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Maximizing Vine Mealybug Control with the Right Product at the Right Time

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Managing vine mealybug in the lower San Joaquin Valley takes a significant amount of knowledge about mealybug biology and the options that are available for control. Successful PCAs have the ability to understand mealybug biology and match what is being seen in the field to control options. Prior to the use of insecticides, this includes an assessment of mealybug life stage, distribution on the vine, and population, as well as vine and vineyard characteristics such as variety, harvest date, disposition of the crop, and damage history.

Generally speaking, all insecticides that target vine mealybug have the potential to be very effective. However, effectiveness can only be achieved if an insecticide that kills on contact comes in contact with a susceptible stage of the pest, or if a product that must be consumed gets into the vine and is present in the fluids being ingested.

Below is a summary of some of the more common insecticides available for vine mealybug control and some general comments about their use. These comments are by no means meant to be a complete set of guidelines, but instead a compilation of information from multiple research and technical reports as well as field observations of many industry people.

Insect Growth Regulators

Applaud: Buprofezin is an insect growth regulator that is most effective against the crawler stage of mealybugs. For this reason it is generally used in late April in the lower San Joaquin Valley, and slightly later as you progress north and spring crawler emergence is delayed. Applaud is regarded as safe to beneficials. The main limitation to Applaud is that it doesn't kill large nymphs or adults. For this reason, it is generally not used after the first few weeks following the first wave of crawlers in the spring. The one exception to this is the period of time close to harvest in table grapes. Due to a new label last year that considerably shortened the PHI, it is now possible to consider using Applaud close to harvest in table grapes as an option for keeping crawlers that emerge from adults that are under the bark from migrating to clusters near harvest.

Soil-Applied Neonicotinoids

Admire: Imidacloprid was the first neonicotoinoid to be registered in grapes and has been a consistent workhorse in vine mealybug management programs. This product is generally applied from April through June, with the best uptake being achieved during periods of root flush. One of the strengths of imidacloprid is its residual activity. Once imidacloprid enters the plant xylem it is able to effect mealybugs for periods of several months. However, the drawback to this is that it takes a while to work. Another significant drawback to imidacloprid is that it binds tightly to certain soil particles. This allows it to be effective in very sandy soils, but highly ineffective in heavier soils where it binds to the soil and doesn't enter the plant.

Clutch: Clothianidin was registered for use in grapes in 2008. Data from May trials in sandy-loam soil in Kern County have shown soil treatments to have similar efficacy against vine mealybug as imidacloprid. This makes sense, considering that both clothianidin and imidacloprid are neonicotinoids, both have low water solubility, and both have relatively high persistence ratings. The problem with this information is that it also suggests that clothianidin may not be very effective in heavier soils. Nobody will know for sure until trials are conducted. Additional work on soil clothianidin treatments are also needed to determine optimal timing for this product. Up until this point, only May treatments have been evaluated.

Platinum: Thiamethoxam is another neonicotinoid that is being evaluated for vine mealybug. Compared to other neonicotinoids it is in the middle with respect to both water solubility and persistence. As for efficacy, thus far it has been inconsistent in University field trials. However, recent changes in labeling are allowing the product to be applied at a higher level of active ingredient than was previously possible or evaluated in trials. At this point what is needed is more research at the higher product rates to determine where it might fit best.

Venom: Dinotefuran was first introduced for use in California grapes in 2007. It is considered the most water soluble of the neonicotinoids, with water solubility levels approximately 65 times higher than imidacloprid. It also has lower persistence than other neonicotinoids, suggesting that it has the potential to get into a plant quicker, but that it won't last as long. University of California field trials in Fresno and Kern County have repeatedly shown very little to no effectiveness of this product against vine mealybug. However, these trials were primarily done on sandy-loam soils in areas with frequent, high volume irrigation where it is likely that the active ingredient was pushed below the root zone, thus restricting sufficient root uptake. The more likely fit for this product is in vineyards with heavier soils, including those that bind up imidacloprid, where future research may or may not find a better fit for this product.

Foliar Neonicotinoids

Assail, Clutch, Provado, and Venom: Generally speaking, foliar neonicotinoids are not very effective against vine mealybug. However, they can kill some mealybugs, especially those that are feeding on the leaves, when these products are used for leafhoppers. The main exception to this rule is clothianidin (Clutch), as it provided good vine mealybug control as a foliar treatment in trials in Kern County in May and provided moderate suppression in Fresno County when used in June. Acetamiprid (Assail) has also provided some suppression of mealybugs, but is generally considered to have too low of an amount of active ingredient to provide good control. This may change, however, in the next couple of years due to efforts to increase the amount of active ingredient that can be used.

Lipid Biosynthesis Inhibitors

Movento: Spirotetramat was registered for California grapes in 2008 and is an excellent vine mealybug product with wide versatility in when it can be used. In-season trials in Kern County have shown it to be effective from April through June, with greatest benefit when used in April. Post-harvest trials have also shown it to be highly effective at suppressing vine mealybug when sprayed from mid-August through late October. Data from UC trials on predators and parasitoids of both grapes and citrus have shown it to be safe to beneficials.

Movento is a foliar insecticide that enters the plant through the leaves and moves systemically in both the phloem and xylem. Getting the most out of the product requires the use of a surfactant that will help it spread over the leaf surface. Once it enters the leaf, it must go systemic, be

ingested by a mealybug, the mealybug must be rendered unable to produce fat bodies, and then eventually dies due the inability to store energy. Because of this mode of action, optimal control takes time, with about 4 weeks after treatment required to see the full effects.

The principle concern with Movento is that international maximum residue levels (MRLs) have not yet been established for all countries. This will limit the use of in-season treatments in vineyards with crops that are exported to countries without established tolerances. However, one way to work around this issue is to use Movento post-harvest. Thus far, samples from vineyards that received post-harvest treatments have not been able to detect residues in fruit from those vineyards that are sampled the following spring.

Organophosphates and Carbamates:

Lorsban: Chlorpyrifos is an organophosphate that is highly toxic to vine mealybug. However, it is limited by labeling restrictions that only allow it to be used prior to bud break or after harvest. Other concerns about the use of Lorsban in grapes relate to off-site movement of chlorpyrifos into groundwater during the dormant season and negative impacts on parasitoids and other beneficials when it is used post-harvest.

There are several keys to the successful use of Lorsban. The first is to do your best to allow it to come in contact with the mealybugs. For this reason, delayed-dormant applications in the spring are usually put on as late as legally possible to ensure that the greatest majority of mealybugs have moved up from below ground. Ideal applications should also coincide with warm and sunny weather, as this is when mealybug movement is at its greatest. Coverage is also essential with these treatments where thorough coverage of the entire trunk area all of the way to the ground is essential. On old vines, removing bark on trunks can make this product more effective.

The key to getting the most out of post-harvest Lorsban is to get it on as early as possible. Since mealybug movement back below ground begins relatively shortly after harvest is over, delays in treatment timing often only mean more missed mealybugs. Kern County post-harvest field trials that were sprayed from late August through early November in 2007 and 2008 showed that very little is gained from post-harvest Lorsban treatments when measured the following spring compared to an untreated check.

Lannate: Methomyl is generally not considered a good product for vine mealybug. However, it has been one of the only options available close to harvest in table grapes and is primarily used as a last resort to keep clusters mealybug-free when all else has failed.

Putting together programs

Recent data on new products such as Movento, Clutch and Venom, as well as label changes from products like Applaud may redefine optimal control programs. The most traditional programs include a delayed-dormant Lorsban followed by an April Applaud, May Admire, and Lannate as close to harvest as needed. The biggest new decision to make is where to place Movento. Post-harvest applications of this product get around the MRL issues and can allow a PCA to skip the Lorsban and possibly either the April or May treatments. In other cases where MRLs are not an issue, growers can skip the delayed-dormant Lorsban, put on Movento in April, and then decide whether or not they need a May or June application of Admire or Clutch. This would free up Applaud, Clutch, or a tank mix of the two as an alternative to pre-harvest applications of Lannate in the case that they are needed. These decisions would be based primarily on pest pressure and variety, with one April Movento likely being sufficient for most varieties being harvested in July, while late-season varieties will still require a stacked program.

The other key changes to programs that can be achieved are in furrow-irrigated vineyards. Traditional programs of Lorsban and Applaud can now incorporate Movento and foliar Clutch as additional tools in the toolbox that can contribute to a more robust management program.

As was stated in the introduction to this article, optimal treatment programs will require a combination of knowledge about the biology of vine mealybug and about the options available for its control. This article has addressed many aspects of the latter of these pieces of information, and can be supplemented by reviewing the results of ongoing research that is being conducted in Kern County with funding from the Consolidated Table Grape Pest and Disease District. Reports from the individual trials that make up that research program can be downloaded from the UCCE Kern County Web site by visiting http://cekern.ucdavis.edu and clicking on Entomology, then Publications, then Grapes.

6th International Table Grape Symposium to be held in California

Jennifer Hashim-Buckey, Viticulture Farm Advisor, Kern County

The 6th International Table Grape Symposium Organizing Committee has been hard at work making arrangements for our upcoming meeting in California in 2010. The symposium will be held at the University of California, Davis in Davis, California from Thursday, June 24 through Saturday, June 26, 2010. A technical tour will follow the meeting from Monday, June 28 through Wednesday, June 30.

At this time we would like to invite you to view our website where you will find important information regarding the upcoming meeting, including key dates, program details, the Call for Abstracts, poster format instructions, registration and hotel details (will be available early 2010), location, opportunities for sponsorship and other information. In addition, we encourage you to view and complete the Statement of Interest Survey as soon as possible so we can make arrangements to accommodate all potential participants. Please check the website frequently, as we will continue to update the information as the planning process continues. Periodically, we will email the entire group when major updates (i.e. registration) occur.

The website can be found at: http://groups.ucanr.org/GoGrapes2010

Should you have any questions about the symposium, please contact Jennifer Hashim-Buckey or Stephen Vasquez at 6thinttablegrapesymposium@gmail.com.

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