

## Efficacy of various insecticides and bio-control agent (*Trichogramma chilonis*) against tobacco budworm (*Helicoverpa armigera*) infesting flue cured virginia tobacco

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### Abstract

An experiment regarding the efficacy of synthetic insecticides and biocontrol agent (*Trichogramma chilonis* Ishii) against tobacco budworm (*Helicoverpa armigera*) was carried out at Gohati village, Swabi, Khyber Pakhtunkhwa under field conditions during the year 2023. For this purpose, seedlings of tobacco cultivar “K-399” having 10 cm heights were transplanted into the field in the month of March. The experiment was laid out in RCBD having 5 treatments (Thiamethoxam, Chlorantraniliprole, Emamectin benzoate, *T. chilonis* and control) replicated three times. A total of three spray were done during the crop growth period. Results revealed that after 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> spray of applications, significantly lowest mean numbers of tobacco budworms (0.97, 0.77 and 0.56) larvae plant<sup>-1</sup> were recorded from tobacco plots treated with Emamectin benzoate, followed by Chlorantraniliprole, Thiamethoxam, and *T. chilonis*, respectively where (1.76, 1.31, 1.13) (1.89, 1.36, 2.70) and (3.03, 2.70, 2.58) mean numbers of budworm larvae were recorded respectively. However, statistically highest mean numbers of tobacco budworms (6.25, 11.09 and 17.92 larvae plant<sup>-1</sup>) were recorded from control plot. Similarly, data regarding time intervals showed that statistically lowest mean number of tobacco budworm (1.42, 2.25 and 3.27 larvae plant<sup>-1</sup>) was recorded 1-day post-treatment time interval, while significantly highest mean number of tobacco budworm (4.44, 5.28 and 6.71 larvae plant<sup>-1</sup>) was recorded after 14 days of treatment application. The interaction demonstrated that significantly maximum number of tobacco budworm (8.86, 13.20 and 21.20 larvae plant<sup>-1</sup>) was recorded from the interaction of control with 14 days post-treatment application, while significantly minimum number of tobacco budworm (0.31, 0.10 and 0.08 larvae plant<sup>-1</sup>) was recorded from the interaction of emamectin benzoate with 1-day post-treatment application. Mean data regarding the efficacy of various synthetic insecticides and *T. chilonis* on mean percent plant damaged by *H. armigera* showed that after of 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> sprays statistically lowest mean percent damage (2.37%) was recorded from Emamectin benzoate treated plants. While, statistically highest mean percent damage (12.72%) was recorded from Control plot. The plot treated with *T. chilonis* resulted in 6.19% mean percent damage. Statistically maximum leaf area (789.65 cm<sup>2</sup>) and number of leaves (24.72 leaves plant<sup>-1</sup>), Grade index (74.14%), Sugar content (18.11%), Nicotine content (2.44%) and cured leaf yield (3271.2 kg ha<sup>-1</sup>) was recorded from Emamectin benzoate treated plots. The plot treated with *T. chilonis* resulted in 684.70 cm<sup>2</sup> leaf area, 21.40 numbers of leaves, 66.20% grade index, 14.31% sugar content, 2.00% nicotine content and 2721.90 kg ha<sup>-1</sup> yield. While significantly minimum leaf area (609.86 cm<sup>2</sup>), number of leaves plant<sup>-1</sup> (20.07 leave plant<sup>-1</sup>), Grade index (53.68%), Sugar content (12.02%), Nicotine content (1.76%), and yield (2319.7 kg ha<sup>-1</sup>) was recorded from control plot. Emamectin benzoate was found to be significantly effective among tested treatments against budworm infestation and hence can be used in combination with *T. chilonis* against tobacco budworm in tobacco fields.

**Key Words:** Tomato fruit borer, *Trichogramma*, FCV, Emamectin, Thiamethoxam

