

Chemical Control/New Products

Effects of Molt Accelerating Compound Residue on Leafroller Larvae

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Using a leaf-disk bioassay, Rohm and Haas experimental ecdysone agonists or Molt Accelerating Compounds (MAC), RH 5992 and RH 2485, and Pennncap-M were evaluated for residue effects on PLR and OBLR neonate larvae. The test was conducted in an apple orchard at the Tree Fruit Research and Extension Center. The trees were 15-year-old spur-type Red Delicious on dwarfing roots. The treatments were applied on 4 Aug at the recommended rate with a handgun sprayer at 300 psi to the point of drip, simulating a dilute spray of approximately 400 gal/acre. Each treatment was replicated three times with one tree in each. Ten leaves were collected from the interior canopy of each tree at 4, 7, 14, 21 and 28 days post-treatment. Two punches (2.3 cm diameter) were taken from each leaf. Four punches were placed in a petri dish (Falcon 1006, 50 x 9 mm), keeping the leaves from each replication separate. Petri dishes were chosen randomly, and five one- to two-day-old leafroller larvae were placed on the leaves. Five petri dishes were prepared for each tree and each leafroller species (75 larvae/treatment). The petri dishes were placed inside a food storage container and kept at 20°C constant temperature and 16:8 photoperiod. Petri dishes were examined after seven days and larval survival recorded.

All treatments were better than the untreated check so statistics were run on the treatments only. All chemicals caused high levels of leafroller larval mortality to 28 days after treatment (DAT, Tables 1 and 2). Residues of RH 5992 on PLR began to break down slightly earlier than RH 2485 or Pennncap-M, but none of the treatments was statistically different at 28 DAT. RH 5992 on OBLR showed more degradation at 21 and 28 DAT than RH 2485 but only at 28 DAT was this difference statistically significant.

Experimental ecdysone agonists or Molt Accelerating Compounds (MAC), RH-5992 and RH-2485, were evaluated using a leaf-dip bioassay to determine their effect on PLR and OBLR larvae. Concentrations of RH 5992 and RH 2485 were diluted in 500 ml of water plus 2 ml of X-77® wetting agent. An untreated control was prepared using water plus the wetting agent. Untreated apple leaves were collected from Red Delicious trees at the WSU Tree Fruit Research and Extension Center, Wenatchee. Leaves were dipped, then allowed to dry. Two punches (2.3 cm diameter) were taken from each leaf. Four punches were placed in a petri dish (Falcon 1006, 50 x 9 mm). Petri dishes were chosen randomly, and five one- to two-day-old leafroller larvae were placed on the leaf disks. The petri dish lids were put in place, and dishes were stored inside a food storage container with a moist paper towel to maintain high humidity and kept at 75°F (±2°F) constant temperature and 16:8 photoperiod. Petri dishes were examined after seven days and larval survival recorded. Ten dishes were used for each treatment (50 larvae/treatment).

Rate responses were noted at 3, 7 and 10 days' exposure for both RH 2485 and RH 5992 ($P < 0.05$). The dose-mortality curves were determined using data from 7 DAT. The LC_{50} and

LC₉₀ for RH 2485 were significantly lower than RH 5992 for PLR and OBLR (Tables 3 and 4). Good fit of data to a dose-mortality line was obtained for RH 2485 against PLR and OBLR and RH 5992 against OBLR; however, more data points are needed to better define the upper end of the dose-mortality relationship for RH 2485 against OBLR. The LC₉₀ values for both products were well below the anticipated rate to be recommended for field application, 90 ppm.

Table 1. Percent mortality of PLR larvae exposed to residues using a leaf-dip bioassay method.

Treatment	Rate form./100)	Average corrected % mortality				
		4 DAT ¹	7 DAT	14 DAT	21 DAT	28 DAT
RH 5992	140 ml	100.0b	91.2b	91.5b	86.4b	92.4b
RH 2485	140 ml	100.0b	100.0c	100.0c	95.5bc	92.4b
Pennacap-M	960 ml	100.0b	100.0c	100.0c	100.0c	98.1b
Check	--	0.0a	0.0a	0.0a	0.0a	0.0a

Means in the same column followed by the same letter not significantly different (P=0.05, Fisher's Protected LSD).

¹DAT=days after treatment.

Table 2. Percent mortality of OBLR larvae exposed to residues using a leaf-dip bioassay method.

Treatment	Rate form./100)	Average corrected % mortality				
		4 DAT ¹	7 DAT	14 DAT	21 DAT	28 DAT
RH 5992	140 ml	100.0b	100.0b	93.6b	83.8b	76.3b
RH 2485	140 ml	100.0b	100.0b	98.4b	91.9bc	91.5c
Pennacap-M	960 ml	100.0b	100.0b	98.4b	100.0c	96.6c
Check	--	0.0a	0.0a	0.0a	0.0a	0.0a

Means in the same column followed by the same letter not significantly different (P=0.05, Fisher's Protected LSD).

¹DAT=days after treatment.

Table 3. Dose-mortality relationship determined by exposing PLR larvae to molt accelerating compounds using a leaf-dip bioassay method, 7 days after treatment.

Treatment	Concentration (ppm)		Confidence interval	Significance index (g)
	LC ₅₀ (limits) ¹	LC ₉₀ (limits) ¹		
RH 2485	0.33 (0.21 to 0.46)	1.54 (1.07 to 2.86)	0.95	0.11
RH 5992	1.33 (0.22 to 2.17)	16.69 (8.68 to 219.14)	0.90	0.39

¹Probit analysis performed by POLO-PC.

Table 4. Dose-mortality relationship determined by exposing OBLR larvae to molt accelerating compounds using a leaf-dip bioassay method.

Treatment	Concentration (ppm)		Confidence interval	Significance index (g)
	LC ₅₀ (limits) ¹	LC ₉₀ (limits) ¹		
RH 2485	0.32 (0.28 to 0.40)	1.08 (0.84 to 1.55)	0.95	0.05
RH 5992	2.19 (1.12 to 2.86)	5.47 (3.98 to 16.08)	0.95	0.39

¹Probit analysis performed by POLO-PC.