

EFFECT OF PRE-EXPOSURE TO SPINOSAD/SPINETORAM AND FEEDING STATUS ON THE HEAT TOLERANCE OF *Tribolium castaneum* (Herbst) (COLEOPTERA: TENEBRIONIDAE) ADULTS

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Tribolium castaneum is a serious pest of raw and processed stored food. High temperature exposure effectively controls insects, yet expensive. Heat tolerance of *T. castaneum* is reduced following pre-exposure to spinosad, but not tested with spinetoram. These effects may vary with insect status/time of feeding status for which no information is available. The objectives of this study were to determine the effect of feeding time in relation to heat exposure on heat tolerance of adult *T. castaneum* pre-treated with either spinosad or spinetoram. Experiments were laid out as a two-factor factorial, completely randomised design with four replicates. White raw rice flour was sprayed with spinosad (1, 12.5 or 25 ppm), spinetoram (1, 31.25 or 62.5 ppm) or distilled water (0 ppm control) as 15 mL kg⁻¹. Two-week-old *T. castaneum* adults were introduced to each flour media for five days. The survived insects were either maintained in flour (experiments 1 and 3) or without food (experiments 2 and 4) and then exposed to 42°C for 12 h. After heat exposure, insects were maintained either with flour (experiments 2, 3) or no food (experiments 1, 4) for another 5 days and survival/mortality was determined. The data were analysed using a mixed-model in SAS with significance level at $p=0.05$. Mortality increased following pre-exposure to spinosad but not with spinetoram. The mortality of insects off-fed continuously or only before heat exposure was significantly higher than that of insects fed continuously or only before heat exposure. The highest mortality (94%) occurred when adults were pre exposed to spinosad and continuously starved whereas the lowest (13%) was in those pre-exposed to spinetoram and fed before heat exposure. This study concludes that thorough cleaning of facilities and thus removal of food would augment the efficiency of a heat treatment through reduced survival of *T. castaneum*.

Keywords: High-temperature, Insecticidal efficacy, Red flour beetle, Reduced-risk insecticides, Starvation