



Effectiveness and Residual Effect of *Bacillus thuringiensis israelensis* for the Control of *Aedes* Species (Diptera: Culicidae) under Laboratory Condition

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Abstract

Bacillus thuringiensis subspecies *israelensis* (Bti) is regarded as the most promising microbial control agent against dengue vectors. Commercially, Bti is available in several formulations, and in Sri Lanka, it is designated as a larvicide for generalized and domestic use. So, this laboratory experiment was designed to evaluate the effectiveness and residual effect of solid formulation of Bti for the control of *Aedes* species. The study was conducted from July to December 2023. For this study, commercially available Bti H-14 mosquito dunks were used. *Aedes* eggs were collected by placing ovitraps in Panadura and Bulathsinhala areas in Kalutara district. Those eggs were reared, and 3rd and 4th instar larvae were used for the experiment. Three replicates were prepared for both treatment and control. A hundred larvae were transferred to each treated and untreated tray, and 24-hour mortality was recorded. An experiment was carried out for up to 22 weeks to detect the residual effect. Every week, 100 3rd or 4th instar larvae were added to each tray without adding Bti dunk. One-way ANOVA test

was used to determine the significant difference in larval mortality between treatment and control. According to that, there was a significant difference ($p < 0.05$) between the mortality of treatment and control up to the 14th week. Within the first week of post-treatment, larval mortality was $94 \pm 2\%$. After that, 100% larval mortality was observed from the 2nd to 5th week of post-treatment. During this period, both *Ae. aegypti* and *Ae. albopictus* larvae collected from Panadura area and *Ae. albopictus* larvae collected from Bulathsinhala area showed 100% mortality. So, this study indicates that commercially available solid formulation of Bti can be used as an effective bio-larvicide to control *Aedes* mosquito vectors in Kalutara district. Nevertheless, further studies should be done at different concentrations lower than the recommended dose and under different field conditions to get more information on the effectiveness and residual effect of Bti.

Keywords: *Aedes* species, *Bacillus thuringiensis israelensis*, Effectiveness, Laboratory condition, Residual effect

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