

Effect of Insecticides on *Closterocerus okazakii* and *Chrysoncharis pentheus* (Hymenoptera: Eulophidae), Parasitoids of *Liriomyza sativae* (Diptera: Agromyzidae)¹

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Abstract

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Closterocerus okazakii (Kamijo) and *Chrysoncharis pentheus* (Walker) are important native parasitoids of *Liriomyza sativae* Blanchard in Taiwan. In this study, seedlings of field bean (*Phaseolus vulgaris* var. *communis* Aeschers) infested with parasitoids or *L. sativae* were used to determine effect of insecticides (oxamyl SL, abamectin EC, cyromazine SL, and cyromazine WP) on *C. okazakii* and *C. pentheus* at different development stages under laboratory conditions. Results showed that all the three tested insecticides had a significant ($p < 0.05$) lethal effect on *C. okazakii* and *C. pentheus* in adult stage but no lethal effect on other development stages (egg, larva and pupa). When adult wasps were treated with insecticides for 24 hours, survival rates of female and male decreased by 62.9 and 7.1%, respectively, for abamectin in *C. okazakii*, 36.0 and 7.0%, respectively, for oxamyl in *C. pentheus*, whereas the others had no significant effects with decreased survival rates or significantly decreased by 4.0–8.2% only. The progeny of these two species of parasitoids decreased by 75.0–87.7% after the treatment of adults with either abamectin or cyromazine for 24 hours, and 50.6–58.3% by the treatment of adults with oxamyl. Among the three insecticides tested, abamectin was the most toxic insecticide for both parasitoid species. When adult wasps were treated with abamectin for 24 hours and released on untreated bean seedlings infested with hosts daily, the longevity of female wasps, longevity of male wasps, number of wasp progeny, and number of *L. sativae* killed by wasps decreased by 79.0–94.6, 61.7–67.5, 100 and 99.8–100%, respectively. In *C. okazakii*, treatment of adult wasps with both formulations of cyromazine resulted in 23.8% reduction of wasp progeny and treatment of adult wasps with oxamyl resulted in 30.2% reduction of female proportion. In *C. pentheus*, treatment of adult wasps with both formulations of cyromazine or oxamyl resulted in 42.4–52.5% reduction of wasp progeny and 21.9–34.5% reduction in the number of hosts killed by wasps. The percentage of hosts-killed increased 0.6 fold by the combined treatment of insecticide and *C. okazakii*, and 1.5 fold by the combined treatment of insecticide and *C. pentheus*, compared to the treatment of *C. okazakii* or *C. pentheus* alone. Abamectin was incompatible

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when used with both *C. okazakii* and *C. pentheus*, whereas oxamyl was incompatible with *C. pentheus*. The results suggest that cyromazine is less harmful to *C. okazakii* and *C. pentheus* and it can be used with these parasitoids for the control program of *L. sativae*.

Key words: *Liriomyza sativae*, *Closterocerus okazakii*, *Chrysocharis pentheus*, Insecticides, Development stages.

