

Toxicity of two volatile bioactives, S-carvone and linalool, on five natural enemies of stored product pests

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Abstract

Some active compounds produced by plants have been recently considered as safe alternatives to the use of residual synthetic insecticides. In a previous work, two plant monoterpenoids, S-carvone and linalool had shown high volatile toxicity against a number of pest species. In this work, the toxicity of these two volatile monoterpenoids on five natural enemies proposed for the biological control of stored product pests has been assessed: two hymenopteran parasitoids of Coleoptera larvae developing inside grain kernels, *Anisopteromalus calandrae* (Howard) and *Lariophagus distinguendus* (Förster) (Pteromalidae); two parasitoids of lepidopteran larvae, *Habrobracon hebetor* Say (Braconidae) and *Venturia canescens* (Gravenhorst) (Ichneumonidae); and a poliphagous predatory mite, *Blattisocius tarsalis* (Berlese) (Acari: Ascidae). Both monoterpenoids showed similar volatile toxicity to all parasitoid species. The concentration of linalool that was necessary to kill 95% of the adults of the pest species *Rhyzopertha dominica* (F.) (LC₉₅, 42.18 mg/L) was also very toxic to all four parasitoid species. However, some *L. distinguendus* and *V. canescens* adults survived at the LC₉₅ of S-carvone for the same pest species (29.41 mg/L). The predatory mite was, in comparison, much more tolerant to S-carvone and linalool, and complete mortality was only obtained after increasing the concentration applied. The combined and/or sequential use of biological control and these bioactive compounds could be an alternative to manage pest populations in stored products.

Keywords: biological control, monoterpenoids, plant volatiles, parasitoids, predators