolium confusum* Jacquelin du Val, *T. castaneum* Herbst, *Plodia interpunctella* Hubner, *Sitotroga cerealella* Olivier, *Oryzaephilus surinamensis* L., *Ephestia kuehniella* Zeller and *Stegobium paniceum* L. Insects were exposed to continuous flows of ozone in doses of 10–135 ppm and exposure times of 5–8 d. Dose-mortality bioassays were conducted on three species of *Sitophilus* and *P. interpunctella*. In another study the impact of temperature on the effect of ozone was tested on two species of stored product pests: *Sitophilus granarius* and *Plodia interpunctella*. Insects were exposed to continuous flows of ozone in doses of approximately 33 ppm for 6 d or approximately 131 ppm for 8 d at low temperatures between 7.3 and 7.9ºC and high temperatures between 29.6 and 31.6ºC, respectively. Results showed that ozone can be applied to control all stages of internal and external feeders at a wide range of temperatures. Exposure doses are now reasonably well defined. These data suggested a general principle on how a general use of ozone can probably be achieved for practical use in storage bins.

Keywords: ozonation, stored product pests, temperature, *Sitophilus granarius*, *Plodia interpunctella*