IN-SEASON CONTROL OF VINE MEALYBUG IN LATE-SEASON TABLE GRAPES, 2008

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During 2008 we conducted a field trial to assess the effects of insecticide treatments on vine mealybug in late-season table grapes. The trial was conducted in a Crimson Seedless vineyard near Arvin, Kern Co. CA. A 2.1 acre portion of a mature vineyard with spacing 11 ft x 7 ft was divided into 64 plots, each 2 rows by 10 vines long, with the plots organized to include one center row for data collection and half of each adjacent row. Plots were organized into a RCBD with 4 blocks of 15 treatments and an untreated check (Table 1).

Foliar treatments were made on 26 Feb, 29 Apr, 22 May or 17 Jun using a commercial air-blast sprayer. Water volume was 150 gpa for applications on 26 Feb and 29 Apr and 200 gpa for the May and June applications.

Soil applications were made using a cup system we developed. Each of the 10 vines in the data row had two, 1.0 gallon per hour drip emitters. Underneath each emitter we placed a 16 fl oz plastic disposable cup that was duct-taped to a bamboo pole. Applications were made by calculating the total amount of pesticide required per vine. This amount was divided by four, with one quarter of the product placed into each of the two cups per vine. Cups were then filled with water, stirred, and the drip system was turned on. Water then dripped into the cup, causing water to overflow out of the cup one drip at a time for 30 minutes. During this 30-minute period, the contents of the cup were stirred every 10 minutes. After 30 minutes, the remaining two quarters of the pesticide for each vine were placed into the two cups and the drip system was left on for an additional 30 minutes, stirring again at 10-minute intervals. At the end of the 1-hour period, the liquid in the cup, which by this time was mostly water, was poured onto the soil under the drip emitter. Soil treatments were applied on 4 Mar, 25 Apr, and 21 May.

Evaluations

Trials were evaluated using timed searches, leaf counts and cluster evaluations. Three minute timed searches on 4-7 vines per plot were conducted by peeling bark from the trunk and cordon areas and counting adult and immature VMB on 29 Apr (4 vines), 28 May (6 vines), and 13 Jun (7 vines). We also evaluated the total number of mealybugs per leaf on 1 Jul and 15 Jul. On each evaluation date we collected five leaves from each of four vines per plot and counted the total number of mealybugs on them. Leaves were collected from a standard location just above a cluster.

Cluster evaluations were conducted on 3 Jul and 15 Jul. On 3 Jul we evaluated 10 clusters per vine on each of 7 vines per plot. Each cluster was given a rating from 0 to 2 with 0 = no mealybug, 1 = honeydew only, and 2 = mealybug present. On 15 Jul we did two separate evaluations of 10 clusters per vine on 8 vines per plot. The first set of 10 clusters consisted of only clusters that were touching the cordon. The second evaluation consisted of 10 clusters that were all free-hanging and did not come in contact with the cordon.

Data were analyzed by ANOVA. Means separation was determined using Fisher's Protected LSD (P=0.05) using untransformed data for leaf and cluster evaluations and transformed data for timed searches (square root (x + 0.05)).

<u>Results</u>

Insecticide treatments provided moderate to no control of vine mealybug in this research trial. High mealybug density coupled with thick bark on a November-harvested variety made even the best of treatments not perform as well as in a companion trial conducted in the early-season variety 'Flame Seedless' in 2008.

Vine mealybug density during timed searches did not reveal any significant treatment affects in April, May or June. Mealybug density on the leaves was not significantly reduced compared to the untreated check on 1 Jul or 15 Jul.

Harvest data on 3 Jul did not document any significant differences in mealybug density by any of the treatments. One hypothesis for why this occurred was that these vines had very thick bark and many of the clusters were touching the bark. As a result we decided to do an additional evaluation on 15 Jul where we took data from clusters that were touching the cordon and clusters that were not touching the cordon independent of each other. During the 15 Jul evaluation there were again no differences in clusters touching the cordon (average of 50.3% of all clusters with evidence of or presence of mealybugs). For clusters not touching the cordon, significant reductions in the percentage of clusters that had mealybugs in them (= category 2) were found in plots treated with Movento in April, May, or June as well as plots treated with split 12 ounces of Applaud or with soil-applied Clutch. All other treatments were statistically equivalent to the untreated check.

Table 1. Insecticide treatments, rates, and timing

Insecticide	Form.	App. Date	Method	Rate Prod/Acre	Surfactant	Rate
Lorsban	4E	26 February	Foliar	4 pt	Latron B-1956	4 oz/100
Applaud Split	70DF	29 April 22 May	Foliar	12 oz 12 oz	Latron B-1956 Latron B-1956	4 oz/100 4 oz/100
Applaud	70 DF	29 April	Foliar	24 oz	Latron B-1956	4 oz/100
Applaud + Movento	70 DF 240SC	29 April 22 May	Foliar	12 fl oz 8 fl oz	Dyne-Amic	4 oz/100
Movento	240SC	29 April	Foliar	8 fl oz	Dyne-Amic	4 oz/100
Movento	240SC	22 May	Foliar	8 fl oz	Dyne-Amic	4 oz/100
Movento	240SC	17 June	Foliar	8 fl oz	Dyne-Amic	4 oz/100
Clutch	2.13EC	22 May	Foliar	6 fl oz	Latron B-1956	4 oz/100
Clutch	2.13EC	21 May	Soil	12 fl oz	n/a	
Venom	20SG	4 Mar	Soil	6 oz	n/a	
Venom	20SG	25 April	Soil	6 oz	n/a	
Venom	20SG	21 May	Soil	6 oz	n/a	
Admire	Pro	21 May	Soil	14 fl oz	n/a	
Platinum Spilt	75SG	25 April 21 May	Soil	2.67 oz 2.67 oz	n/a	
Platinum	75SG	21 May	Soil	3.67 oz	n/a	

Table 2. Effects of insecticides treatments on the density of vine mealybug

	3-min timed searches			VMB per leaf	
	29 April	28 May	13 June	1 July	15 July
Lorsban Feb	4.1a	26.4a	53.2a	6.0a	1.8a
Applaud Split 12 oz	--	24.9a	43.9a	2.4a	2.1a
Applaud April 24 oz	--	27.4a	54.1a	8.2a	3.2a
Applaud + Movento	--	39.4a	52.0a	4.5a	1.6a
Movento April	--	27.4a	64.4a	2.0a	3.2a
Movento May	--	--	71.5a	4.1a	4.4a
Movento June	--	--	--	2.9a	3.9a
Clutch Foliar	--	--	97.3a	6.5a	16.5c
Clutch Soil	--	--	83.8a	12.0a	2.6a
Venom Feb	17.4a	29.9a	51.7a	6.1a	2.6a
Venom April	--	44.0a	72.6a	9.7a	4.3a
Venom May	--	--	105.6a	11.8a	9.0abc
Admire Pro May	--	--	89.5a	5.1a	6.1ab
Platinum Split 2.67 oz	--	33.2a	67.5a	11.5a	2.8a
Platinum 3.67 oz May	--	--	95.7a	6.4a	13.9bc
Untreated	13.4a	47.8a	69.5a	12.2a	4.0a
$F =$	0.90	0.64	1.36	1.85	2.16
$P =$	0.455	0.734	0.215	0.056	0.024

Means in a column followed by the same letter are not significantly different ($P > 0.5$, Fisher's protected LSD) after square root (x + 0.5) transformation of timed search data. Untransformed means are shown.

Table 3. Effects of insecticides treatments on the density of vine mealybug in clusters.

	Cluster Ratings, 3 Jul Percentage clusters per category			
	0	1	2	1 + 2
Lorsban Feb	88a	5.7a	6.4a	12.1a
Applaud Split 12 oz	96a	3.2a	1.1a	4.3a
Applaud April 24 oz	88a	8.2a	87.5a	10.7a
Applaud + Movento	92a	4.6a	3.6a	8.2a
Movento April	91a	6.8a	2.5a	9.3a
Movento May	84a	11.4a	5.0a	16.4a
Movento June	85a	7.9a	7.1a	15.0a
Clutch Foliar	81a	11.1a	8.2a	8.2a
Clutch Soil	91a	4.3a	4.3a	8.6a
Venom Feb	89a	6.1a	5.0a	11.1a
Venom April	86a	9.3a	4.6a	13.9a
Venom May	83a	6.4a	11.1a	17.5a
Admire Pro May	81a	11.4a	7.5a	18.9a
Platinum Split 2.67 oz	82a	10.0a	7.9a	17.9a
Platinum 3.67 oz May	736a	13.2a	13.9a	27.1a
Untreated	86a	9.3a	4.6a	13.9a
$F =$	1.54	1.34	1.48	1.54
$P =$	0.1322	0.2191	0.1529	0.1322

Means in a column followed by the same letter are not significantly different ($P > 0.5$, Fisher's protected LSD).

Table 4. Effects of insecticides treatments on the density of vine mealybug in clusters touching and not touching the cordons.

	Damage Ratings Cluster Ratings not touching cordon 15 Jul Percentage clusters per category				Damage Ratings Clusters touching cordon 15 Jul Percentage clusters per category			
	0	1	2	1 + 2	0	1	2	1 + 2
Lorsban Feb	91cd	4.1ab	4.7ab	8.9ab	60.6a	8.2a	31.2a	39.4a
Applaud Split 12 oz	93d	4.1ab	3.4a	7.5a	47.4a	23.9a	28.7a	52.6a
Applaud April 24 oz	90bcd	5.9abc	4.4ab	10.3abc	60.6a	17.1a	22.3a	39.4a
Applaud + Movento	86bcd	8.4abc	5.3ab	13.8abc	56.8a	17.2a	23.5a	43.2a
Movento April	90bcd	6.3abc	3.4a	9.7abc	64.1a	15.9a	20.0a	35.9a
Movento May	89bcd	7.2abc	3.4a	10.6abc	55.1a	18.8a	26.1a	44.9a
Movento June	93d	4.4abc	2.5a	6.9a	64.2a	14.5a	21.3a	35.8a
Clutch Foliar	80abc	10.0abcd	9.7bc	19.7bcd	26.6a	23.3a	50.2a	73.5a
Clutch Soil	88bcd	9.1abc	3.4a	12.5abc	50.9a	17.1a	32.0a	49.1a
Venom Feb	90bcd	3.1a	6.6ab	9.7abc	65.8a	12.5a	21.7a	34.2a
Venom April	79ab	11.3cd	10.0bc	12.3cd	39.3a	23.9a	36.8a	60.7a
Venom May	83bcd	10.6bcd	5.9ab	16.6abc	41.9a	21.4a	37.1a	58.5a
Admire Pro May	84.bcd	10.9bcd	5.0ab	15.9abc	31.5a	26.1a	42.4a	68.5a
Platinum Split 2.67 oz	85bcd	10.0abcd	5.3ab	15.3abc	51.2a	28.3a	20.5a	48.8a
Platinum 3.67 oz May	71a	16.3d	13.1c	29.4d	32.3a	16.3a	51.4a	67.7a
Untreated	81abcd	9.1abc	9.7bc	18.8abcd	46.7a	12.9a	40.6a	53.3a
$F =$	2.06	1.91	2.08	2.06	1.75	1.04	1.40	1.75
$P =$	0.0315	0.0484	0.0293	0.0135	0.0738	0.4350	0.1887	0.0738

Means in a column followed by the same letter are not significantly different ($P > 0.5$, Fisher's protected LSD). Untransformed means are shown.