

Sublethal Effects of Clothianidin and Summer Oil on the Demographic Parameters and Population Projection of *Brassicorhynchus brassicae* (Hemiptera: Aphididae)

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Abstract : The cabbage aphid, *Brassicorhynchus brassicae* (Hemiptera: Aphididae), is known as an economically important and oligophagous pest of different cole crops. The polyvoltine characteristics of *B. brassicae* resulted in resistance to insecticides. For this purpose, in this study, the sub-lethal concentration (LC25) of two insecticides, clothianidin and summer oil, on the life table parameters and population projection of cabbage aphid were studied at controlled condition (20 ± 1 °C, R.H. 60 ± 5 % and a photoperiod of 16:8 h (L:D). The dipping method was used in bioassay and life table studies. Briefly, the leaves of cabbage containing 15 the same-aged (24h) adults of cabbage aphid (four replicates) were dipped into the related concentrations of insecticides for 10 s. The sub-lethal (LC25) obtained concentration were used 5.822 and 108.741 p.p.m for clothianidin and summer oil, respectively. The biological and life table studies were done using at least 100, 93 and 82 the same age of eggs for control, summer oil and clothianidin treatments respectively. The life history data of the greenhouse whitefly cohorts exposed to sublethal concentration of the aforementioned insecticides were analyzed using the computer program TWOSEX-MSChart based on the age-stage, two-sex life table theory. The results of this study showed that the used insecticides affected the developmental time, survival rate, adult longevity, and fecundity of the F1 generation. The developmental time on control, clothianidin and summer oil treatments was obtained (5.91 ± 0.10 days), (7.64 ± 0.12 days) and (6.66 ± 0.10 days), respectively. The sublethal concentration of clothianidin resulted in decreasing of adult longevity (8.63 ± 0.30 days), fecundity (14.14 ± 87 nymphs), survival rate (71%) and the life expectancy (10.26 days) of *B. brassicae*, as well. Additionally, usage of LC25 insecticides led to decreasing of the net reproductive rate (R_0) of the cabbage aphid compared to summer oil and control treatments. The intrinsic rate of increase (r) (day⁻¹) was decreased in F1 adults of cabbage aphid compared with other treatments. Additionally, the population projection results were accordance with the population growth rate of cabbage aphid. Therefore, the findings of this research showed that, however, both of the insecticides were effective on cabbage aphid population, but clothianidin was more effective and could be consider in the management of aforementioned pest.

Keywords : the cabbage aphid, sublethal effects, survival rate, population projection, life expectancy

Conference Title : ICISE 2024 : International Conference on Insect Science and Entomology

Conference Location : London, United Kingdom

Conference Dates : June 27-28, 2024