Pome Fruits—Chemical Control

Effects on Honey Bees of Ambush or Dimethoate Applied to Apples

D. F. Mayer, R.D. Britt and J.D. Lunden
Washington State University Irrigated Agricultural Research and Extension Center, Prosser, WA

Keywords: bees, Ambush, Dimethoate, apple

Four plots were established in a 5-year-old commercial orchard of Golden Delicious apples at Harrah, WA. Plot size was 4.5 acres. One plot was sprayed with Ambush (8 oz/ acre), one plot was sprayed with Ambush (16 oz/acre), and one plot sprayed with Dimethoate (4 lb/acre). One small part near the orchard center on the west side was not treated and served as the check. The orchard contained a high population of blooming mustard on the orchard floor. Spray applications were done when the orchard was at 5% open bloom, using a tractor-drawn air-blast sprayer at a rate of 250 gallons of water per acre. Applications were 26 April at 8 am with the low rate of Ambush, followed by the high rate of Ambush and then the Dimethoate ending at 11 am. Undertree sprinklers were turned on during the night on 26, 27, and 30 April for frost control.

The number of honey bees per tree per 30 seconds (10 replications) foraging in the plots was recorded on 26, 27, 29 and 30 April.

On 25 April, 4 strong honey bee colonies with Todd dead bee traps were established adjacent to each plot. The number of dead bees in the traps was recorded prior to 8 am before and following the chemical application. Prior to application and on 6 May colony conditions and the frames of bees were recorded for each colony.

Results

There were no significant differences in the number of honey bees foraging the trees in any of the plots as compared to the untreated check (Table 1). However, there were few bees foraging the apple trees.

Ambush (8 oz/acre). The application resulted in a low kill of adult bees on days 2, 3, and 4 following the application (Table 2). The average number of frames of adult bees per colony was 13 prior to application and 12.5 at the conclusion of the test. On 6 May, there was no break in the brood cycle and all colonies had good numbers of brood.

Ambush (16 oz/acre). The application resulted in a low kill of adult bees on days 1, 3 and 4 following the application and a moderate kill on day 2 following the application (Table 2). The average number of frames of adult bees per colony was 13 prior to application and 14 at the conclusion of the test. On 6 May, there was no break in the brood cycle and all colonies had good numbers of brood.

Dimethoate. The application resulted in a moderate kill of adult bees for 4 days following the application and a low kill on day 5 (Table 2). The average number of frames of

adult bees per colony was 13 prior to application and 11.5 at the conclusion of the test. On 6 May, one colony had a break in the brood cycle though new eggs were present. The other colonies did not have a break in the brood cycle and had good numbers of brood. During the study all colonies had symptoms of bee poisoning such as pulling larvae or pupae from the colony and increased incidence of chalkbrood.

Conclusion

The test was almost a worse case scenario. The sprays were applied one day later than planned and applied in the morning rather than the evening because of inclement weather. Sprinklers were turned on at night for frost control, resulting in wet foliage. Wet foliage normally increases the hazard of any insecticide to bees. However, the results using Ambush are quite encouraging and further work is necessary to determine if Ambush can be used without significant effects on honey bees.

Table 1. Effects of applying insecticides to 'Golden Delicious' apples on 26 April (5% open bloom) on honey bee (HB) foraging, Harrah, WA, 1991.

		Mean no. HB/tree/30 sec			
Treatment	Rate/acre	26 Apr	27 Apr	28 Apr	29 Apr
Ambush 2EC	8 oz	0a	0.4a	0.1a	1.0a
Ambush 2EC	16 oz	0a	0.4a	0.3a	0.5a
Dimethoate 25WP	4 lb	0a	0.3a	0.4a	0.2a
Untreated check	---	0a	0.5a	0.2a	0.3a

Means within a column followed by the same letter are not significantly different at the P=0.05 level, Newman-Keuls studentized range test.

Table 2. Effects of applying insecticides to 'Golden Delicious' apples on 26 April (5% open bloom) on honey bee (HB) mortality, based on Todd dead bee traps in colonies placed adjacent to treated plots, Harrah, WA, 1991.

	Rate/	Mean no. HB/colony/day						
Treatment	acre	26 Apr	27 Apr	28 Apr	29 Apr	30 Apr	1 May	2 May
Ambush 2EC	8 oz	69	66	151	137	195	101	56
Ambush 2EC	16 oz	49	116	330	155	169	100	53
Dimethoate 25WP	4 lb	85	561	465	562	508	279	115