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## **The application of ethyl formate for the treatment of stored grain insect pests**

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### **ABSTRACT**

Fumigation treatment of stored grain products is an important component of maintaining commodity integrity. Here, we reported laboratory preliminary trials to evaluate the efficacy of liquid ethyl formate (EF) as a potential fumigant for controlling stored grain insects. Ethyl formate was applied twice with a four-hour interval between applications within a simulated mini grain silo containing 52 kg of wheat and three common durable commodity insect pests (*Sitophilus oryzae* (Linnaeus), *Rhyzopertha dominica* (Fabricius) and *Tribolium castaneum* (Herbst)) in the different locations. Ethyl formate was highly effective in causing acute mortality in the adult life stage of three insect species assessed, with adult mortality greater than 99% across all species 24 h post-fumigation. Variation in the pattern of emergence of adults in the fumigation treatment compared to the control indicate EF had a chronic effect on internal stages (eggs, larvae and pupae) within the grain. Immature life stages of *R. dominica* exhibited the greatest susceptibility to EF, with *T. castaneum* displaying the most tolerance. Additional applications of the fumigant would be necessary to fully control all life stages. Given the acute success of EF in treating the adult life stages of the three species investigated and the chronic effect on immature life stages within the grain, the compound remains a viable grain fumigant for the control of durable commodity pests. Further trials will be required to determine the efficacy of the fumigant to other common insect pest species and the various life stages of these insects.

**Keywords:** Fumigant, Methyl bromide alternative, Ethyl formate, Fumigation, Stored grain insect pests, Insect mortality