

Pome Fruits—Biology

Bioassay, Field-Aged Residues of *Bacillus thuringiensis* (*Bt*) Against Leafrollers, 1992

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Using a leaf-disk bioassay, different *Bt* products were evaluated for their effect on PLR larvae. *Bt* products were applied to Red Delicious apple trees at their recommended field rates as shown in Table 1 using a handgun sprayer at 300 psi to the point of drip, simulating a dilute spray of approximately 400 gallons per acre. Treated apple leaves were collected 1, 3, 5, 7 and 9 days post-treatment. Two punches (2.3 cm diameter) were taken from each of 20 leaves per treatment on each date. Four punches were placed in a petri dish (Falcon 1006, 50 x 9 mm). Five one- to two-day-old leafroller larvae were placed on the leaf disks and the petri dish lid was put in place. Ten dishes were used for each *Bt* product and rate (50 larvae per treatment). Dishes were placed inside a food storage container with a wet paper towel to maintain a high humidity and kept at 75°F ($\pm 2^\circ\text{F}$) constant temperature and 16:8 photoperiod. Dishes were examined after 96 and 144 hours to determine larval survival. Data were corrected for untreated mortality using Abbot's formula.

Percent larval mortality caused by all products declined through the fifth day when results became variable (Table 1). Javelin gave the highest larval mortality at 1 and 3 days post-treatment, followed by Dipel, then MVP. MVP at the 3-quart rate gave higher larval mortality at 1 and 3 days post-treatment compared to the 2-quart rate. The pattern of declining larval mortality for MVP was similar to that of the other *Bt* products even though the initial level of mortality was much less. The short residual life of all *Bt* products indicates that repeat applications at 7-day intervals during the period when the pest's susceptible stage is present would be required to achieve acceptable commercial control.

Table 1. Corrected percent mortality of PLR larvae exposed to field-aged residues of *Bt* products using a leaf-disk bioassay method.

		Corrected percent larval mortality—96 hours ¹ (days after treatment)				
Product	Rate form./acre	1	3	5	7	9
Dipel 2X	1 lb	51.1b	39.1a	31.8b	16.2ab	42.5b
Javelin	1 lb	80.0c	50.0a	29.5b	32.4b	22.5ab
MVP	2 qt	11.1a	26.1a	9.1ab	5.4ab	35.0b
MVP	3 qt	37.8b	32.6a	25.0ab	0.0a	0.0a

		Corrected percent larval mortality—144 hours ¹ (days after treatment)				
Product	Rate form./acre	1	3	5	7	9
Dipel 2X	1 lb	57.1b	41.3a	37.5b	17.2a	45.9b
Javelin	1 lb	90.5c	52.2a	30.0ab	24.1a	32.4ab
MVP	2 qt	14.2b	32.6a	7.5ab	3.4a	35.1ab
MVP	3 qt	40.5a	43.5a	32.5ab	0.0a	5.4ab

¹Means in the same column and days after treatment with the same letter are not significantly different (P=0.05, Student-Newman-Keuls).