VIT TIPS

San Joaquin Valley Viticulture Newsletter

UC CE University of California Agriculture and Natural Resources Cooperative Extension

Winter 2017

Vine Mealybug Management

George Zhuang, UCCE Fresno County

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This past season, many growers and PCAs reported a tough battle suppressing vine mealybug populations in some Fresno County vineyards, leading them to question current management strategies to decrease mealybug densities and reduce their spread and damage in the vineyard.

The season typically starts with movement of vine mealybug from the lower vine sections underneath the bark of the trunk where they commonly reside during the dormant period. During early spring in Fresno County, new eggs hatch underneath the bark, and are not often seen by vineyard managers until the population increases and starts to move up from the trunk to the cordon and shoots. Rather than believing in a complete movement of the whole population up the trunk, it is better to consider that the population increases in spring and early summer and much of the next generation moves to the leaves and clusters as the vine matures (but there are always some mealybugs still on the vine trunk). Typically, growers notice the honey dew and sooty molds when the vine mealybug has already fed on the leaves and clusters, but in heavy populations the trunk can have a 'wet' appearance even before the population moves to the leaves. After harvest, the vine mealybug population again accumulates on the trunk and even the roots (just below the soil surface) for overwintering.

Growers need to control the population before it gets into the fruit, and in 2016 we saw some heavily infested grape clusters in some vineyards having irreversible damage to fruit yield and quality (Fig 1). For some wine grape growers, an additional concern is that vine mealybug is the vector of grapevine leafroll associated viruses (GLRaVs), which can reduce yield, delay fruit maturity, and reduce wine quality. Therefore, early scouting is critical to implement a proper management program with the best timing and selection of insecticide materials. However, if you had heavy mealybug populations and damage in 2016, you should be considering your strategy early in 2017 to prevent crop damage.

First, monitor and prevent the introduction of vine mealybug from infested vines or vineyards. This pest does not walk quickly or far, but it does move between vines and even vineyards.

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Figure 1. A Thompson seedless cluster heavily invested with vine mealybug.

Upcoming Events

Southern San Joaquin Valley Grape Symposium

January 30, 2017
8:00 am—3:00 pm
UCCE Kern County
1031 S. Mount Vernon Avenue
Bakersfield, CA 93307
4 DPR CE units will be offered.
There is no cost to attend, but please RSVP to Ashraf El-Kereamy at (661)868-6226 or aelkereamy@ucanr.edu
Agenda is available at:
http://cetulare.ucanr.edu/files/254279.pdf

UCCE Sonoma Grape Day

February 8, 2017
8:00 am—12:00 pm
Luther Burbank Center for the Arts
50 Mark West Springs Road
Santa Rosa, CA 95403
Sign in and breakfast start at 7:00 am and the program begins at 8:00 am.
DPR CE units have been requested.
Cost of attendance is $40 if payment is received by February 7th, or $45 at the door. For more information, including the agenda, or to pay online, please visit:
http://cesonoma.ucanr.edu/viticulture717/2016_Grape_Day/

Current Wine and Winegrape Research Conference

February 13, 2017
9:00 am—5:30 pm
UC Davis Conference Center
550 Alumni Lane
Davis, CA 95616
4 DPR CE units will be offered.
$49.00 Includes lunch, wine reception that starts at 4:00 p.m. and course materials. To sign up and for further information, please go to: https://extension.ucdavis.edu/section/current-wine-and-winegrape-research

UC IPM Pesticide Safety Trainings

UC IPM is partnering with AgSafe to offer up-to-date instructor training programs that are approved and co-funded by the California Department of Pesticide Regulation (DPR). Updates to the Federal Worker Protection Standard (WPS) that will have the most impact on CA agriculture include:

- Annual pesticide safety training for all fieldworkers
- Instructors must attend an updated and approved Train-the-Trainer course, and
- Expanded training content for fieldworkers and handlers

Participants who complete this training will become qualified to provide pesticide safety training to fieldworkers and pesticide handlers, as required by California state regulations and the revised Federal Worker Protection Standard (WPS). Visit the workshop website (http://ucanr.edu/survey/survey.cfm?surveynumber=19549) for specific date and location information and to register.

Vineyard Sanitation

Allison Ferry-Abee, UCCE Tulare & Kings Counties

By investing a little time for vineyard sanitation in the slow(er) winter months, you can save time, and potentially pesticide sprays, during the busy growing season. There are a couple of simple steps to reduce disease, insect and weed pressure for the rest of the year.

1. Remove mummy clusters
2. Properly dispose of woody debris and cull vines
3. Weed control
4. Spray equipment maintenance

Remove Mummy Clusters

The most important vineyard sanitation measure is to remove and destroy desiccated (mummy) clusters. Mummy clusters are a significant overwintering site for Botrytis, sour rot fungi, and omnivorous leaf roller larvae. Pruning will remove many mummy clusters, but all remaining clusters during or after pruning should be removed by hand and thrown into row centers. The row centers should be disked to bury mummy clusters. If significant debris and vineyard trash is present directly underneath vines, the areas between vines should also be cultivated with a French plow or Bezzerides cultivator. Special care needs to be taken when using this equipment to ensure vines are not damaged.

Properly Dispose of Prunings and Cull Vines

In most cases, woody debris and pruned canes can be chipped and spread back in the vineyard, and vines to be culled (such as vines infected with Pierce's disease) can be disposed of by normal means. However, there are special circumstances in which cull material needs to be completely destroyed, particularly vines infected with Botryosphaeria (bot) canker (for information on identification and other control measures of grape trunk diseases, see "Vineyard Trunk Diseases", in *Vit Tips* November/December 2015 Issue.) Because Bot canker fruiting bodies (pycnidia) can release spores even from dead tissue, all diseased material (prunings and cull vines) must be either buried or burned. Chipping wood is not enough to adequately destroy the fruiting bodies.

Weed Control for Omnivorus Leaf Roller (OLR)

OLR larvae overwinter in vineyard debris and mummy clusters (see above for control), but they can also overwinter in vineyard weeds. They often aren't seen until their populations have been allowed to build for several years without sanitation measures. Weeds should be controlled by herbicides or disking. In vineyards with cover crops and a history of OLR, the cover crop may need to be disked under for one year before resuming cover crop cultivation the next year.

Spray Equipment Maintenance

While not strictly part of vineyard sanitation, spray equipment maintenance is nonetheless an essential part of your pest management program, and winter is an excellent time to do it. Replace all spray nozzles and calibrate equipment. You should also consider replacing pressure regulators, which tend to lose accuracy over time, and are often overlooked. However, they are simple and inexpensive to replace, and are cheap insurance to help ensure effective pesticide application.

Pictured: One step to control for omnivorous leaf roller (above) is to reduce overwintering larva in mummy clusters (below).
(Photos by UC IPM)

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There is a natural spread from infested vines by wind and birds; the transportation of equipment and tools from infested vineyards (e.g., harvesters and shears from field crews) and the movement of contaminated fruit, pomace, canes and leaves which can all aid the dissemination of this pest.

Pheromone traps, such as a red delta trap (Fig. 2) baited with a synthetic vine mealybug sex pheromone, can be used to monitor vine mealybug. This technique is most useful when you don't have any mealybug in the vineyard and you're trying to monitor for new arrivals. Depending on the size of the location, two traps in a small vineyard or two traps per 80 - 120 acres can be placed on the edges of the block near the road or adjacent vineyard. In the San Joaquin Valley (SJV), the first significant flight of male vine mealybug is in June, and traps should be placed around this time of the year to monitor the counts of male adults on a biweekly basis. Peak flights occur from August to October in the SJV. The number of male mealybug catches will be important to identify the presence of vine mealybug, however, the count will be of less value in determining density of vine mealybug. Note however, that if you had considerable damage in 2016, using pheromone traps may not be as important as visually following the population development and increase in the block.

Visual sampling of mealybug can be easy. Training a field crew to identify the signs of vine mealybug feeding is the most efficient way to make an early detection. The large amount of honey dew on the trunk and cordon (Fig. 3) will have a dark and wet appearance. The active movement of ants along the trunk is another good indicator of vine mealybug infestation. Having the field crew trained and scouting during the pruning, leaf removal and harvest stages can help to spot and mark the infestation areas and treat them after harvest or the next season. Vine mealybug identification posters are useful to train your field crew and they are available through http://cesanluisobispo.ucanr.edu/Viticulture/Vine_mealybug/ or contact your local farm advisor for availability. Once the presence and density of vine mealybug have been identified, certain strategies will be implemented to reduce the population. Here we will focus on conventional vineyards (for organic vineyards, the options will be more limited).

Ant control

Adult female vine mealybug is relative immobile and the large amount of honey dew it secretes attracts ants (e.g., native grey ant, the most common in the SJV).

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Figure 2. Pheromone trap for vine mealybug. (Photo by UC IPM.)

Figure 3. Dark and wet appearance of a grapevine trunk infected with vine mealybug.

Breaking Dormancy in Grapes

Ashraf El-Kereamy, UCCE Kern County

The decrease in the photoperiod and temperature near the end of the growing season induces a condition in grapevines known as endodormancy. During this rest period, the vines need to be exposed to a satisfactory number of hours at low temperatures to release them from dormancy and allow their normal regrowth in the spring. Factors that affect the onset and the release of endodormancy are complex and regulated by a myriad of physiological, biochemical and hormonal changes inside the vine, all of which could be affected by different genetic and environmental factors. For instance, several hormones including auxin, abscisic acid, ethylene and gibberellins directly or indirectly contribute to grapevine dormancy, as do carbohydrate content, reactive oxygen species (reactive molecules and free radicals derived from molecular oxygen) and antioxidant enzymes in the buds.

Generally, the chilling requirement for most of the grapevine varieties grown in California is relatively low compared to other fruit trees. However, different varieties have different chilling requirements. Once the chilling hours are met, buds will regrow when suitable temperatures become available. Exposure of the vines to insufficient chilling hours during endodormancy results in low, erratic, delayed, prolonged bud break and non-uniform clusters in different developmental stages. This presents cultural problems, especially in table grapes, where uniform cluster development facilitates the treatment of clusters for berry thinning and sizing at the precisely right time of cluster development. Such problems are most common in subtropical areas characterized by relatively warm winters. Naturally, a grapevine becomes active following the activation of the cell sap in the vascular system due to the relatively warmer weather by the end of the winter. Having an ample carbohydrate reserve helps vines rehydrate and provides the energy needed by the growing buds in spring.

In certain parts of California, to obtain optimal yield and quality, it is necessary or desirable to help the vines meet their chilling requirement and end endodormancy. Artificial stimulation to help bring the vines out of dormancy also allows for the manipulation of budbreak timing, which could help in getting an earlier crop and higher prices or to meet market demand in a specific period. However, advancing budbreak by weeks may only translate into a few days of earlier maturity because fewer

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Pictured: Budbreak in DORMEX® treated grapevines (left), showing advanced and uniform budbreak compared to untreated grapevines (on the right). (Photo by A. El-Kereamy).

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degree days are available during the cooler and shorter days of late winter and early spring. Generally, manipulating the timing of the bud break could result in advancing grape maturity by, at most, one or two weeks.

Different materials can be used to help release grapevines from dormancy. However, among all the materials tested, hydrogen cyanamide (H_2CN_2), the active ingredient of DORMEX®, is the only useful and available restbreaking agent in California. Hydrogen cyanamide is a toxic restricted material that needs to be handled and sprayed with extra care, and any drift to the untargeted area could completely burn non-target vegetation. Hydrogen cyanamide is applied after pruning and 4-8 weeks before the expected bud break, depending on the variety, the region and the purpose of the treatment, either to advance maturity or just achieving higher budbreak percentage. The timing of the application is dependent on the variety and the winter temperature of the region where the vineyard is located. In southern regions like Coachella, hydrogen cyanamide application could be used to obtain an early crop in the early varieties. However, hydrogen cyanamide can also be used to obtain higher percentage and uniform bud break in later varieties. Improper timing of hydrogen cyanamide application might result in significant bud injuries by the product itself since it is highly toxic, or to young shoots which could be damaged by frost if early budbreak exposes the shoots to freezing temperatures. A study by former UC Extension Specialist Nick Dokoozlian, showed that other chemicals such as CAN-17, a calcium ammonium nitrate nitrogen fertilizer, when used at the rate of 35% plus 2% surfactant, could also be used to manipulate budbreak in years with colder winter weather and allowed vines to accumulate a high number of chilling hours over 200 hours at 7 °C (44.6° F). However, that treatment was ineffective in years with low chilling hours (less than 100 hours). Studies to better understand grapevine endodormancy and to search for new safer materials and methods to release endodormancy are still underway in several areas of the world.

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Ants are not only tending and protecting vine mealybug from predation and parasitism, but also moving vine mealybug along the grapevine. Controlling ants will expose the vine mealybug to the attack of parasitoids and predators, which could reduce its population density and slow its spread.

There are some ant controls, including baits and chemical sprays, although most methods are not a complete solution. Some growers have used bark stripping and the application of a sticky barrier to reduce ants moving up the trunk, but this can be very costly.

Mating disruption

Similar to the theory of pheromone traps, this method requires a much higher concentration of vine mealybug sex pheromone than pheromone traps in the vineyard to confuse the male adults to disrupt their successful mating. Synthetic sex pheromone is dispersed through the whole vineyard using dispensers or sprayable formulations. Mating disruption is most effective when the mealybug population is low.

Insecticide programs

There are a couple of insecticides which growers can apply to control vine mealybug. Based on their chemical characteristics, and the location of vine mealybug during the season, materials such as Lorsban®, Applaud®, Admire®, or Movento® can be applied as the season progresses. More information about the timing and rates of these insecticides can be found at http://ipm.ucanr.edu/PMG/r302301911.html.

Among all the insecticides, Movento® is most widely used on grapevines to control vine mealybug. The timing of spray is especially important to achieve the maximum effectiveness of control. Movento® is a foliar applied translaminar insecticide and it has to get into the vine through the active leaf first and then the metabolite changes to an 'enol' and it is this metabolite that helps kill the mealybug. The insecticide acts as a lipid biosynthesis inhibitor. It inhibits the metabolic processes that primarily deal with lipids and fats and the mealybug can't move, molt, and feed. The mealybug will die off more slowly than with some contact insecticides, so managers need to be patient. Also, the enol will stay in the vine for a long time so it can kill mealybug long after the Movento® is sprayed on the vine (the Daane lab has found good levels of the enol in vines more than 150 days after application).

Recently, further studies have been carried out by the Daane lab to investigate the partitioning and translocation of Movento® through grapevines. The on-going study will help growers make the maximum use of their insecticides to control vine mealybug.

Pictured: Vine mealybug identification posters are useful to train your field crew and they are available through http://cesanluisobispo.ucanr.edu/Viticulture/Vine_mealybug or contact your local farm advisor.

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Contact your local viticulture farm advisor or UCCE county office to be added to the e-mailing list or if you wish to receive a mailed copy.

Contact Us

Questions? Concerns? Follow up? Please feel free to contact us.

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