Section V
Soil Arthropods

LAB AND FIELD TRIALS TO CONTROL ROOT WEEVIL LARVAE IN SMALL FRUITS

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The residual persistence of the experimental neonicotinoid Actara (thiamethoxam) was bioassayed with black vine and rough strawberry root weevils collected from a 'Totem' field in Woodland, WA. Actara was applied at 0.086 lb(AI)/acre from a low pressure boom sprayer equipped with 3 Floodjet TK-SS20 nozzles calibrated to apply 114 gpa at 58 psi at 2.1 mph on 12 July 2004. Four days after treatment, 45 leaves were collected and divided into 3 sets of 15 leaves placed in water vials capped with cotton plugs. These field-weathered leaves were held under lab condition for another 6 days. Forty-five black vine weevil and 45 rough strawberry root weevil adults were placed in groups of 3 per treated leaf and observed for mortality from day 5 to day 10 after field application. A mixture of both weevil species was used as the untreated check for which no mortality occurred over the testing period.

Compared with excellent contact/stomach activity of foliar applied Brigade/Capture, mortality on 5 day old Actara residue was 29% for both species (Table 1). Maximum mortality of 76% and 84% was recorded for the black vine weevil and rough strawberry root weevil, respectively, on 10 day-old residue held under lab conditions. Data from Syngenta showed that as much as 60% of the active ingredient moved into sprayed tomato leaves by day 9 and 50% remained by day 21. Because of the translaminar movement of Actara, its extended residual control is at least 2-fold more than foliar applied Capture/Brigade.

The contact and translaminar mode of entry for Actara was measured at varying times after application on red raspberry foliage for adult, rough strawberry root weevil. Several 'Meeker' plants were sprayed with Actara at 0.06 lb(AI)/acre on 12 July at the Vancouver REU. Ten leaves were sampled daily for 9 days posttreatment from treated and untreated plants. Three adult, rough strawberry root weevils were placed on each leaf whose petiole was placed in a water-filled vial capped with a cotton plug and held in 6 inch Petri dishes. Daily cohorts of 30 weevils each for both treatments were held for 5 days. Excellent contact and stomach poison activity was observed within 24 hours of the application through 8 days posttreatment (Table 2).

The contact activity of Admire (imidoclopyrid), Platinum (thiamethoxam) and Belay (clothianidin) was evaluated with a simulated test tube, soil drench bioassay for activity to both spring and fall populations of rough strawberry root weevil larvae. Maturing late-spring root weevils were placed on top of field soil contained in 3.75 inch long glass test tubes on 19 May and 24 May. These larvae migrated 1-2 inches into the soil before they were drenched with 4 ml of field rates of Admire and Platinum. Cohorts of 15 and 20 larvae/treatment at the two respective treatment dates were destructively sampled 14 days post-drench. Larval/prepupal mortality averaged 42% for Admire and 40% for Platinum (Table 3). These levels suggest that a late spring drench application(s) may not be optimal for economic control of new generation root weevils.

Similar drench tests were conducted in late August to control early instar, rough strawberry root weevil that will feed on roots over the following 8 months. From 31 August to 9 September, second instar rough strawberry root weevil larvae were collected from an infested strawberry field in Vancouver, WA. Each of four treatments consisted of 10 larvae placed in soil filled test tubes. These were treated with 6 ml of field rates of Admire, Platinum, Belay and water control one day later. Each regime was repeated at 5 different dates and larval mortality was determined with destructive sampling at 3 to 7 days posttreatment, respectively. Belay and Platinum provided excellent control from 4-7 days posttreatment; Admire was somewhat variable but significantly different from the control at the same time intervals (Table 4). General contact mortality of immatures in soil tend to be slightly delayed compared with foliar formulations when exposed to adult root weevils.

Table 1. Actara's translaminar residual on strawberry at rennovation.

	Percent Mortality					
Actara 25WG	5DAT	6DAT	7DAT	8DAT	9DAT	10DAT
Rough strawberry weevil	29a	38a	67a	82a	82a	84a
Black vine weevil	29a	42a	60a	64a	73a	76a
Untreated check	0b	0b	0b	0b	0b	0b

Percentages within columns followed by the same letter are not significantly different (Tukey HSD test, $P<0.05$).

Table 2. 2004 residual activity of Actara to rough strawberry root weevil on red raspberry foliage

	Percent Mortality								
	1DAT	2DAT	3DAT	4DAT	5DAT	6DAT	7DAT	8DAT	9DAT
Actara 25WG	80	90	97	80	83	80	97	83	33
Untreated check	0	7	14	14	0	0	0	0	3

Cohorts fed for 5 days.

Table 3. Spring, RSRW larval drench test.

Treatment	lb(AI)/acre	Percent mortality	
Admire 2F	0.5	53a	30a
Platinum 2SC	0.125	40ab	40a
Untreated check		0b	15a

Percentage within columns following by the same letter are not significantly different (Tukey HSD test, $P<0.05$).

Late instar RSRW larvae.

Table 4. Fall, RSRW larval drench test.

		Percent mortality				
Treatment	lb(AI)/acre	3DAT	4DAT	5DAT	6DAT	7DAT
Admire 2F	0.5	10b	100a	70b	90a	50b
Belay 16WSG	20 fl. oz.	60ab	100a	100a	100a	100a
Platinum 2SC	0.125	80a	100a	100a	100a	90a
Untreated check		20b	0b	0c	0b	0c

Percentages within columns following by the same letter are not significantly different (Tukey HSD test, $P<0.05$).

Fall (small) instar larvae.