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Evaluation of ethyl formate for management of both resistant and susceptible strains of *Cryptolestes pusillus* and *Cryptolestes ferrugineus*

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ABSTRACT

Insect pests are a major issue negatively affecting both quality and quantity of the grain during the post-harvest storage. Fumigation is a widely used method for control of a variety of insect pests due to its high degree of efficacy and cost effectiveness. Phosphine is the main fumigant deployed for the control of stored grain insect pests. However, insect resistance has been accorded to phosphine, this has led to ineffective control of many important stored grain insect species, particularly like *Cryptolestes pusillus* (Schönherr) and *Cryptolestes ferrugineus* (Stephens). As a result, there is an urgent need to identify and evaluate an alternative fumigant. Ethyl formate is proposed as a viable alternative to phosphine due to its status as a registered food additive, favourable environmental properties, kills insect rapidly and low toxicity to humans. This report evaluated ethyl formate as an alternative fumigant to manage phosphine susceptible and resistant strains of *C. pusillus* and *C. ferrugineus*. The results indicated that there were no significant LD_{50} and $LD_{99.5}$ with ethyl formate fumigation between the susceptible and resistant strains of *C. pusillus* and *C. ferrugineus*. That is, there are no cross resistance between ethyl formate and phosphine. The complete control of *C. pusillus* and *C. ferrugineus* can be achieved with in short period of exposure, such as 6 h with lower concentration of ethyl formate.

Keywords: Grain, Insect, *Cryptolestes pusillus, Cryptolestes ferrugineus,* Fumigation, Fumigant, Ethyl formate, Phosphine, Phosphine resistant