

Abstract

Ladybird *Hippodamia variegata* (Goeze) (Col.: Coccinellidae) is an important predator of pistachio psylla. The best way to evaluate the insecticidal effect on insect is demographic toxicology. In this study, side effects of different concentrations of pesticides including Spirotetramat and Acetamiprid were studied on the third instar larvae of *H. variegata* under controlled laboratory conditions (temperature $27.5 \pm 1^\circ \text{C}$, relative humidity $65\% \pm 5$ and photoperiod of 16 hours of light and 8 hours of darkness). The results showed that the LD_{50} values of Spirotetramat and Acetamiprid were obtained as 4689.944 and 76.816 ppm, respectively. Both pesticides significantly increased the developmental period of immature stages of *H. variegata*. The mean of duration time of larval growth and its development increased in acetamiprid treatment (11.73 days) compared with control (9.31 days). Both treatments decreased the survival rate of *H. variegata* in comparison with control. Acetamiprid significantly caused more negative side effects on the reproductive parameters of this ladybird compared with control. Maximum and minimum values of net reproductive rate and net reproduction rate were obtained as 229.57 and 188.24 in control treatment and 138.22 and 88.46 in Acetamiprid treatment, respectively. Gross hatch rate was found to be maximum and minimum values as 0.81 and 0.64 in control and Acetamiprid treatments, respectively. Means of the intrinsic rates of increase (r_m) values in the same age group of the ladybirds treated with Acetamiprid, Spirotetramat, and control were 0.107 ± 0.0014 , 0.127 ± 0.0022 and 0.156 ± 0.0023 , respectively. The number of eggs per female per day and the number of fertilized eggs per female per day were obtained as 2.53 and 1.80 for Spirotetramat and 2.34 and 1.49 for Acetamiprid. The parameters including gross and net reproductive rate, as well as finite rate of increase intrinsic birth rate significantly increased Spirotetramat compare to Acetamiprid. Similarly, the average of generation time (T) significantly increased in Acetamiprid and Spirotetramat compared with control. Based on findings of this study, it can be concluded that the side effects of Acetamiprid and Spirotetramat which were routinely applied in the pistachio orchards against insect pests could effectively threaten the biological parameters of *H. variegata* and directly increase the efficiency of this natural enemy of the pest population.

Key words: Demographic toxicology, *Hippodamia variegata*, Reproductive parameters, Life table, Side effects, Acetamiprid, Spirotetramat.



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**Biological effects of two pesticides Spirotetramat and
Acetamiprid on *Hippodamia variegata* (Goez) (Col.:
Coccinellidae) in laboratory condition**

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