Integrated Research for Sustainable Insect Pest Management in Cranberries

Report 2013

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The Cranberry Institute

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CRANBERRY: *Vaccinium macrocarpon* (Aiton), 'Stevens'

SPOTTED FIREWORM CONTROL ON CRANBERRIES, 2013

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Spotted Fireworm*: Choristoneura parallela* (Robinson)

This test evaluated the efficacy of a pre-bloom application of Altacor against spotted fireworm larvae in cranberries. The test was conducted on a 3.72 acre commercial cranberry bog, cv. 'Stevens', located in Chatsworth, New Jersey. Application was made via airplane, using grower standard methods, on 27 May. Treatments were applied in 10 gallons of water per acre. Altacor 35WDG was applied at 4.0 oz per acre. Six widely-spaced sweepnet samples were taken from the bog 4 days before treatment (pre-spray), and 4 and 7 days after treatment (DAT), on 23 May,

31 May, and 3 June respectively. A sweep set consists of 25 sweeps. Samples were bagged and brought back to the laboratory where the number and identity (species) of larvae were recorded, as well as larval status: live, moribund, or dead. Percent live, percent moribund, and percent dead were calculated, and percent data were arcsine square-root transformed prior to analysis. Data were analyzed using ANOVA, and means separation by Tukey test at $P \leq 0.05$. Variation in total larvae per sample was not significant for the pre-spray (13.83±3.04) and the two post spray samples (4-DAT =19.50±5.30, 7-DAT = 14.83±4.88). Altacor was effective at reducing the survival of spotted fireworm larvae by 4 and 7 DAT (> 90% control).

Table 1.

Sample (Date)	Larvae (n)	% Larvae (Mean ± SE)						% Control
		Alive		Moribund		Dead		
Pre-Spray (23-May)	13.8 ± 3.0	100 ± 0	a	0 ± 0	c	0 ± 0	b	-
4-DAT (31-May)	19.5 ± 5.3	5.42 ± 4.36	b	52.48 ± 9.74	a	42.09 ± 10.68	a	(94.6)
7-DAT (3-June)	14.8 ± 4.9	9.44 ± 8.18	b	16.57 ± 7.65	b	73.98 ± 15.54	a	(90.6)

Altacor 35WDG applied 27-May

Percent data were arcsine square-root transformed prior to analysis

Means within a column followed by different letters are significantly different (Tukey test, $P \leq 0.05$)

% control = [1-(% Alive post-spray / % Alive pre-spray)]*100

CRANBERRY: *Vaccinium macrocarpon* (Aiton), 'Early Black'

SPARGANOTHIS FRUITWORM AND SPOTTED FIREWORM CONTROL ON CRANBERRIES, 2013

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Sparganothis fruitworm: *Sparganothis sulfureana* (Clemens)

Spotted fireworm*: Choristoneura parallela* (Robinson)

This experiment tested the efficacy of Altacor, Delegate WG, Exirel, IKI-3106, Intrepid 2F, Imidan 70WP, and Lorsban 4E in controlling Sparganothis fruitworm larvae in cranberries. The

treatments and rates were: Altacor at 4 oz/ac, Delegate WG at 6 oz/ac, Exirel at 13.5 floz/ac, IKI-3106 at 16.4, 22.0, and 27.4 floz/ac, Intrepid 2F at 16 floz/ac, Imidan 70WP at 4 lb/ac, and Lorsban 4E at 3 pts/ac. The experiment was conducted in an 'Early Black' cranberry bog located at the Rutgers PE Marucci Center in Chatsworth, New Jersey. Plots were 1.22 × 1.22 m each (1.49 sq meters), replicated 4 times in a completely randomized block design. Control plots received no insecticide. Applications were made with a R&D CO_2 backpack sprayer, using a 1-liter plastic bottle. The sprayer was calibrated to deliver 50 gal of vol per acre at 30 psi, using a single T-jet VS 110015 nozzle, yielding 69.5 ml per plot. Separate plots were treated on 23 July (to assess 1 day after treatment (DAT) and 3 DAT) and on 30 July (7 DAT). On each sample date, treated uprights were randomly clipped from the center of each plot for use in laboratory assays. Samples were taken 30 cm from plot edges. Three insecticide-treated uprights were inserted in florists' water picks, enclosed in a ventilated 40-dram plastic vial, and secured on Styrofoam trays. For both species, eight vials were setup for each treatment on days 1, 3, and 7 days after treatment (1 DAT, 3 DAT, and 7 DAT). On each sample date, three neonates were placed in each vial, with each vial considered a replicate. Neonates used in the assay were obtained from laboratory colonies kept at the Rutgers PE Marucci Center. Vials with plants and insects were placed on a light bench in the laboratory at approx. 25°C, on a 15:9 L:D cycle. Mortality was assessed after 7 days. Number of larvae (alive, moribund dead, or missing) was recorded. Data on percent live larvae are reported. Data were analyzed using ANOVA and means separation by Tukey test at $P = 0.05$. Percent data were arcsine square-root transformed prior to analysis. At 1 DAT, all insecticides reduced larval survival of Sparganothis fruitworm

(Table 2) and spotted fireworm (Table 3). All insecticides remained effective 7 DAT except for Imidan.

Table 2. Sparganothis fruitworm

Treatment	Rate	% Live Larvae (Mean ± SE)		
		1 DAT	3 DAT	7 DAT
Altacor	4 oz/ac	0.0 ± 0.0 b (100)	0.0 ± 0.0 b (100)	0.0 ± 0.0 b (100)
Delegate WG	6 oz/ac	0.0 ± 0.0 b (100)	0.0 ± 0.0 b (100)	8.3 ± 5.5 b (88.2)
Exirel	13.5 floz/ac	0.0 ± 0.0 b (100)	37.5 ± 7.6 a (10)	12.5 ± 8.8 b (82.4)
IKI-3106	16.4 floz/ac	0.0 ± 0.0 b (100)	0.0 ± 0.0 b (100)	20.8 ± 8.8 b (70.6)
IKI-3106	22 floz/ac	4.2 ± 4.2 b (93.8)	0.0 ± 0.0 b (100)	12.5 ± 6.1 b (82.4)
IKI-3106	27.4 floz/ac	4.2 ± 4.2 b (93.8)	0.0 ± 0.0 b (100)	0.0 ± 0.0 b (100)
Intrepid 2F	16 floz/ac	0.0 ± 0.0 b (100)	4.2 ± 4.2 b (90)	4.2 ± 4.2 b (94.1)
Imidan 70 WP	4 lb/ac	0.0 ± 0.0 b (100)	0.0 ± 0.0 b (100)	70.8 ± 11.7 a 0.0
Lorsban 4E	3 pts/ac	0.0 ± 0.0 b (100)	0.0 ± 0.0 b (100)	0.0 ± 0.0 b (100)
Control	-	66.7 ± 8.9 a -	41.7 ± 15.1 a -	70.8 ± 9.8 a -

Means within a column followed by different letters are significantly different (Tukey test, P≤0.05)

Numbers in parenthesis are % control = [1-(% live in treated / % live larvae in control)]*100

Table 3. Spotted fireworm

Treatment	Rate	% Live Larvae (Mean ± SE)		
		1 DAT	3 DAT	7 DAT
Altacor	4 oz/ac	0.0 ± 0.0 b (100)	0.0 ± 0.0 b (100)	8.3 ± 8.3 b (90.5)
Delegate WG	6 oz/ac	0.0 ± 0.0 b (100)	0.0 ± 0.0 b (100)	20.8 ± 12.5 b (76.2)
Exirel	13.5 floz/ac	0.0 ± 0.0 b (100)	4.2 ± 4.2 b (94.1)	12.5 ± 6.1 b (85.7)
IKI-3106	16.4 floz/ac	4.2 ± 4.2 b (91.7)	0.0 ± 0.0 b (100)	29.2 ± 9.8 b (66.7)
IKI-3106	22 floz/ac	0.0 ± 0.0 b (100)	4.2 ± 4.2 b (94.1)	20.8 ± 10.8 b (76.2)
IKI-3106	27.4 floz/ac	0.0 ± 0.0 b (100)	0.0 ± 0.0 b (100)	4.2 ± 4.2 b (95.2)
Intrepid 2F	16 floz/ac	0.0 ± 0.0 b (100)	0.0 ± 0.0 b (100)	12.5 ± 6.1 b (85.7)
Imidan 70 WP	4 lb/ac	0.0 ± 0.0 b (100)	0.0 ± 0.0 b (100)	79.2 ± 8.8 a (9.5)
Lorsban 4E	3 pts/ac	0.0 ± 0.0 b (100)	0.0 ± 0.0 b (100)	0.0 ± 0.0 b (100)
Control	-	50.0 ± 12.6 a -	70.8 ± 13.3 a -	87.5 ± 6.1 a -

Means within a column followed by different letters are significantly different (Tukey test, P≤0.05)

Numbers in parenthesis are % control = [1-(% live in treated / % live larvae in control)]*100

CRANBERRY: *Vaccinium macrocarpon* (Aiton), 'Early Black'

BLUNT-NOSED LEAFHOPPER CONTROL ON CRANBERRIES, 2013

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Blunt-nosed Leafhopper: *Limotettix vaccinii* (Van Duzee)

This experiment compared the efficacy of Closer SC™ and Lorsban 4E in controlling blunt-nosed leafhoppers in cranberries. The treatments and rates were: Closer SC™ at 4.25 and 5.75 fl oz/ac and Lorsban 4E at 1.5 and 3.0 pts/ac. The experiment was conducted in an 'Early Black' cranberry field located at the Rutgers PE Marucci Center in Chatsworth, New Jersey. Plots were 1.22 x 1.22 m each, replicated twice in a completely randomized block design. Each plot was separated by a 30 cm buffer zone. Control plots received no insecticide. Applications were

made with R&D CO_2 backpack sprayer, using a 1-liter plastic bottle. The sprayer was calibrated to deliver 50 gal of vol per acre at 30 psi, using a single Teejet vs 110015 nozzle, yielding 69.5 ml per plot. Treatments were applied in the afternoon of 6 June. Twelve hours after treatment, morning of 7 June, insecticide-treated uprights were clipped from the central area of each plot. For each replicate, 4–5 uprights were inserted in a florist's water pick, enclosed in a ventilated 40-dram plastic vial, and secured on Styrofoam trays. Each treatment was replicated in ten vials, five from each treated plot, with five adult leafhoppers placed in each vial. Blunt-nosed leafhoppers were collected on 6 June from a commercial cranberry bog in Chatsworth, New Jersey, and stored at 18°C until needed on 7 June. Plants and insects were placed on a light bench in the laboratory at approx. 25°C, on a 15:9 L:D cycle. Mortality was assessed at 1 and 3 days after transfer. Number of leafhoppers (alive or dead) was recorded and percent mortality calculated. Data were analyzed using ANOVA and means separation by Tukey test at $P = 0.05$. Percent data were arcsine square-root transformed prior to analysis. Closer was as effective as Lorsban in controlling blunt-nosed leafhoppers (Table 4).

Table 4.

Treatment	Rate	% Mortality[1] (mean ± se)
Closer SC™	4.25 fl oz/ac	100.0 ± 0.00 a
Closer SC™	5.75 fl oz/ac	100.0 ± 0.00 a
Lorsban 4E	1.5 pts/ac	100.0 ± 0.00 a
Lorsban 4E	3.0 pts/ac	100.0 ± 0.00 a
Control	-	20.0 ± 5.96 b

[1] Percent mortality data collected 24 hr post exposure.

Means within a column followed by different letters are significantly different ($P \leq 0.05$).

Percent data were arcsine square-root transformed prior to analysis.