

Progress Report  
Black-Headed Fireworm Control in Cranberries with Avant-2005  
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**Introduction:** We conducted two studies in 2002 and four studies in 2005 to evaluate the efficacy of Avant on black-headed fireworm "BHF" (*Rhopobota naevana*). One of these studies was conducted on first generation BHF, the other five on second generation BHF. Comparison to conventional and/or other biorational products were made.

**Study 1: May 2005** In the first study two rates on May 19, 2005 of Avant (3 oz/acre, 6 oz/acre) were applied and compared to controls. This study was composed of 8 replications placed in a randomized complete block design and were sprayed at 360 gpa using a CO<sub>2</sub> sprayer. Plots were 16 square feet. Samples were collected from a 1 square foot area in each plot 6 days post-spray and were evaluated for up to a couple weeks post spray. This data was inconclusive due to low BHF population density (Table 1).

A second evaluation of feeding damage was conducted approximately 2 months post-spray. The results suggested that the second generation was more damaging and the control of first generation larvae within the plots was insufficient to prevent damage from second generation BHF. The plots were rated on a scale from 1 to 10 with 1 being no damage and 10 completely dying and webbed. Plots had an average rating of 5 (Table 1).

**Study 2: July 2005** In the second study two rates on July 6, 2005 of Avant (3 oz/acre, 6 oz/acre) and one rate of Diazinon (2 qt/acre) were applied and compared to controls. This study was composed of 6 replications placed in a randomized complete block design and were sprayed at 360 gpa using a backpack sprayer. Plots were 100 square feet. Samples were collected in two ways; 5 days post-spray: 25 randomly selected uprights, and 8 days post-spray: 10 sweeps per plot.

Few larvae were collected in our post-spray samples in spite of high population densities pre-spray. The Avant rates did not differ from each other or from the Diazinon treatment; however there was a 98% reduction in BHF compared to the controls (Table 2).

**Study 3: July 2005** In the third study Avant was applied on July 18, 2005 at 3 oz/acre and compared to a control. This study was composed of 8 replications with 100 square foot plots in a randomized complete block design. Plots were assessed 2 days post-spray using 20 sweeps per plot. There were no significant differences found between treatments, however it appeared that sampling at two days post-spray may be a day too early for sampling due to the appearance of sickly larvae that were still alive. Third instar and earlier larvae were appeared to be more susceptible to Avant than fourth and later instar larvae; with 87 % mortality compared to 45 % mortality in late instar larvae in treated plots. However, 55 % mortality occurred in the controls, possibly as a result of parasitism or predation by other insects (Table 3).

**Study 4: August 2005** In the fourth study Avant was applied on August 22, 2005 at 6 oz/acre and compared to Diazinon at 2 qt/acre and a control. This study was composed of 6 replications with 100 square foot plots in a randomized complete block design. Plots were assessed 3 days post-spray by first collecting 10 uprights that appeared to have webbing; followed the same day with 10 sweeps per plot, a burndown rating was performed on 10-12-05. No significant differences occurred among the treatments including the control. Due to the generally low numbers of larvae found in the plots and the low mean burndown rating of 2.5 throughout the plots few conclusions can be drawn (Table 4).

**Study 1&2 2002** The efficacy of Avant on second generation BHF<sub>W</sub> was compared to several other biorational insecticide at two location. Treatments were replicated 8 per site and sprayed at 30 gpa. Overall, the efficacy of Advant was comparable to other biorational products (Tables 3a,b, c& 4). None of the biorational were as effective as Orthene. Confirm was usually less effective than Advant for several parameters.

**Conclusions:** The trials suggest that Avant can be used to suppress BHF<sub>W</sub>. No crop damage was observed from Avant. Three oz/acre of Avant was sufficient to suppress 4<sup>th</sup> instar and earlier larvae, but only marginally effective at suppressing late instar larvae. Although these studies suggest that Advant is less efficacious than conventional insecticides, they do indicate that Advant provides comparable control to other biorational products. Our data would justify including BHF<sub>W</sub> on the Avant label for cranberries in the PNW.

Table 1. Larval response to Avant application on May 19, 2005 (Study 1).

Rating Date			Total Larvae	Dead	% mortal	Webbing Rating
May-25-05			May-25-05	May-25-05	May-25-05	1-10 Aug-18-05
Trt No.	Treatment Name	Rate Rate Unit				
1	control - white		1.0 a 2.4 StDev	0.5 a 1.1 StDev	17.8571434 a 36.4215698 StDev	5.4 a 3.9 StDev
2	Advaunt - blue	3 OZ/A	1.0 a 1.4 StDev	0.5 a 0.8 StDev	31.2500000 a 45.8062706 StDev	6.0 a 3.6 StDev
3	Advaunt - green	6 OZ/A	0.3 a 0.7 StDev	0.3 a 0.7 StDev	12.5000000 a 35.3553391 StDev	5.4 a 2.3 StDev
LSD (P=.05)			1.98	1.03	48.01970673	3.34
Standard Deviation			1.85	0.96	44.77361679	3.12
CV			246.03	231.27	218.03	55.81
Bartlett's X2			8.949	1.398	0.563	1.863
P(Bartlett's X2)			0.011*	0.497	0.755	0.394
Replicate F			0.497	0.385	0.332	1.469
Replicate Prob(F)			0.8220	0.8963	0.9263	0.2555
Treatment F			0.441	0.179	0.372	0.107
Treatment Prob(F)			0.6523	0.8376	0.6958	0.8990

Table 2. Larval response to Avant application on July 6, 2005 (Study 2).

Rating Date			Total Larvae	Total Dead	% dead	Burndown
Jul-14-05			Jul-14-05	Jul-14-05	Jul-14-05	1-10 Aug-02-05
Trt No.	Treatment Name	Rate Rate Unit				
1	control-white		8.0 a 5.8 StDev	0.0 a 0.0 StDev	0.0 a 0.0 StDev	4.3 a 2.1 StDev
2	Avant-blue	3 OZ/A	0.0 b 0.0 StDev	0.0 a 0.0 StDev	0.0 a 0.0 StDev	5.2 a 2.3 StDev
3	Avant-green	6 OZ/A	0.7 b 0.8 StDev	0.5 a 0.8 StDev	33.3 a 51.6 StDev	5.3 a 1.4 StDev
4	Diazinon-pink	2 QT/A	0.5 b 0.8 StDev	0.5 a 0.8 StDev	33.3 a 51.6 StDev	5.8 a 2.0 StDev
LSD (P=.05)			3.62	0.75	43.01	2.64
Standard Deviation			2.95	0.61	34.96	2.10
CV			128.52	242.21	209.76	40.61
Bartlett's X2			22.093	0.0	0.0	1.273
P(Bartlett's X2)			0.001*	1.00	0.001*	0.736

Table 3a. Blackhead fireworm in 2002- relative comparison of biorational insecticides- Crowley farm.

Trial ID: BHFw 4 2002			Study Dir.: William W. Orchard					
Location: Crowley Farm			Investigator: Kim Patten					
Insect Code	larvae	small larvae	Med larvae	Large larvae (>4mm)	total bhw larvae			
Crop Code								
Part Rated								
Rating Data Type	#/10 sweeps	#/10 sweeps	#/10 sweeps	#/10 sweeps	#/10 sweeps			
Rating Date	Jul-17-02	Jul-17-02	Jul-17-02	Jul-17-02	Jul-17-02			
Trt-Eval Interval	7 DA-A	7 DA-A	7 DA-A	7 DA-A	7 DA-A			
ARM Action Codes								
# Subsamples, Dec.								
Trt No.	Treatment Name	Rate	Unit					
01	Control			4.0 a	1.4 a	1.7 a	0.9 a	4.0 a
02	Confirm	8 OZ/A		2.4 ab	0.7 ab	0.9 a	0.9 a	2.4 ab
03	Success	6 OZ/A		0.7 ab	0.6 ab	0.1 a	0.0 a	0.7 b
04	Intrepid	8 OZ/A		1.0 ab	0.6 ab	0.3 a	0.0 a	0.9 b
05	Intrepid	12 OZ/A		0.9 ab	0.4 ab	0.4 a	0.0 a	0.9 b
06	Success	10 OZ/A		2.6 ab	0.6 ab	0.6 a	0.3 a	1.4 b
07	Calypso	4 OZ/A		1.6 ab	0.4 ab	0.9 a	0.3 a	1.6 b
08	Confirm	16 OZ/A		1.4 ab	0.7 ab	0.6 a	0.1 a	1.4 b
09	Calypso	6 OZ/A		1.0 ab	0.4 ab	0.6 a	0.1 a	1.1 b
10	Avaunt Hasten	6 OZ/A 38.4 OZ/A		1.4 ab	0.4 ab	0.3 a	0.7 a	1.4 b
11	Assail	0.6 OZ/A		0.6 b	0.0 b	0.6 a	0.0 a	0.6 b
12	orthene	21.3 OZ/A		0.4 b	0.0 b	0.3 a	0.0 a	0.3 b
LSD (P=.05)				2.01	0.68	0.93	0.89	1.69

Table 3b. Blackhead fireworm in 2002- relative comparison of biorational insecticides- Crowley farm.

Insect Code		total bhw larvae	bhw larvae #/25 uprights	bhw damage uprights #/25	
Crop Code					
Part Rated					
Rating Data Type		Jul-17-02	Jul-17-02	Jul-17-02	
Rating Date		7 DA-A	7 DA-A	7 DA-A	
Trt-Eval Interval					
Trt No.	Treatment Name	Rate Rate Unit			
01	Control		2.95 a	2.0 a	13.0 a
02	Confirm	8 OZ/A	1.56 ab	2.4 a	10.4 ab
03	Success	6 OZ/A	0.40 ab	1.8 a	8.4 ab
04	Intrepid	8 OZ/A	0.35 ab	1.2 a	5.2 ab
05	Intrepid	12 OZ/A	0.35 ab	2.4 a	9.6 ab
06	Success	10 OZ/A	0.93 ab	2.0 a	6.6 ab
07	Calypso	4 OZ/A	0.80 ab	3.4 a	7.4 ab
08	Confirm	16 OZ/A	0.97 ab	2.8 a	5.8 ab
09	Calypso	6 OZ/A	0.46 ab	2.6 a	6.2 ab
10	Avaunt Hasten	6 OZ/A 38.4 OZ/A	0.71 ab	2.2 a	9.2 ab
11	Assail	0.6 OZ/A	0.24 b	1.6 a	5.8 ab
12	orthene	21.3 OZ/A	0.08 b	1.0 a	3.4 b
LSD (P=.05)			4.115t	2.10	5.14

Table 3c. Blackhead fireworm in 2002- relative comparison of biorational insecticides- Crowley farm

Insect Code		BHFW- (larvae < 2mm)	BHFW- me (larvae 2-4mm)	BHFW- la larvae >4mm)	total larvae	
Crop Code						
Part Rated						
Rating Data Type		10 sweep	10 sweep	10sweep	10 sweepP	
Rating Date		Jul-29-02	Jul-29-02	Jul-29-02	Jul-29-02	
Trt-Eval Interval		19 DA-A	19 DA-A	19 DA-A	19 DA-A	
Trt No.	Treatment Name	Rate Rate Unit				
01	Control		47.11 a	21.3 a	15.3 a	47.11 a
02	Confirm	8 OZ/A	24.62 abc	12.7 ab	6.9 b	24.62 abc
03	Success	6 OZ/A	31.02 ab	13.1 ab	8.4 b	31.02 ab
04	Intrepid	8 OZ/A	14.20 bc	8.0 ab	1.1 b	14.20 bc
05	Intrepid	12 OZ/A	7.68 bc	3.7 b	1.1 b	7.68 bc
06	Success	10 OZ/A	22.18 abc	13.3 ab	4.9 b	22.18 abc
07	Calypso	4 OZ/A	16.40 bc	9.6 ab	5.4 b	16.40 bc
08	Confirm	16 OZ/A	11.29 bc	5.3 ab	2.7 b	11.29 bc
09	Calypso	6 OZ/A	16.87 bc	8.0 ab	5.1 b	16.87 bc
10	Avaunt Hasten	6 OZ/A 38.4 OZ/A	24.25 abc	12.7 ab	8.0 b	24.25 abc
11	Assail	0.6 OZ/A	13.96 bc	6.6 ab	4.6 b	13.96 bc
12	orthene	21.3 OZ/A	5.05 c	3.0 b	0.4 b	5.05 c
LSD (P=.05)			5.16	9.85	5.33	11.173t

Table 4 Blackhead fireworm in 2002- relative comparison of biorational insecticides- Cranwell farm

Insect Code				BHFW
Part Rated				Larvae
Rating Data Type				Sweeping
Rating Unit				#/10 Sweep
Rating Date				Jul-17-02
Trt-Eval Interval				8-DAT
Trt No	Treatment Name	Rate	Unit	
01	Control			9.4 a
02	Confirm	8	OZ/A	8.3 a
03	Success	6	OZ/A	2.9 b
04	Intrepid	8	OZ/A	3.1 b
05	Intrepid	12	OZ/A	0.6 b
06	Success	10	OZ/A	3.0 b
07	Calypso	4	OZ/A	2.3 b
08	Confirm	16	OZ/A	2.4 b
09	Calypso	6	OZ/A	3.0 b
10	Avaunt	6	OZ/A	3.7 b
	Hasten	38.4	OZ/A	
11	Assail	0.6	OZ/A	2.9 b
12	orthene	21.3	OZ/A	0.0 b
LSD (P=.05)				2.57