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IMPACT OF SUB-LETHAL DELTAMETHRIN EXPOSURE ON FECUNDITY OF PYRETHROID RESISTANT MALE BED BUGS

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Abstract The purpose of this study was to evaluate sub-lethal dose effect of deltamethrin on the reproduction of resistant male *C. lectularius*. The deltamethrin-based product Suspend Polyzone (4.75% deltamethrin, 95.25% other ingredients; Bayer Environmental Science) was applied to 10.16 cm^2 raw wood panels at the 0.03% label rate using a compressed air sprayer at 25 psi. Control panels were treated in the same manner using distilled water. All treated wood was allowed to dry 24 hours. One plastic medicine cup (30 ml) with the bottom removed was inverted and secured to each treated panel using heated paraffin wax to prevent bed bug escape. A preliminary 30 minute exposure test using five virgin male Harold Harlan strain, pyrethroid susceptible, bed bugs was performed in conjunction with five virgin Jersey City, NJ, USA, deltamethrin resistant (>300X resistant to topical deltamethrin application) male bed bugs. There was 100% mortality and moribundity at 24 hours post-exposure for susceptible males, while 100% of the resistant males were alive. After the preliminary exposure test, twenty Jersey City, deltamethrin resistant virgin male bed bugs were fed on the same day wood panels were treated with Suspend Polyzone or water for the control. Ten bed bug males were exposed to the Suspend Polyzone treated wood panels and ten bed bug males were exposed to the water treated wood panels for 30 minutes at 24 hours post treatment and then removed to a clean vial. Twenty virgin, Jersey City females were given a blood meal three days post-treatment and immediately introduced at a 1:1 ratio to the either the Suspend Polyzone exposed males or the water exposed males for mating. Twenty-four hours after mating, the females were moved to a clean glass vial to lay eggs. After 10 days when no new eggs were recorded, all females were removed from the vials. The average number of eggs per female and egg hatch rate was calculated. First instar nymphs were fed 7 days after eclosion and monitored for successful molting to second instar. There was no significant difference between the mean number of eggs laid per control female and the females mated with deltamethrin exposed males, 12.40 and 12.0 respectively ($p=0.8680$). There was no significant difference between the mean number of nymphs hatched from control female eggs and the eggs of females mated with deltamethrin exposed males, 11.77 and 11.22 respectively ($p=0.9327$). There was also no significant difference in the mean proportion of nymphs hatched from control female eggs and the eggs of the females mated with deltamethrin exposed males, 83.47% and 83.79% respectively. In this study there were no significant differences in the fecundity of deltamethrin resistant male bed bugs after a sub-lethal exposure. However, differences may have been detected under different experimental conditions.

Key words *Cimix lectularius*, insecticide, reproduction