

Vineyard Views **by Cliff Ohmart**

Vine Mealybug

Up until a few weeks ago, I don't think the California wine industry was paying much attention to vine mealybug, a pest accidentally introduced into the state relatively recently. I know I wasn't. However, with recently confirmed finds of vine mealybug infestations in Napa, Sonoma, Yolo, and Sacramento Counties we all need to be aware of this very important pest, how to identify it and what to do if we think we have found an infestation.

What are mealybugs and what do they look like?

Mealybugs are closely related to scale insects but do not produce a hard, protective covering as do scale insects. Instead mealybugs produce soft waxy secretions giving them a white, fluffy (or 'mealy') appearance from whence they get their name. Immature mealybugs (nymphs) are soft-bodied with few distinguishing features. In fact to the untrained eye they don't really look like insects at all. They are small (less than 1/4 inch) oval blobs with body segmentation usually apparent when looked at under magnification. The first nymphal stage, which hatches from the egg, is called a crawler, because unlike the other nymphal stages, they have well-developed legs and antennae. Crawlers are the primary means of mealybug dispersal, moving from one spot to another on the plant and they are easily spread by wind (as well as on farm equipment). Adult male and female mealybugs are completely different from each other. Adult females are wingless with few distinguishing features, looking just like nymphs only bigger, while adult males are much smaller, barely visible without a hand lens, have wings and well developed legs and antennae. Furthermore, adult males lack functional mouthparts, so do not feed. Their role in life is to fly and find a female with which to mate. Female vine mealybugs release a pheromone to attract the winged males. This pheromone was recently identified and synthesized by Dr. Jocelyn Millar at University of California Riverside. Currently only UC and other state personnel have access to pheromone traps that can be used for monitoring but hopefully these traps will become commercially available.

Mealybugs have sucking mouthparts and are phloem feeders. Phloem is the tissue that is just under the bark of the vine. Like aphids and many other sucking insects, mealybugs must take in great quantities of plant fluids, and therefore secrete a lot of liquid waste called 'honeydew'. Honeydew promotes the growth of a black fungus called sooty mold so a significant infestation of mealybugs creates a black, sticky mess.

There are four mealybug species that are capable of causing economic damage to Californian winegrape vineyards; grape mealybug, obscure mealybug, longtailed mealybug and vine mealybug. Two other species, the pink hibiscus mealybug and the citrus mealybug, have the potential to become economic problems on winegrapes but either do not occur in vineyards yet or are found infrequently on grapes.

What is vine mealybug, where did it come from and where is it now?

Vine mealybug, *Planococcus ficus*, is native to the Mediterranean region. It has spread to Pakistan, South Africa, Argentina, the southeastern US and now California. It feeds on all parts of the grape vine, including the roots, setting it apart from the other grape mealybug species, which feed on all parts of the vine except the roots. All life stages are present throughout the year. During the winter eggs, crawlers, nymphs and adults are found under the bark, within developing buds and on roots. Most are found on the lower trunk near the soil and on roots. As temperatures warm in the spring, vine mealybug numbers increase and become more visible. By late spring and early summer they have moved to all parts of the vine. When looking for vine mealybug infestations look for white fluffy material on and under bark, canes and in bunches, and also look for copious amounts of honeydew, which gives bark a water-soaked appearance. Vine mealybug produces much more honeydew than do the other mealybug species and heavy infestations produce cone shaped deposits that look like candle wax or little stalactites. Another distinguishing feature is that the other three species have a 'tail' that is created by elongated waxy filaments while they are not elongated on vine mealybug.

Vine mealybug was first found in California in 1994 on table grapes in the Coachella Valley. It spread to southern Fresno County in 1998. In 2000 and 2001 it was found in several vineyards in the Central Coast region in Santa Barbara and San Luis Obispo Counties. In August of this year a vineyard in Sacramento County was found infested with vine mealybug. Within two weeks of this find, vine mealybug-infested vineyards were found in Sonoma and Napa Counties, too. Infested vineyards have also been found in the Clarksburg area in Yolo County.

The sudden recent spate of findings begs the question "Why does vine mealybug seem to be spreading quickly all of a sudden and how is it spreading?" Some of these infestations have most likely been present for more than one year and are just now becoming noticeable. Until a vine mealybug infestation gets large enough to produce noticeable amounts of honeydew it is not easy to find. Regarding how it is spreading, experts feel that the most common way it has reached winegrape vineyards in northern California is on the roots of potted grape vines that were grown in vine mealybug-infested areas in the southern San Joaquin Valley. The move from Coachella Valley to southern Fresno County was thought to be via contaminated farming equipment.

Damage caused by the vine mealybug is similar to but more severe than that caused by other mealybug species. Grape bunches on infested vines become a sticky, sooty mold-infested mess. More importantly, heavy infestations of vine mealybug severely stress vines and significantly reduce yield (Dr. Kent Daane, pers. comm.).

How can vine mealybug be controlled?

Several types of insect natural enemies prey upon vine mealybug. The most important appears to be a parasitic wasp, *Anagyrus pseudococci*, which has achieved up to 20% parasitism in some vineyards in the Coachella Valley. *A. pseudococci* was introduced

throughout California in the 1940's to control citrus mealybug. Dr. Dan Gonzalez at the University of California Riverside has been doing research on new strains of *A. pseudococci* that may be better adapted to the environmental conditions in the Coachella and San Joaquin Valleys. He also introduced *Leptomastidea abnormis*, another species of parasitic wasp that attacks vine mealybug. The presence of mealybug 'mummies' is evidence of parasite activity. Mummies are the dead outer skins of parasitized mealybugs that remain after the parasite has developed inside the mealybug. Mummies are hard shells, usually round or oval and somewhat puffed up looking. There will be one or more perfectly round holes in the mummy if the wasp parasites have emerged.

Other insects also attack vine mealybug, such as brown lacewings, minute pirate bugs and a species of lady beetle called the mealybug destroyer (*Cryptolaemus montrouzieri*). The larvae of the mealybug destroyer resemble mealybugs themselves because they are covered with waxy filaments, too.

Ants are associated with vine mealybug colonies because they are attracted to and feed on the honeydew. Ants are a big problem in vine mealybug management because they move mealybugs from one place to another and chase away parasites and predators.

The most important cultural pest management strategies are directed at keeping vine mealybug from moving from an infested vineyard to a non-infested one. Infested leaves, bunches and bits of cane can travel on farm equipment from one site to another. It is extremely important that all farm equipment used in an infested vineyard is cleaned before it leaves the site. Vine mealybug can also be transported on clothing. Therefore vineyard workers should not move from an infested vineyard to a non-infested one on the same day.

Vine mealybug management is very problematic. Ants interfere with natural enemies so that untreated populations sooner or later reach unacceptable levels. Furthermore, vine mealybug is difficult to control with insecticides because many individuals occur underneath the bark, on the roots or other protected areas on the vine. So far, research by the University of California has shown that the most efficacious treatment is with a combination of chlorpyrifos (Lorsban) and imidacloprid (Admire). Unfortunately, Lorsban is disruptive to vineyard integrated pest management programs and Admire is expensive. For the most up to date information on recommended treatments visit the University of California Statewide IPM Program website at www.ipm.ucdavis.edu and look for UC Pest Management Guidelines for vine mealybug.

The most important thing that growers and pest control advisors can do at the moment about vine mealybug in California is to limit its spread to new areas and vineyards. Therefore be on the lookout for anything that might resemble a vine mealybug infestation and bring it to the attention of your Farm Advisor and your county Agricultural Commissioner's Office. All the mealybug species resemble each other to the untrained eye so it is very important that an expert is brought in to identify the mealybug species involved.

The following resources were used in writing this column and contain more detailed information: Godfrey et al. 2002. Mealybugs in California Vineyards. Univ. Calif. Agric. Nat. Res. Publ. 21612; Peacock, et. al. Vine mealybug: A serious new pest in the San Joaquin Valley. Univ. Calif. Agric. Nat. Res. Publ. IPM6-00 at <http://cetulare.ucdavis.edu/pubgrape/ipm600.pdf>; and UC Pest Management Guidelines- Vine Mealybug at www.ipm.ucdavis.edu/PMG/r302301911.html.