VectoBac G (Bti) Efficacy for Field Application of Ochlerotatus abserratus Mosquito Larvae

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Abstract

Bacillus thuringiensis israelensis (Bti) is a commonly used larvicide part of many mosquito control programs. We tested the potency of VectoBac G (Bti) after it had been stored away for about a year. 3rd instar *Ochlerotatus abserratus* larvae were subject to five treatments: two sub-lethal dosages of 2.5 and 5 lbs/acre, minimum and maximum label rate of 10 and 20 lbs/acre, and untreated control. Larval mortality was recorded at 1-hr, 2-hr, 24-hrs, and 48-hrs post exposure. After 24 hours, more than 92% mortality in larvae exposed to all treatments of Bti. 100% mortality recorded after 48 hours of exposure to all treatments of Bti. Untreated Control group reported 2% mortality after 48 hours. VectoBac G is still very potent after one year if stored properly.

Objective

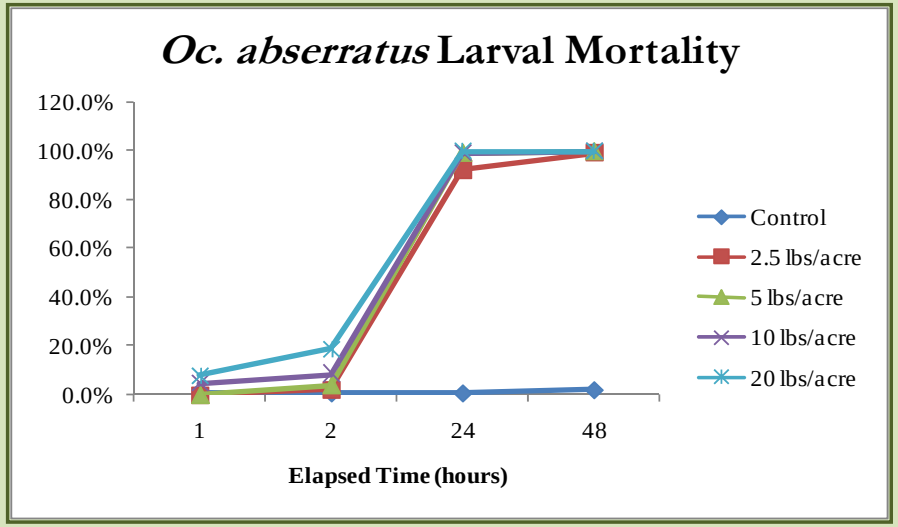
The Norfolk County Mosquito Control Project conducts an extensive and calculated aerial larvicide program early in the mosquito season to suppress the imminent mosquito population. The intent of this experiment was to test the shelf-life and potency of VectoBac G (Bti), the primary larvicide for the Norfolk County Mosquito Control Project, after it had been stored away for a season or more.

Materials and Methods

The recommended label rate is 2.5-10 lb/acre for 1st-2nd instar larvae and 10-20 lb/acre for 3rd-4th instars or when the water is heavily polluted.

For our 3rd instar *Oc. abserratus* larvae we used the recommended label-rate treatments of 10 lb/acre and 20 lb/acre and sub-label rates of 25% and 50% of the minimum label rate (2.5 lb/acre and 5 lb/acre respectively). These sub-label rates will be considered sub-lethal dosages for the purposes of this experiment.

Since we had 17 in x 12 in tubs in the lab we converted the acreage application for square footage of these tubs (volume application rate is not described).



Mortality per 150 larvae

	Control		Total	0.04g		Total	0.07g		Total	0.15g		Total	0.30g		Total
Time (H)	Number	%	Mortality	Number	%	Mortality	Number	%	Mortality	Number	%	Mortality	Number	%	Mortality
1	1	0.7%	0.7%	0	0.0%	0.0%	0	0.0%	0.0%	7	4.7%	4.7%	12	8.0%	8.0%
2	0	0.0%	0.7%	3	2.0%	2.0%	6	4.0%	4.0%	6	4.0%	8.7%	16	10.7%	18.7%
24	0	0.0%	0.7%	136	90.7%	92.7%	143	95.3%	99.3%	136	90.7%	99.3%	122	81.3%	100.0%
48	2	1.3%	2.0%	10	6.7%	99.3%	1	0.7%	100.0%	1	0.7%	100.0%	0	0.0%	100.0%
Total	3	2.0%		149	99.3%		150	100.0%		150	100.0%		150	100.0%	

Materials and Methods

Application rate of 1 lb/acre

1 acre= 43,560 ft^2

1 lb/43,560 ft^2 = 2.29 x 10^{-5} lb/ ft^2

2.29 x 10^{-5} lb/ ft^2 x 453.6g/lb= 0.01 g/ft^2

Application rate of 1 lb/acre for 17 in x 12 in tubs

Area of tub= 17 in x 12 in= 204 in:

204 in^2 x 1 ft^2/ 12 in^2 = 1.42 ft^2

0.01 g/ft^2 x 1.42ft^2= 0.0148 g

Application rates for 1.42ft^2 tubs

2.5 lb/acre= 0.0148 g x 2.5= 0.037 g

5 lb/acre= 0.0148 g x 5= 0.074 g

10 lb/acre= 0.0148 g x 10= 0.148 g

20 lb/acre= 0.0148 g x 20= 0.296 g

Three sets of 5 basins each (4 treatments and 1 control) were filled to a depth of ~1/2 in of field collected water. Before filling basins with water, we lined ours with white trash bags (due to the fact that our basins are black) to make the mosquito larvae more visible.

We collected and identified larvae from the field as *Ochlerotatus abserratus*. 50 larvae were transferred into each basin for a total of 750 larvae in all 15 basins.
Next, a few pinches of ground fish food (fish flakes) were added to each basin to encourage feeding activity. Immediately afterwards, the corresponding amounts of Bti were added to each treatment basin.

Larvae mortality was recorded in 1 hr, 2 hr, 24 hr, and 48 hr intervals. To control for cross-contamination among treatment and control basins, we used a different dropper for each basin.

Conclusion

After about a year in storage, VectoBac G was still very potent. Even at the sub-label rate for 3rd instar larvae, we achieved more than 99% larval mortality after 48 hours of exposure. These results may vary in a more organic or polluted larval habitat.