Grape Mealybug Venom Systemic Insecticide Trial, 2007

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Test Location: Domain Chandon

Test Crop: Grapes: *Vitis vinifera* L. Chardonnay; Wente clone on 5C rootstock, planted in 1995 at 5 ft vine X 8 ft row spacing (1089 vines per acre)

Species targeted: Grape mealybug

Products Tested: Venom® - Dinotefuran

Experimental Design: Two treatments (Venom® and untreated) were replicated five times in a block design. Each replicate (plot) was three rows and all rows were treated. Grape mealybug population data were taken from 40 vines on the north half of the center row in each plot.

Summary: Venom® was applied by drip irrigation to winegrapes infested with grape mealybugs in three-row plots and replicated 5 times. At harvest, populations in the Venom® plots were reduced by approximately 50% as compared to the untreated control.

Treatments and Rates:

Table 1. Systemic product application rates and timing for grape mealybug control

Treatment	Rate	Application Timing
	oz ac^{-1}	
Venom®	5.95	June 25, 2007
Control	-	-

Application Method:

Venom® was applied to the vine root zone via chemigation for systemic plant absorption. Vines were irrigated for four hours prior to and for four hours after insecticide application. Venom® was applied through the drip line. Venom® was applied to three adjacent full rows. The next set of three rows was left untreated as the control. Each replication of contiguous 6 rows was repeated 5 times for a total of 30 rows (15 treated + 15 untreated).

Evaluation Procedures:
Vines were examined pre-treatment, on May 29, for mealybug presence by counting all grape mealybug stages found in two minutes in 10 vines. An average of 6 mealybugs were found per vine per two minute count with mealybug densities equal among treatment rows.

Venom® effectiveness was evaluated on 3 dates: July 23 and twice prior to harvest on September 8 and 10. On July 23, one basal leaf per vine was removed from each of 30 vines per plot. Leaves were examined the same day by microscope and the numbers of grape mealybug crawlers and nymphs per leaf were counted. For the pre-harvest sample on September 8, in each plot 50 bunches touching the cordon were removed from the vines and each cluster rated on a scale of 0 to 2 as follows: 0 = no mealybug found; 1 = 1 to 10 mealybugs; 2 = >10 mealybugs. On September 10, 50 bunches per plot were selected in the same manner and removed; bunches were opened and all mealybugs counted.

Statistical Analysis:
Grape mealybug populations were calculated as the sum of all mealybug stages for two sampling dates and as a rating for the bunch sample on September 8. ANOVA was used to detect treatment differences between mealybug populations and mean separation was based on Tukey's HSD.

Results and Discussion:
For the leaf sample of July 23, 2007 (approximately one month after treatment) Venom® had statistically significant more mealybugs per leaf than the control ($p=0.0001$). Venom® had on average 1.17 mealybugs per leaf while the untreated plots had 0.43. I have no explanation for this increase in mealybug numbers on the leaves in the Venom® plots. The pre-treatment count of mealybugs per vine was not statistically significant between plots with approximately 6 mealybugs/vine per 2-minute count. Thus, there was no difference in populations at the start of the experiment.

Two pre-harvest samples were taken. The first sample was taken on September 8 and clusters were rated. Due to concerns that categorizing populations of mealybugs into a three-point rating scale may not accurately reflect population levels, a second sample was taken on September 10. In the second sample the number of mealybugs per bunch was recorded. By either method of population assessment, Venom® had half the number of insects or rating value compared to the control (Figures 1 and 2). Differences were statistically significant in each method ($p=0013$ by rank/bunch and $p=0.0121$ by number of mealybug/bunch). Venom® plots on average had 0.188 mealybugs per bunch while the control had 0.372 (Figure 2).

Conclusion:
Venom® reduced grape mealybug populations by approximately 50% in comparison to the control in the two pre-harvest evaluations. On September 10, about 10 days prior to harvest, populations in both treatments (Venom® and untreated) were noticeably reduced from the pre-treatment count on May 29. At the beginning of the experiment, mealybugs were readily visible with an average of 6 mealybugs per 2-minute count. At the end of the experiment mealybugs were not so readily found.

Figure 1. – Mean grape mealybug cluster rating on a scale from 0 to 2 (0=no mealybug; 1=1 to 10 mealybugs; 2>10mealybugs) sampled on September 8, 2007

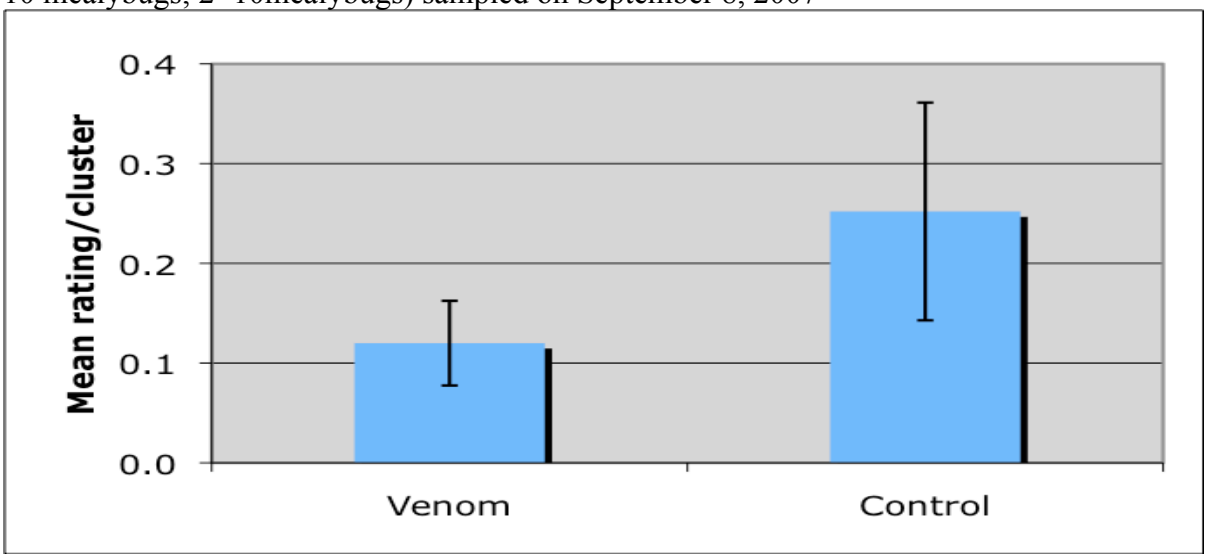

Figure 2 – Mean number of grape mealybug per cluster sampled on September 10, 2007