

Effects of methoprene on extreme temperature tolerance and reproduction of *Tribolium castaneum* (Coleoptera: Tenebrionidae)

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Abstract

The juvenile hormone analogue methoprene is a reduced-risk insecticide. It disrupts insect development of immature stages preventing the emergence of adults. Several studies have shown that lower concentrations that permit the emergence of adults also have sub-lethal effects. Exposure to methoprene (Diacon II) at 3.33 ppm reduced the heat tolerance of *Tribolium castaneum* (Herbst) adults. However, it did not affect the heat tolerance of larvae at 0.07 ppm. Higher concentrations of methoprene were lethal to larvae without heat treatment. Methoprene (67 ppm) had no effect on the cold tolerance of adults. Furthermore, methoprene (0.03 ppm) did not alter cold tolerance of larvae. Exposure to 15°C for 2 weeks increased the cold tolerance of adults from 4 d to 7 d, and larvae 3 d to 5 d; however, methoprene concentrations had no effect on cold tolerance. *Tribolium castaneum* larvae exposed to methoprene (0.001 ppm) had lower fecundity as adults. Males were more affected than females in reducing the offspring when paired with untreated mates. These results show the potential of methoprene as an emerging insecticide and a viable alternative to currently used synthetic insecticides. The data on the effect of methoprene on extreme temperature tolerance of *T. castaneum* have been submitted to the Journal of Stored Products Research.

Keywords: Methoprene, Extreme temperature tolerance, Reproduction, Larvae, Adults

References

- Arthur, F. H., 2004. Evaluation of methoprene alone and in combination with diatomaceous earth to control *Rhyzopertha dominica* (Coleoptera: Bostrichidae) on stored wheat. *Journal of Stored Products Research* 40, 485-498.
- Daglish, G. J., Pulvirenti, C., 1998. Reduced fecundity of *Rhyzopertha dominica* (F.) (Coleoptera: Bostrychidae) following exposure of adults to methoprene. *Journal of Stored Products Research* 34, 201-206.