Cooperative Extension, University of California

From the Vine

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An Overview of Vine Mealybug in California

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Vine mealybug, *Planococcus ficus*, is emerging as a serious vineyard pest across grape growing districts in California. Severe infestations were recently discovered in several young vineyards within the central and north coast grape growing regions. It is thought that the source of movement was from infested nursery plant materials. However, it is important to note that this pest is easily moved from infested to non-infested areas with contaminated farm equipment, worker clothing, birds and wind. These new discoveries have prompted a series of questions and requests for information regarding pest biology and effective control measures. As with any new pest, education and correct management choices are paramount to protect your vineyard from new infestations and prevent further spread.

History and Distribution

The vine mealybug (VMB) has been considered an economic pest of grape since the late twentieth century and is found throughout much of the Mediterranean region. It is primarily located in Italy, Spain, France, Israel and Egypt, as well as in South Africa, Azerbaijan, India, Pakistan and Argentina. It was first identified in California in 1994 in the Coachella Valley. Four years later, significant infestations of VMB were discovered in Kern County. In June 1999, five vineyards had verified infestations and it is suspected that the number of infested vineyards in Kern since then has increased. The first VMB discoveries in Fresno County were made in both new and old vineyards during the summer of 1999. Until recently, infestations of VMB were relatively localized. However, in 2002, new outbreaks were discovered in Santa Barbara, San Luis Obispo, Sacramento, San Joaquin, Madera, Stanislaus, Napa and Sonoma Counties. All finds occurred in young vineyards that were less than 3 years old and much of the nursery plant material (the initial source of VMB) has been traced back to Kern County. At the time of shipment, contamination was not suspected and no precautions were taken against the pest. To mitigate this problem some county agricultural commissioner's offices are creating compliance agreements with protective treatment and sanitation protocols to prevent artificial spread of the pest. Contact your local agricultural commissioner's office to find out if a VMB prevention compliance agreement exists in your county.

Damage

In general, mealybugs derive their nutrients from the phloem tissue and are capable of feeding on many different parts of the vine: trunk, canes, leaves, clusters and sometimes the roots. Mealybugs negatively impact crop quality and yield by contaminating clusters with egg sacs, larvae, adults, and honeydew. Often the honeydew leads to mold growth, defoliation and fouled fruit. The VMB is particularly troublesome because it excretes significantly more honeydew than other mealybug species. This leads to large amounts of mold on clusters and leaves; thus, making it exceedingly difficult to clean the fruit at harvest. In many cases, bunches are left unmarketable. Even a small infestation of VMB can quickly result in large economic losses if left unchecked. Once established in a vineyard, VMB are extremely difficult to control with insecticides.

Identification

Mealybugs are soft, oval-bodied pests that are pink in color with a white waxy covering that extends into filaments along the margins of their bodies. Adult females lay their eggs in a white, cottony ovisac. Eggs hatch into small nymphs that are called crawlers. These young nymphs are highly mobile and move long distances within a vine. Nymphs gradually increase in size to become adult females or males. Females have the traditional look of a mealybug. Adult males look like tiny wasps, are active fliers, and are attracted to pheromones emitted by adult females.

VMB can be distinguished from other mealybug species through an examination of the waxy filaments on the sides and tail of the larger nymphs and adult females. The waxy filaments that protrude from sides of the body of the VMB are shorter than those on the *Pseudococcus* (grape, obscure, and longtailed) mealybugs. VMB also have relatively short caudal filaments.

The VMB can be found and feed on all parts of the vine, including the root system, throughout the year. This is not true for the other mealybug pests of grapes, which are mainly found on the above-ground portions of the vines. All stages of VMB may overwinter underneath the bark of the trunk or below the soil line on the root system. Its underground habit provides it with an excellent refuge from parasitoids and contact insecticides. VMB are also protected by ants, who will tend the mealybugs and fend off their natural enemies. Below is a summary of the major differences between vine and grape mealybug.

Table 1. Comparisons between the vine and grape mealybug

ID Characteristic	Vine Mealybug	Grape Mealybug
Length of Adult female	≈0.25 cm	≈0.5 cm
Length of waxy caudal (tail) filaments	< ¼" of body length, may also be citrus mealybug, submit sample for ID	¼" – ¾" of body length, may also be obscure mealybug
Overwintering site	Under bark, underground on roots	Under bark
Overwintering stage	All stages	Eggs, 1st,2nd instars
Number of generations	4-6 overlapping	2-3
Feeding sites	Trunk, cordon, canes, leaves, clusters, roots	Mainly leaves and clusters, not on roots
Virus transmission	Yes	No

The seasonality of VMB populations varies with geographical area and vine phenology. For example, in the Coachella Valley, populations peak during the late spring and then decline

dramatically by mid-summer. In contrast, VMB populations build through the spring and then peak from the end of June into the middle of August in the San Joaquin Valley. The VMB has approximately 4-6 generations per year, which result in multiple life stages at any given time over the season. This is in stark contrast to other the *Pseudococcus* species that have only 2-3 generations.

Although the above table gives some general information regarding identification, if you suspect that you might have VMB, it is imperative to have them correctly identified. Samples should be taken to your Cooperative Extension Farm Advisor's office or your local agricultural commissioner's office for proper identification. Sample protocol is as follows: 1.) Collect 3 – 10 large mealybugs and place them in a vial of alcohol 2.) Label specimens with location and sample date. Rapid identification of VMB ensures a quick treatment response and a more effective control program.

Treatment and Control

According to UCCE Pest Management Guidelines, the most effective insecticide treatment approach is the combination use of chlorpyrifos (Lorsban®) and imidacloprid (Admire®) throughout the season. Treatment begins in infested vineyards during the spring (just prior to budbreak) with a chlorpyrifos application directed towards the trunk and the base of the vine to capture movement of ants and mealybugs from the roots up to the aerial parts of the vines. Treatment is then followed up around bloom with a full rate (32 oz.) application of imidacloprid through the drip system. In some cases, growers may chose a split rate application of imidacloprid in which 16 oz. are applied at bloom and a second application is made approximately 30 days before harvest. The timing of the second application may have to be coordinated for Glassy-winged sharpshooter control. A late fall foliar insecticide may be warranted to kill crawlers on foliage in order to prevent wind spread of contaminated leaves during leaf drop. Read and check the label directions of these products carefully to ensure that they are labeled for use on grape and the guidelines for rates, special local needs, re-entry intervals and pre-harvest intervals are met.

Aside from chemical treatments, there are two additional keys to control VMB: sanitation and biological control. Since the adult females are wingless and move rather slowly, the main cause of spread is artificial movement, particularly the crawler stage. It is imperative that steps are taken to prevent the VMB from moving out from a localized site. Do not move equipment or vehicles from infested to non-infested areas unless it has been cleaned thoroughly with a high-pressure power washer to remove all plant and soil debris. All vegetative material (prunings) from an infested block must remain in the infested area and should be disposed of properly by either onsite burning or incorporation. Workers should be trained to identify VMB and if crews are moved from ranch to ranch, specific crews should be assigned to work only in infested areas. If movement of crews between ranches is required, visual inspection and a change of work clothes may be necessary when moving from infested to non-infested areas.

Biological control of VMB is an active area of research in California. Resident natural enemies play a key role in suppression of the pest in other countries; however, none of the species provide effective economic control or even reduced the spread of VMB to new areas in the San Joaquin Valley. Of the parasitoids studied, the most successful species is a wasp called *Anagyrus pseudococci*. This species has provided up to 20% parasitism in some vineyards in the Coachella Valley. Although researchers are still evaluating augmentation of *A. pseudococci*, they may be purchased from Foothill Agricultural Research, Corona, CA,

(909) 371-0120 for release (15,000/acre) in commercial vineyards. Release timing should be scheduled between March and April. It is important to note that some chemical programs may disrupt the establishment of biological control organisms.

Pheromone Trapping

In 2001, Jocelyn Millar of UC Riverside identified a sex pheromone produced by VMB. The pheromone was loaded into lures and placed in hollow triangular sticky traps. In the last year, there have been extensive field tests and the technique is considered to be an excellent method to detect incipient infestations. Pheromone traps are currently being used on an experimental basis to monitor VMB males in nurseries and in newly infested areas of the state. It is anticipated that the VMB sex pheromone will be commercially available in 2003, and will undoubtedly become an exceptional tool in the fight against this serious pest.

VMB Weblink and Specialists

- UC Pest Management Guidelines: http://www.ipm.ucdavis.edu/PMG/r302301911.html
- Kent Daane, Division of Insect Biology, UC Berkeley, (559)646-6522, Daane@uckac.edu
- Walter Bentley, Area IPM Advisor, Entomologist, KAC, (559) 646-6527, walt@uckac.edu
- Jocelyn Millar, Professor, Department of Entomology, UC Riverside, (909) 787-5821, jocelyn.millar@ucr.edu

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