



SONOMA COUNTY VITICULTURE NEWSLETTER



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The Vine Mealybug in Sonoma County

The **vine mealybug** was recently found in two Sonoma County vineyards. Up until now, this insect pest had never been seen in the North Coast. It is very important that growers know how to recognize and look for infestations of vine mealybug and notify the Agricultural Commissioner if you believe you have seen this insect. Through a concerted effort, Sonoma County growers may be able to confine and manage local infestations and prevent this serious pest from spreading to thousands of acres of vineyards in this county.

In California, the **vine mealybug** (*Planococcus ficus* Signoret) is a pest of grapevines, although it can feed on other crops (fig, avocado, mango and pomegranate). Some people confuse its name with the **grape mealybug** (*Pseudococcus maritimus* Ehrhorn), however these are two distinctly different insects. The grape mealybug is probably native to North America and can be found throughout the San Joaquin Valley and portions of the North and Central Coast on grapevines as well as a few other crops. The grape mealybug has been present in some North Coast vineyards for decades and occasionally severe infestations require treatment.

The vine mealybug is not native to North America; however it is quickly moving to grape growing regions in California. Although it was first officially identified in the state in 1994, it was seen a few years earlier in Coachella Valley vineyards – a region which is now totally infested. In 1998 it was identified in Kern County and the following year it was found in Fresno County vineyards. It is estimated that together, those two counties now have over a thousand infested acres. The pest was found in localized areas within single vineyards in Santa Barbara and San Luis Obispo Counties in 2000 and 2001 respectively. The growers responded by removing many infested vines and aggressively treating those that remained within the areas. Thus far, the pest has not been seen again at either of those vineyard locations. Vine mealybug was recently found in a different region in the Central Coast and growers are responding as before. In early August of this year, it was discovered in a vineyard in the southern end of Sacramento County. A week or so later it was located in two Sonoma County vineyards and a find in Napa County was confirmed not long after that.

The insect's behavior in the San Joaquin Valley may be altered in our cooler climate; however there will probably be enough similarities to warrant its place in the 'very serious pest' category. The vine mealybug causes more damage than the grape mealybug for several reasons.

- In the San Joaquin Valley, the vine mealybug has been found to have 5-7 generations a year, thus small numbers can reach damaging levels quickly.
- All stages of the insect – eggs, crawlers, nymphs and adults - may be found feeding on various parts of the vine all year. This includes the leaves, clusters and canes, as well as under the bark of the cordons, spurs and trunk.

- A portion of the population is always located just below the soil level on the roots and trunk, thus these insects are protected from biological control agents such as parasitoids. Foliar insecticides are less effective for the same reason.
- The vine mealybug excretes much more honeydew than other species, thus potentially causing more damage to clusters. Black sooty mold grows on the honeydew which can coat the leaves, canes, fruit and bark.

In the Coachella Valley, vine mealybug populations reach high levels on grapevines by June then the population drops slightly, presumably due to excessive heat. However, by June, in heavily infested sites, the honeydew is so heavy on the trunks that it runs down the bark.

Spread by plant material and equipment

One means of movement of the vine mealybug to new sites is on wood shipped from grapevine nurseries that are infested with this pest. This method of spread is less likely to occur when such nurseries apply chemical controls and have taken other measures to eradicate infested plants.

Movement by vineyard equipment has been and still remains the more common and much more likely method of spread of vine mealybug within the San Joaquin Valley. In that region, the first infested vineyards found had some association with Coachella Valley vineyards where the pest was well established. The female vine mealybug and all of the immature stages cannot fly, thus they must be transported. The adult female insects are around 3 millimeters in length and all other stages are still smaller. As a result the immature stages, especially the “crawlers”, are easily transported on machinery. Mechanical harvesters and leaf removers will spread the crawlers down the vine rows. So will field workers who touch each vine during the season performing canopy management practices and at harvest because the crawlers are on their hands, clothing and shoes. In late fall, infested leaves will blow down the vine rows into uninfested areas and in the winter, the insects will be on the prunings.

The relative population size of vine mealybug fluctuates during the year due to temperature and to some extent variety. It takes about two years for a new infestation to be noticed. By that time, the masses of bright white adults and nymphs are relatively easy to find depending on the severity of the infestation. This means that there were several months when normal vineyard practices moved the insects from the initial site of infestation to other vines in the same block or to adjacent properties – or even further. That is why it is important for growers to take precautions NOW and not wait until an infestation is located before you change your farming practices to prevent the movement of this pest.

Control

There are very few parasitoid natural enemies present in California that attack the vine mealybug. In the late 1990’s researchers from UC and the California Department of Food and Agriculture imported, evaluated and released parasitoids and predators to enhance the biological control of vine mealybug. The California Table Grape Commission funded that importation. Thus far, biological control – although present - has not significantly reduced the population levels of any infestation.

Currently, vine mealybug is controlled by the use of insecticides. Walt Bentley, UC Integrated Pest Management Advisor at the Kearney Agricultural Research and Extension Center has conducted significant

research in the San Joaquin Valley on chemical control of the vine mealybug. There are few materials that are effective in reducing this pest's population and correct application timing is crucial to minimize disruption to natural enemies.

Chlorpyrifos (Lorsban® 4E) has been used during dormancy to reduce the population of crawlers and adults on all aboveground parts of the vine. This is a Special Local Need label which specifies that the material can only be applied once per crop year. It must not be applied after budbreak because the Lorsban will reduce the current season's crop. Some table and raisin grape growers apply this material in early spring, prior to budbreak. There is a second Special Local Need label for the same product to control argentine ants. When either native or non-native ants are associated with mealybug infestations, the populations of the mealybug are greater because the ants disrupt the biological control complex. Ants "tend" or "farm" mealybugs to encourage the production of honeydew and in the process prevent the parasitoids from getting close to the mealybugs. Lorsban applications, directed to the base of the vine and trunk may be applied up to three times per year to control argentine ants; however growers may not treat the same acreage under the requirements of both labels.

Imidicloprid (Admire®) in San Joaquin Valley research trials has been found to be most effective against mealybugs when applied around bloom. It is less effective when applied earlier. Also, it is of questionable value when applied late in the fall post harvest due to lower temperatures and canopies that are often not in their prime at the end of the season thus reducing uptake. There is evidence that crawlers on the canes and spurs at this time are less affected than those on the leaves, therefore a significant portion of the population is not controlled.

Buprofezin (Applaud® 70WP) is an insect growth regulator that is registered for use in grapes. It disrupts the development of the immature stages of mealybugs and some other insects. Targeted pests will remain alive for some period of time after treatment. It is not active on adult insect pests; therefore an application must be timed when there is a high proportion of crawlers present in the canopy which in the San Joaquin Valley is in mid-summer.

There are other contact insecticides that are registered for use in grapes and which are potentially effective against vine mealybug; however it is important to realize that they may also be disruptive to the biological control of non-target pests.

Researchers have found that seasonal abundance of vine mealybug is different in the Coachella and San Joaquin Valleys. This means that insect development will most likely be different still in the North Coast. As a result, an effective chemical management plan must be developed that is specific to the cooler growing regions.

The chemical control strategies described in this newsletter are based on San Joaquin Valley research and current knowledge of the vine mealybug's population trends in that region. (See article written by Walt Bentley.) They are presented here simply because once vine mealybug is found in your vineyard, its population will only increase to damaging levels over time. If your vines are young, then aggressive chemical control measures combined with rigorous and vigilant sanitation procedures, may eradicate it from your vineyard. It is more likely however that these actions will significantly reduce the population to a level that can be maintained with a single annual insecticide application. In addition, effective chemical control will reduce the risk of spreading vine mealybug to neighboring vineyards.

Trapping

Pest identification and monitoring are essential components of an IPM program and the vine mealybug presents a problem in both of these areas. Mealybug identification is difficult and searching each vine to determine if your vineyard is infested is time consuming to say the least. To address this problem a project began this year to study a sampling technique. A large group of researchers are involved in the project headed by Kent Daane, Cooperative Extension Specialist at UC Berkeley. It involves the use of sticky traps baited with lures impregnated with a synthetic sex pheromone that was synthesized just last year by Jocelyn Millar, faculty member in the Department of Entomology at UC Riverside.

Only the male vine mealybug can fly and the newly developed pheromone is somewhat specific to this insect. There is preliminary evidence that the trap also attracts male mealybugs belonging to a different species that is not an agricultural pest. This is one reason why the lure is still experimental and not commercially available. Over one hundred traps were placed in selected Sonoma County vineyards at the end of August and thus far, they have been useful in identifying one of the two infested sites.

Based on data collected in the San Joaquin Valley, the times when the male vine mealybug is present and thus may be trapped is in September and again in spring. Next year, more traps will be deployed in Sonoma County vineyards. Based on the number of infested sites that are initially located by trapping, the County Agricultural Commissioner will devise a response plan. It will be necessary to look for infested vines in those sites and UC Cooperative Extension will be involved in PCA and grower training. Additionally, UC researchers must determine if the number of male vine mealybugs trapped is related to the number of infested vines in the vineyard. By this time next year, trapping results will give us a more accurate picture of the current distribution of vine mealybug in the county. Trap data will also give us better information on the biology of this pest in the North Coast and ultimately how to target chemical applications so that biological control is not disrupted.

What you can do now

It is very important to take precautions when moving vineyard equipment and people between one property and the next. Rinse off all machinery and equipment with a hose (preferably a power washer) before transporting. This includes mechanical harvesters, tractors, sprayers and ATVs as well as picking tubs. If you farm your own property and all equipment stays “in-house”, there is less of a risk of a vine mealybug infestation. It is important that you provide your field workers with the ability to change their clothes before they leave one property and move to another.

Look for the vine mealybug in your vineyard now – before harvest – so that appropriate precautions can be taken immediately. If your vines have already been picked, or you have a young, non-bearing site, I urge you to take the time to look for this pest. Learning if your vineyard is infested now will allow you to plan a control program starting this winter to prevent its movement to other vines in your vineyard, or your neighbor’s.

When purchasing new or replacement vines from nurseries, find out if the supplier is monitoring for the vine mealybug and what precautions they are taking to prevent the pest from hitchhiking on your vine order.

What to look for

The insects will be in the canopy on the leaves and canes, as well as on the trunks where they are protected in the crevices of the bark. As temperatures fall, you will find more just below the soil surface on the trunk and roots. Start your search on replants that are in cartons or tubes. Also focus on the trunk in the area adjacent to and under the green tie-tape as well as at the graft union.

- Look for the bright white bodies of the female adults and nymphs. They may occur singly but are often clumped in groups.
- Look for honeydew that is excreted by the insects on the leaves and fruit (with heavy infestations this is similar to melted candle wax) as well as the black sooty mold that grows on the honeydew.
- The presence of ants on the trunk and cordons usually indicates that mealybugs or European fruit lecanium scale insects are present. Follow their trail and watch where they go.

If you find mealybugs and are not sure if they are the vine mealybug or the far more common grape mealybug, then bring several adult insects to the County Agricultural Commissioner's office. The adults will be the largest individuals in any mass you find. Accurate identification can only be done by a lab. However, if you find the insects just below the soil surface on the vine trunk, you most likely have found vine mealybug.

What happens if you find vine mealybug in your vineyard

Contact the County Agricultural Commissioner's office. The California Department of Food and Agriculture has rated the vine mealybug as a "B" pest. "B" rated pests are of quarantine significance and regulated at the discretion of the County Agricultural Commissioner. Depending on the situation, the site may be delimited by his staff in order to identify the infested areas inside your vineyard. A Compliance Agreement may be issued that will outline specific requirements and precautions to prevent spread during harvest and transport of your grapes to a winery. The Commissioner may request that you treat your vines.

During the growing season, strategically timed applications of specific insecticides will significantly reduce the population. Depending on the individual situation, you may be able to eradicate the insect. You can also prevent further spread into adjacent vines and properties by coordinating your field crew's movements relative to infested blocks. And as always, you will have to wash off all vineyard equipment that is used in the infested block before it is moved into adjacent blocks or leaves your property.

For more information

To see photos of both the vine mealybug and the grape mealybug as well as learn the differences in their biology and control options, visit the UC Pest Management Guidelines at

<http://ucipm.ucdavis.edu/PMG/selectnewpest.grapes.html>

The vine mealybug is listed by its name. The grape mealybug is described under the heading "Pseudococcus Mealybugs"

Also, UC Publication 21612, "Mealybugs in California Vineyards" is a new publication now available. It can be purchased from my office or online at <http://anrcatalog.ucdavis.edu/>

Vine Mealybug, *Planococcus ficus*, Management for North Coast Vineyards
Walt Bentley, University of California IPM Advisor, California Statewide IPM Program,
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Restricting movement of vine mealybug, *Planococcus ficus*, will require a series of insecticide treatments that can be integrated with biological control organisms. Because the insect survives well on roots near the soil surface, as well as above ground plant parts, pay special attention to the base of the vine when using insecticides.

If grapes have not been harvested, vines should be treated with Provado® (imidachloprid) prior to harvest observing the PHI. This treatment will give short-term kill of the above ground mobile stages and, therefore, reduce the possibility of movement to uninfested areas of the vineyard. Provado® will not give long term residual required to kill newly hatching eggs later in the fall. It will reduce spread that can occur during harvest. If possible, infested areas should be hand harvested with special caution taken to keep pickers from transferring the infestation to other areas. A separate crew should be assigned to harvest the infested area. After harvest that crew should be allowed to change clothing. Take care to wash clothing worn during harvest.

Grapes from the infested area should be carefully isolated for transport to the crushing area. The gondolas should be covered with a plastic tarp to reduce wind blown movement of the leaves. The crushing process will kill vine mealybug. However, the gondolas should be cleaned of plant debris. This debris should be destroyed prior to movement back to the vineyard. Leaves infested with vine mealybug are quite sticky and readily adhere to equipment and people. Watch for this when any equipment or individuals are in infested areas of the vineyard.

After harvest, consult with the County Agricultural Commissioner. Consider making an application of Lorsban® (chlorpyrifos). The four-pint rate applied in a minimum of 200 gallons per acre should cover the vine and also contact the base of the plant. No other additive is required with this treatment. Chlorpyrifos residues will provide approximately two-week residual control of the crawler and female stages of vine mealybug.

In 2003, another Lorsban treatment should be made prior to budbreak in late March. The same rates used in 2002 should be used. The spring treatment is more effective if applied on a warm day (70° F). The crawler stage is active on such days and contact with the insecticide will be improved compared to application when temperatures are below 65°F.

Take precautions not to move prunings or other plant parts to noninfested vineyards. Make sure to clean equipment that may have been used in infested vineyards.

During the bloom period, if on drip irrigation, Admire® (imidachloprid) should be injected with irrigation. There is a Special Local Need label for this application. A single application can be made with a minimum of 24 ounces of product. If two applications are made, each should be made at 16 ounces per acre. The first should be applied during bloom and the second approximately 8 to 10 weeks later, depending upon preharvest interval. Do not exceed 0.5 lb active ingredient imidacloprid (Admire + Provado) per acre per year.

During the summer, releases of the parasitoid *Anagyrus pseudococci* should be made to establish it in the area. This parasitoid is available from the insectaries FAR, Inc. (909-371-0120) and Rincon Vitova (805-643-5407). Specific recommendations for release are currently under development and will be available in 2003.

During the summer field workers should be trained in identifying and marking infested areas. This can help restrict movement by marking small portions of the vineyard for treatment prior to large-scale infestation; isolation of infested areas is paramount. A new pheromone for the male vine mealybug is now being utilized for monitoring. It can be used to help find incipient infestations. However, to corroborate the male "finds" in the sticky traps, vines infested with vine mealybug must also be located in the vineyard.

The product names given herein are supplied with the understanding that no discrimination is intended and no endorsement by UC Cooperative Extension is implied.

