OLR MATING DISRUPTION USING A PARAFFIN EMULSION DELIVERY SYSTEM – 1999, 2000 & 2001 Trials

Maxwell Norton, UC Cooperative Extension, Merced County
Walt Bentley, UC Cooperative Extension, Kearney Agricultural Center

Omnivorous leaf roller (OLR), *Platynota stultana,* is the most common worm pest of grapes in the San Joaquin Valley (SJV) and is one of the primary causes of summer bunch rot complex. The standard practice for controlling OLR is to treat the first generation at 700-900 degree-days after the biofix. The most popular insecticide for this use is cryolite because of its safety, low cost and minimal disruption of beneficial arthropods. If potential for damage is high, the second or third generations may be treated also. Because of a concern for fluoride residues in must and wine, many wineries have placed restrictions on the use of cryolite in winegrapes.

UC Cooperative Extension researchers have been investigating the use of mating disruption (MD) as a means of controlling OLR. MD is successfully used to control Oriental Fruit Moth in stone fruit and work done so far indicates we can do the same with OLR in grapes. The biggest challenge to date has been developing an inexpensive delivery system that will release the appropriate dose over the prescribed period. The system must not be sensitive to high air temperatures which have been observed to greatly increase release rates in many dispensers.

The system being investigated in this trial is a liquid paraffin emulsion in which the pheromone is suspended. The liquid product which is manufactured by Gowan, is applied using a hand applicator which is marketed for use by forestry personnel to apply paint marks to trees.

Materials and Methods 1999

The site was a fourth leaf block of Chardonnay winegrapes in north-east Merced County. The block was under drip irrigation, the middles were mowed, permanent cover crop and the weeds under the vines were controlled using herbicides with no French plowing. The block was separated from the rest of the ranch and winegrapes by a slough and adjacent dirt roads. The nearest block was approximately fifty meters away to the east. The prevailing wind was from the north-west. There was another vineyard approximately 200 meters upwind.

For the trial we divided the block into thirds with the upwind third being the check, the downwind third to receive the highest rate, and the center third receiving the low rate.
The paraffin emulsion was applied by squirting the material on the top of the cordon in a spot that would be quickly shaded by the emerging foliage or by the stake. By shading the material we hoped to minimize photo-decomposition. We applied material to every fourth vine or every other vine depending upon the rate per acre desired.

The rates used were 10gai/ Ac applied twice and 20gai/ Ac applied once. We began catching male moths in pheromone traps on the 19 April and the first application was made 21 April. Two standard OLR pheromone traps were placed in each treatment and monitored for the duration of the trial. Since the minimum duration of the emulsion was anticipated by the manufacturer to be 90 days we re-applied the 10gai/Ac 90 days later on 22 July. We did not reapply the 20gai/Ac rate in order to determine how long it would last under field conditions.

One week prior to harvest, 50 bunches each were picked from four samples rows in each treatment and examined for worms, worm webbing and bunch rot. Since OLR is a major cause of bunch rot in the SJV, we presumed that some of the differences in bunch rot levels are due in

most part to differences in OLR pressure. The data was reported as one of three categories: webbing + rot, worms + rot, or rot alone.

Results and Discussion 1999

The pheromone traps in both treatments did not catch any male OLR for the full duration of the experiment which terminated with commercial harvest on 16 September. The traps in both treatments did not became active again until 20 of September at which time the traps in both treatments became active. We presume that the pheromone finally became depleted at about that time. This suggests that we were successful in confusing the male moths and prevented them from finding the pheromone traps while the crop was in the field.

The results of the bunch examinations are shown in Table 1.
Bunch rot and worm levels were low in this site.

Table 1. Worms, worm damage, rot and total counts per 50 bunch sample.

Treatment	Webbing + Rot	Worms + Rot	Rot Only
Check	1.5 a	1.0	0.0 b
10 gai	0.0 b	0.5	1.75 a
20 gai	0.25 b	0.5	0.0 b
LSD*	1.2	n.s.	1.3

*Significant at the 5% level

The above data suggests that both MD treatments reduced OLR damage and the portion of bunch rot that was due to OLR damage. The low overall damage suggests that we did not have a problem with mated females entering the site from adjacent blocks.

This system must be tested over a number of years and under various geographical configurations to make broad recommendations about its use but the above data suggests that this may be a highly effective delivery system.

Materials and Methods 2000

The design of the 2000 trials were very similar to 1999 and at the Chardonnay site the plot was an exact overlay of the previous year. In addition to the Chardonnay site we added a 1981 Grenache block with a history of medium OLR pressure near Merced, California. Each treatment area was close to 4 acres. The vineyard was planted to a 7X12 foot spacing or 519 vines per acre under drip irrigation. The middles were mowed and the berms were treated with herbicide and no French plowing.

We also reduced the rates applied. In 2000, each site had three treatments: untreated check, 5 gai and 10 gai. The paraffin emulsion was applied to every other vine regardless of rate in order to maintain the same number of false trails in each treatment and have the rate per acre as the only variable. At the Grenache site we also had a “grower standard” which received 2 quarts/ac of MVPII on 12 May and again on 28 May.

The Chardonnay site had only sulfur applied during the season for mildew control. There was no mildew observed and no other pesticides of any type were applied. At the Grenache site sulfur,

copper, Abound and Rally were all used in a resistance management program for controlling powdery mildew and phomopsis. Neither disease was a problem.

At the Chardonnay site the flight began on 14 April and applied only one application on 25 April. At the Grenache site the flight began on 17 March and made the first application on 11 April. On 28 July the traps became active in the 5gai treatment at the Grenache site and we re-treated the low rate only on 2 August. There were no re-treatments made at the Chardonnay site. Two standard pheromone traps were placed inside each treatment area in the Chardonnay site and three traps were placed inside each treatment at the Grenache site.

On 16 June we examined over 200 bunches on the vine for the presence of OLR larvae and webbing. Just prior to harvest on 22 August we returned and harvested 200 bunches (4, 50-bunch samples from 4 different rows) from each treatment and pulled them apart to look for the presence of OLR, webbing and bunch rot.

Results and Discussion 2000

The OLR flights began on 17 March at the Grenache site and 14 April at the Chardonnay site. The pheromone traps in both treatments at the Chardonnay site and the high rate at the Grenache site caught very few, if any male OLR for the full duration of the experiment which terminated with commercial harvest. The exception was the 5gai rate in the Grenache, which became active on 28 July. This suggests that we were successful in confusing the male moths and prevented them from finding the pheromone traps and presumably females.

During the survey on 16 June we found no OLR at the Chardonnay site out of 200+ bunches. At the Grenache site we found one OLR nest with larvae in the check.

The results of the 22 August bunch examinations are shown in Tables 2 and 3.
Data is expressed as average number of bunches per 50-bunch sample.

Table 2. Chardonnay site: Worms, worm damage, rot and total counts per 50 bunch sample.

Treatment	Larvae and/or Webbing	Total Bunch Rot
10 gai	0.5 a	2.0 a
5 gai	1.75 ab	3.5 ab
Check	6.75 b	8.0 b

Fisher's Protected LSD - Significant at the 10% level

Table 3. Grenache site: Worms, worm damage, rot and total counts per 50 bunch sample.

Treatment	Larvae and/or Webbing	Total Bunch Rot
10 gai	4.75	1.0
5 gai	2.25	0.75
Check	6.0	2.5
Grower Std	4.25	1.0

When the blocks were harvested, there were no penalties nor dockage by the winery for worms or bunch rot.

Since it was not feasible to replicatessss the large treatment blocks, the statistical analysis represents the sample site variability compared to the treatment variability. As in 1999, the results suggest that we were successful in suppressing OLR populations using a mating

disruption program. The level of worm damage and bunch rot in the MD treatments was significantly lower than the check at the Chardonnay site. Though not statistically significant, the MD treatment was similar to the growers spray program at the Grenache site. The paraffin emulsion appears to be a feasible delivery system for the pheromone.

Materials and Methods 2001

For 2001, we repeated the trials on exactly the same sites as 2000. In these two trials wanted to determine if the number of point sources were a determining factor in MD. Both treatments areas received 10g.a.i./acre but we varied the number of point sources by applying a single dose every six vines versus a double dose every 12 vines. The materials were applied 13 April at the Grenache site and 27 April at the Chardonnay site. Traps were placed and monitored in the same fashion as before. The Chardonnay site received no insecticide nor miticide treatments during the season. The Grenache site received no foliar insecticides nor miticides but it did receive on imidachloprid treatment via drip system the first week of July for suppression of phylloxera and grape leaf hopper.

Results and Discussion 2001

At the Grenache site OLR trap counts were suppressed in both treatments until mid-August. The second week of June there was a very large peak flight in the check and adjacent grower treatments but the peak never exceeded .75 moths/trap/night in either MD treatment area. Due to a communications breakdown, trapping did not begin at the Chardonnay site till 7 August. Trap counts were ≤ 0.5moths/trap/night in all treatments for the rest of the season.

Just before commercial harvest, we collected 200 clusters from each treatment and examined them for evidence of OLR or its damage. We attempted to segregate rot that was caused by OLR damage and rot from other causes such as cluster tightness, natural breakdown or other possible causes. The data is presented in tables 4 & 5.

Table 4. Grenache site: Worms, worm damage, rot and total counts per 200 bunch sample.

	Rot Only	Rot & Webbing or Feeding	+ Live Larvae Or Pupae	= Total OLR or Damage
2 every 12th vine	22	3	3	6
1 every 6th vine	18	1	2	3
Check	15	4	6	10

At the Grenache site, the data suggest that almost all of the bunch rot was from causes other than OLR damage. Overall, OLR damage was low. It appears that both treatments reduced OLR damage equally well but statistically this probably is not significant.
The Grenache site was also monitored with pheromone traps all season. Typical trap counts were 0.0 to 0.4 moths/trap/night (MTN). Both treatments significantly reduced trap catches until about 20 August when all traps and those in the adjacent grower practice behaved similarly.

Table 5. Chardonnay site: Worms, worm damage, rot and total counts per 200 bunch sample.

	Rot Only	Rot & Webbing or Feeding	+ Live Larvae Or Pupae	= Total OLR or Damage
2 every 12th vine	1	1	0	1
1 every 6th vine	4	1	0	1
Check	2	5	1	6

At the Chardonnay site, bunch rot and OLR damage were both very low this year – even in the check. We think that the background level was too low to see the difference in treatments that we observed in prior years. Because of an oversight, this site was not monitored with pheromone traps until August and September. Trap counts in the two treatments and check were all very low and caught <1 MTN for the duration.

The data in Tables 4 and 5 suggest that the bunch rot present in 2001 was due to causes other than OLR. OLR observations and damage was numerically lower in both treatments than the check. With the low populations of 2001 there does not appear to be a difference in control with the two point source levels. With high populations there may be a difference.

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For information about product availability and registration contact
James Brazzle at jbrazzle@gowanco.com or M: 916/801-2892.