Almond Newsletter

Cooperative Extension Glenn County

UC CE | University of California Agriculture and Natural Resources

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In this issue:

Submitted by:

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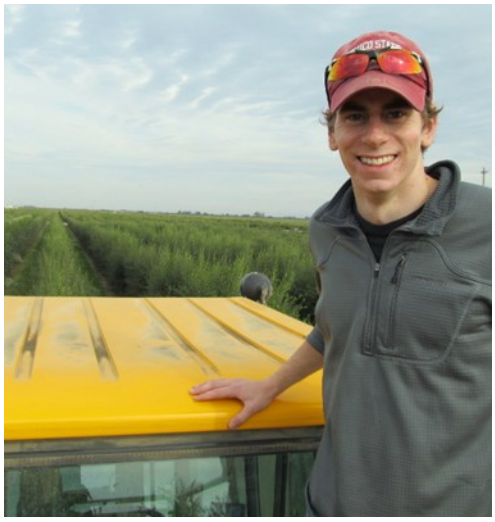
View archived newsletter articles at: sacvalleyorchards.com

New Farm Advisor Introduction

Luke K. Milliron, UCCE Farm Advisor Butte, Glenn, and Tehama Counties



I am ecstatic to be working as the UC Cooperative Extension (UCCE) orchard systems Farm Advisor for Butte, Glenn, and Tehama Counties. I am based out of the Butte County Cooperative Extension Office in Oroville. I grew up in Chico and studied Crop Science at Butte College and Chico State. While attending Chico State, I worked as a Student Assistant to Tree Crop Farm Advisor Bill Krueger, out of the Glenn County Cooperative Extension office.

In 2013 I left Chico to pursue a Master of Science degree in Horticulture and Agronomy at UC Davis. While at UC Davis in the midst of drought in California, I studied the measurement of almond tree water stress during dormancy. In 2015, I was selected as the UCCE Horticulture Intern, an internship program funded by the Almond Board of California and the California Dried Plum Board aimed at training the next generation for UC Cooperative Extension. In this internship I worked on UC field trials in Sutter, Yuba and Colusa County almond and prune orchards with Farm Advisor Franz Niederholzer.

I have most recently been working as an Agronomy Technician at Dellavalle Laboratory, Inc. in Davis. At Dellavalle, I worked for the past year to assist growers with analytic crop nutrient management through soil and plant tissue sampling and irrigation management support in almond, walnut, grapevine and processing tomato systems. At each step in my journey I have greatly enjoyed working with growers and other agriculture professionals. I am humbled and very excited to work as your almond farm advisor. I encourage you to contact me by sending me an e-mail at lkmilliron@ucanr.edu, giving me a call at (530) 538-7201 or stopping by the office at 2279-B Del Oro Avenue in Oroville.

Relationship between Varieties and Bacterial Blast during Bloom – 2017

Dani Lightle, Orchards Advisor, Glenn, Butte & Tehama Cos.

Bacterial blast doesn't occur every year, so when there are a large number of orchards affected, it is natural to want to look for patterns in the occurrence and severity. One of the orchards affected this spring was the Regional Almond Variety Trial at the Chico State University Farm. This setting gives us a controlled orchard at which to compare the incidence of bacterial blast on the 30 varieties planted in the orchard.

Photo 1. Trees rated with severe symptoms had a substantial majority of branches with clusters of blasted flow-

There were four nights where temperatures were recorded below 30°F while the trees were in the peak bloom period (Feb 23, 24, 26 & 28). On March 13, I walked one replicate (12 trees/variety) within the orchard and rated each variety for the presence & severity of bacterial blast. I rated trees on a 0-5 scale, where 0-1 was few or no blasted flowers observed, 2-3 was some blast, and 4-5 was severe blast symptoms (photo 1). The majority of varieties (25) had a rating between 0-2, while just a few varieties (5) had severe damage.

Many growers and PCAs commented to me that the problem seemed to be worse on rootstocks with plum heritage (Marianna 2624 and Krymsk 86). The variety trial is planted on K86, however, there is one replicate of the variety 'Kester' planted on both K86 and Hansen rootstock; neither had severe blast. On Hansen, blast on 'Kester' was rated 1; with 'Kester' on K86, blast was rated 2. The difference between rootstocks with and without plum genetics was insignificant since 'Kester' was not particularly susceptible to blast.

Another question is whether there was a relationship between when the trees were in full bloom and the severity of bacterial blast symptoms. After removing the variety UCD 3-40 (an early blooming variety that had reached 100% petal fall by the frosty nights), I graphed the severity ratings against the dates that the trees were in full bloom. There was no relationship between full bloom timing and blast symptoms observed (Figure 1).

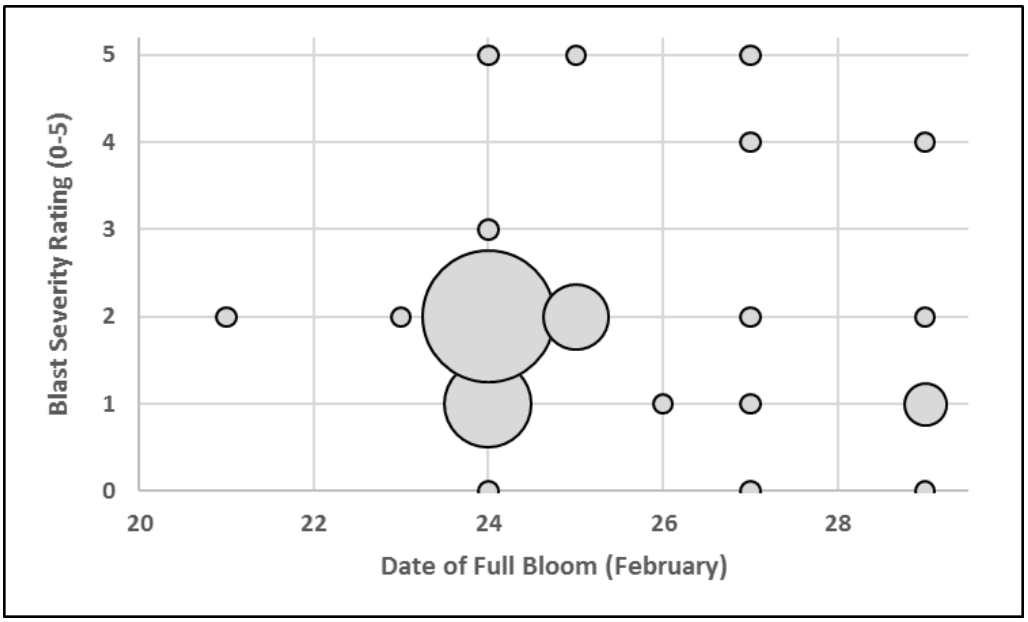


Figure 1. Relationship between the date of full bloom and the observed severity. The larger bubbles represent a greater number of varieties with the given rating on that bloom date.

Since bloom timing was not a major influence on whether varieties had blast, we can look at which varieties within the trial were most and least susceptible:

Least Susceptible with Ratings 0-1 Variety (*source*)	**Most Susceptible with Ratings 4-5 Variety (*source*)**
Nonpareil	Self Fruitful P13.019 (*Burchell*)
Supareil (*Burchell*)	Self Fruitful P16.013 (*Burchell*)
UCD 1-232, UCD 1-16, UCD 18-20 (*UC Davis*)	Y 116-161-99 (*USDA*)
Winters (*UCD*)	Wood Colony
Sterling (*Burchell*)	Bennett (*Duarte*)
Y 117-91-03 (*USDA*)	
Sweetheart (*UCD)*	
Kester on Hansen rootstock (*UCD*)	

Approaches to Spider Mite Management in Almonds

Emily J. Symmes, Sacramento Valley Area IPM Advisor
University of California Cooperative Extension and Statewide IPM Program

Spider mite management in almonds can be accomplished through one of two general approaches: starting with a prophylactic early-season treatment or using threshold-based treatment timings and conservation biological control. Both have pros and cons, and each method *can be* used to successfully manage spider mites. This article will summarize each method.

Prophylactic approach: Early abamectin (Agri-mek®, generics) treatments have become the norm in many almond orchards in this region. When applied properly and at the appropriate time, abamectin can be a very effective miticide and these early treatments can control mites well into summer. Below are some key considerations regarding the most effective and responsible use of abamectin:

- Abamectin functions as a nerve toxin that must be ingested by mites. Once applied, the material must move into the leaf tissue, where it can then be picked up by feeding mites. This translaminar movement of the material works best prior to leaf hardening and when leaves are mostly free from dust and other residues. Applications before leaf hardening *can be* highly effective.
- Applying abamectin after leaf hardening (i.e., with hull-split sprays) may seem like an inexpensive insurance policy, even if the effectiveness of the material at this timing is greatly reduced. However, bear in mind two additional issues: this is the time when natural enemies tend to be more abundant *if preserved early in the season* (more on that below) and, from a resistance-management standpoint, two applications of the same active ingredient within the same season is not advisable.
- Abamectin is highly toxic to spider mite natural enemies, particularly sixspotted thrips and predator mites. Use of abamectin early in the season may contribute to later season spider mite flare-ups due to reduction or elimination of these beneficials in the orchard by direct toxicity and/or by reducing their food source (spider mites, European red mites, brown almond mites).
- Without beneficials to at least slow a mite flare up as the abamectin wears off (expect 60 days of activity if applied properly and at the tight time), spider mite populations can jump up to dangerous levels in just a couple of weeks in summer heat and water stress. Juggling irrigation/sprayer access, harvest prep activities, and crew availability to spray a sudden mite flare-up can mean the fix to a fast-moving problem isn't fast

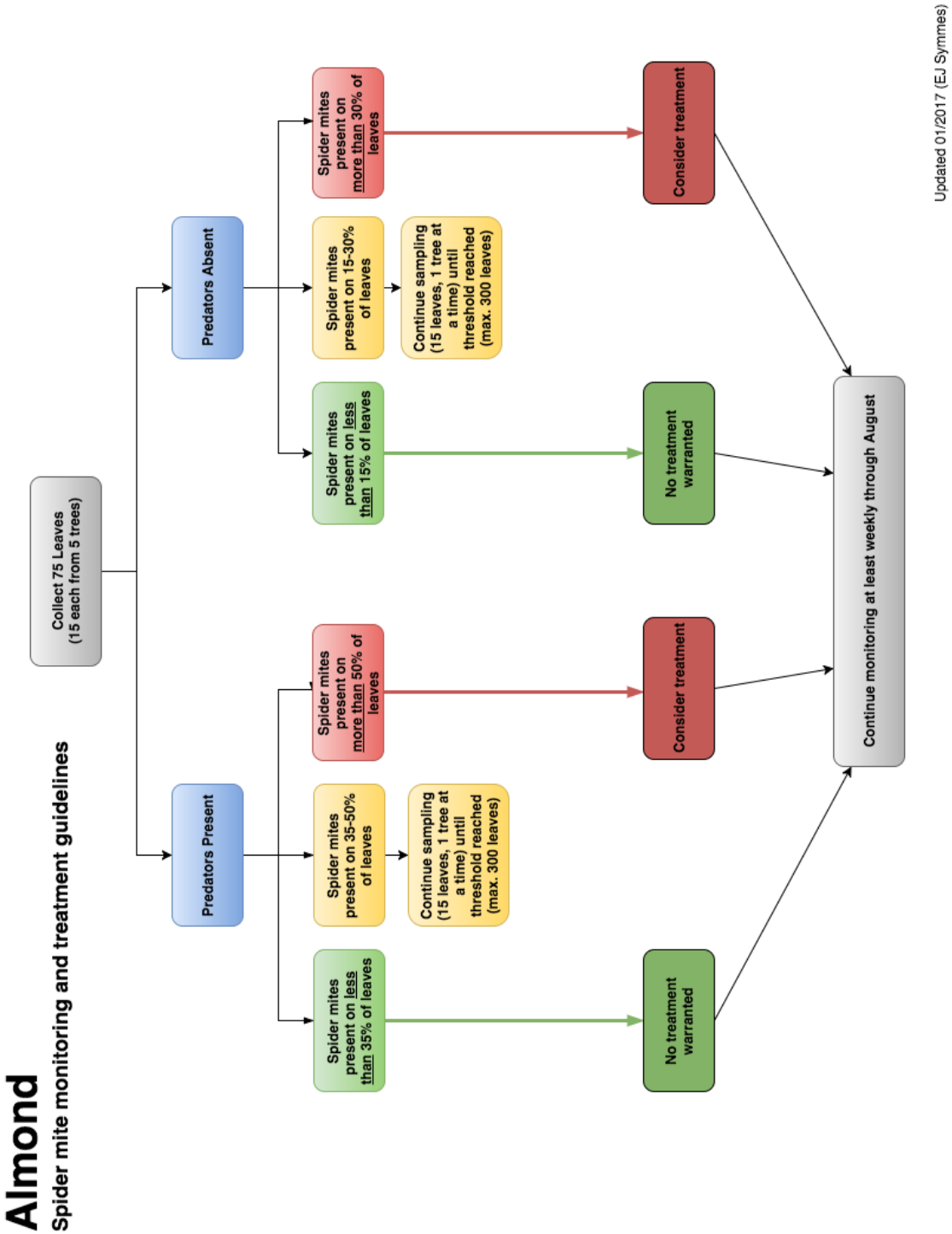
enough, and that can mean dropped leaves at harvest. Lots of dropped leaves at harvest can mean slow drying nuts, slow nut pickup, longer water shut off and more orchard water stress that can translate to future yield loss.

- In years where spider mites are slow to develop (seems to be the case this year so far), "May sprays" of abamectin may be of very little value, as additional later-season sprays often become necessary regardless of early-season intervention, and natural enemies are unnecessarily disrupted. Weigh the pros and cons of the inexpensive insurance policy in treating below-threshold populations vs. destruction of natural enemies (FREE control) and consider how overuse of a particular chemistry over time can increase the likelihood of resistance development. Best to use practices that help maintain all of the tools in the toolbox so that they are available and effective when particular situations call for it.
- A very good summary article on the uses (and misuses) of abamectin in almonds written by UCCE Entomology Advisor David Haviland: thealmonddoctor.com/2013/04/12/managing-mites-in-almonds-with-abamectin/.
- A recent blog post from Franz Niederholzer on continued mite monitoring and management after a May abamectin treatment can be found at: sacvalleyorchards.com/almonds/insects-mites/what-to-if-you-applied-abamectin-to-almonds-in-may/.

Threshold and biological control approach: With this method, spider mites are treated once economic thresholds are reached (not before) and the overall goal is to maintain a balanced ratio of natural enemies-to-spider mites that will allow the beneficials to help suppress spider mite populations.

- Monitoring and treatment thresholds take into account the abundance of both the pest spider mites and their key natural enemies (predator mites and sixspotted thrips). For details, see the decision tree below and ipm.ucanr.edu/PMG/r3400211.html.
- The basic tenet of conservation biological control (maintaining "good bugs" in our orchards to help control the pests) is "Don't Starve Them & Don't Kill Them." Early season destruction of natural enemies and/or their food sources will likely mean that they will not be present, or not present in enough numbers at the right time, to provide measurable impacts later in the season when we need them to help fight flare-ups.
- Admittedly, predators alone may not be sufficient to keep spider mites below economically-damaging levels, and miticides may be needed based on your site-specific monitoring when thresholds are reached. Know which predators are present and choose materials accordingly. Using a miticide that is gentle on beneficials helps keep them around to suppress spider mites missed by the pesticide. This link contains a table of almond pesticides and their impact on beneficials, including predatory mites and sixspotted thrips: ipm.ucanr.edu/PMG/r3900311.html.
- Best practices for getting the most out of your threshold-based miticide application include choosing the right material for the job (i.e., those softer on predators if they are present, desired residual activity and pre-harvest intervals, quick and effective knock-down if needed, etc.), obtaining optimal coverage (high volume, slow speed), and applying with oil or the recommended adjuvant.

Adult two spotted spider mites with eggs.
Photo credit: CSIRO


Almond
Spider mite monitoring and treatment guidelines
Collect 75 Leaves (15 each from 5 trees)
Predators Present
Predators Absent
Spider mites present on less than 35% of leaves
Spider mites present on 35-50% of leaves
Spider mites present on more than 50% of leaves
Spider mites present on less than 15% of leaves
Spider mites present on 15-30% of leaves
Spider mites present on more than 30% of leaves
Continue sampling (15 leaves, 1 tree at a time) until threshold reached (max. 300 leaves)
Continue sampling (15 leaves, 1 tree at a time) until threshold reached (max. 300 leaves)
No treatment warranted
Consider treatment
No treatment warranted
Consider treatment
Continue monitoring at least weekly through August
Updated 01/2017 (EJ Symmes)

Navel Orangeworm Update

Franz Niederholzer, UCCE Farm Advisor, Colusa and Sutter/Yuba Counties

Navel orangeworm is the key pest in almond. Nut feeding by this pest directly reduces yield and grower income. For example, 1% damage* in a 2500 kernel lb/acre crop = 25 kernel lb/acre loss (and $62.5/acre at a price of $2.50/lb). Also, NOW damage is frequently contaminated with highly toxic fungus *aflatoxin*, which is carried by the pest. Certain major almond markets have an extremely low tolerance for *aflatoxin*.

What should growers think about when planning for NOW management at hull split and harvest, particularly when egg and/or pheromone traps are largely empty in the spring?

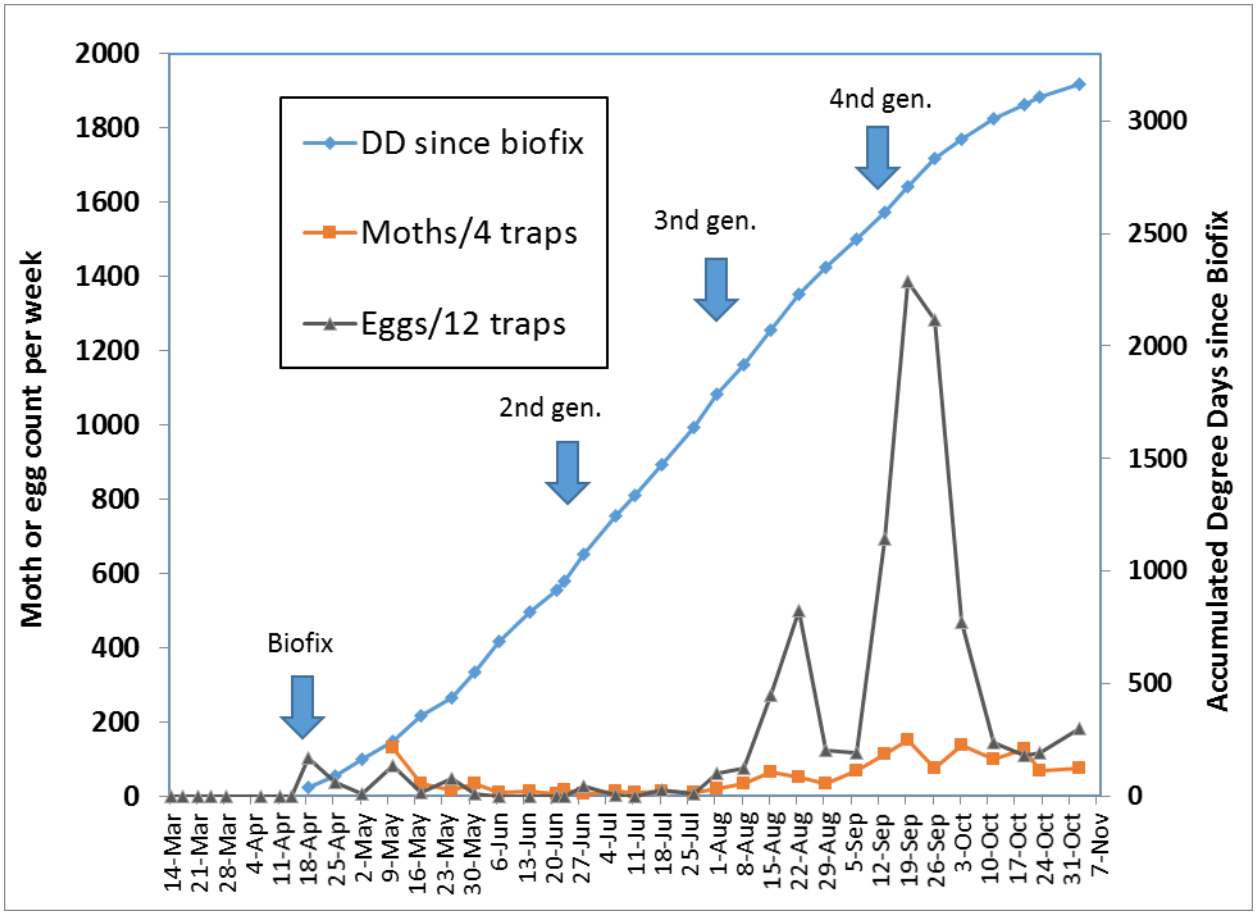
- *NOW adults can fly a quarter of a mile.* When hull splits starts in your orchard, your nuts can become vulnerable to moths from your neighbor's orchard, if they are a quarter of a mile away, or less.
- *Time your hull split spray(s) based on crop sensitivity (hull split), not trap counts – especially in low pressure years.* When NOW pressures are low, egg traps don't always attract females for egg laying when flights begin – especially when there are thousands of splitting real nuts as competition.

Here are some general reminders for NOW control as harvest approaches:

- *Harvest at 100% hull split.* Shake your trees once the nuts have reached 100% hull split. NOW populations build with every generation (see graph below) and NOW females lay fewer eggs on harvested nuts than those nuts still in the trees. So get the nuts on the ground as soon as they are ready. For pictures and description of 100% hull split, see: http://ipm.ucanr.edu/PMG/C003/m003fchullsplit.html.
- *If you spray, spray early.* Newer, soft pesticides used for NOW control last a long time and work well on eggs and small worms. Research by Dr. Frank Zalom, UC Davis Entomology Department, suggests that effective pesticide residual is in this order (roughly): Intrepid® 4 weeks > Altacor® 3 weeks > pyrethroids (Brigade®, etc.) 2 weeks. Consult with your PCA and consider spraying early, so eggs are laid on treated surfaces. This may mean starting to spray as blanks are beginning to split – depending on how long it takes you to get across the orchard. Why spray early when pressure is low? The longer you can keep the NOW population low, the lower the pressure will be later in the season when pollinators (Monterey, etc.) are splitting.
- *Spray carefully.* Field research results from Dr. Joel Siegel (USDA) and Ken Giles (UC Davis) have repeatedly shown that slower sprayer ground speed (2 MPH) and higher spray volume (150-200 gpa vs 100 gpa) delivers the best possible NOW control. Also, spraying when the humidity is higher (roughly 10 PM to 10 AM) means less spray evaporation and better coverage. Need to move faster? Consider using an additional sprayer instead of driving too fast and getting less control (lease/borrow?). If better spray timing could reduce damage by 0.5% (0.25% on your grade sheets*) in a 2500 kernel lb/acre orchard, that's $31.25/acre/year back in your pocket before any quality incentives.

*Because many damaged nuts are lost through the blower at pickup, 1% actual damage in the field will show up as 0.5% damage on reject sheets from your processor. So, 1% damage on your reject sheet is probably 2% damage in the field.

Navel orangeworm egg trap and pheromone lure catches over time, plus Degree Day (DD) accumulation and NOW generation (gen.) timings in Colusa County, 2016.



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Curious about what your farm advisors are seeing in the orchards? Check out the 'Photos from the Field' feature on our website at: www.sacvalleyorchards.com/photos-from-the-field/.

Yellowing Trees on Krymsk 86 after a Wet Spring

Franz Niederholzer, UCCE Farm Advisor, Colusa and Sutter/Yuba Counties

I have received several calls in the last week from growers and PCAs regarding yellowing Monterey or Butte trees on Krymsk 86 (K86) rootstock (see Monterey photos below). The symptoms – yellowing, rolling leaves with increasing edge burn with time – are very similar to those seen on these two varieties on Marianna 2624 plum rootstock and are most common on second leaf trees. Like the problem in the plum rooted trees, trees showing the symptoms on K86 appear singly or in random groups down the tree row. These symptoms have been seen on Monterey or Butte on K86 in past years, but they are appearing earlier in the year than usual, perhaps due to the wet winter.

What is the problem? In plum, a similar looking condition is called Union Mild Etch (UME) and is related to pitting at the graft union of affected trees that limits movement of sugars from the canopy to the roots, weakening the roots and predisposing small feeder roots to attack by weak fungal pathogens under warm, wet soil conditions. However, while the canopy symptoms on the K86 rooted trees look similar to those of UME on plum rooted trees, there are no graft union symptoms present on K86 and the condition is not called UME. Right now, we don't understand exactly what is causing the problem on K86. [Some growers and PCAs refer to it as an incompatibility between the variety (scion) and the rootstock, as the symptoms can look like that condition.]

What can growers do to correct this? Nothing special. Experience says that adding extra nitrogen or water to "green up" the trees will make the situation worse (I have seen it make the situation much worse on plum rooted trees). Most of the trees should recover, although the early appearance of symptoms suggests that the trees may look worse before they turn the corner and improve. There is no quick fix. Most important is to treat the trees like the rest of the orchard, and make sure you are not over-irrigating or fertilizing.

Monterey/K86 trees in the same orchard, one (left) with the yellowing symptoms described in this article and one (right) shows no symptoms. Photographed on June 2 by Franz Niederholzer.

Pre- & Post-Harvest Almond Orchard Management Considerations

Katherine Pope, UCCE Orchard Advisor Yolo, Solano, & Sacramento Cos.

JUNE

- *Assess Navel Orangeworm and Peach Twig Borer populations.* If the next generations come prior to hullsplit they will go back to mummy nuts and shoots respectively. Generations can be predicted using your biofix and Degree Day models. Back up degree-day predictions by checking traps. For more, see http://ipm.ucanr.edu/PMG/r3300311.html.
- *Monitor for mites* weekly in the orchard's hot spots. Consider the presence of predators, in addition to the presence of mites, when making treatment decisions. Expand monitoring to the whole orchard after July 1. For more on monitoring and treatment, see http://ipm.ucanr.edu/PMG/C003/m003fcspdmites02.html.

JULY

- *Get ready for hull split.* UC models predict hull split in early-to-mid July this year for Nonpareil, at least a week later than recent years. To predict hull split using data from you nearest CIMIS station, visit http://fruitsandnuts.ucdavis.edu/Weather_Services/almond_hullsplit_prediction/Hull_Split_Calculator/
- *Regulated Deficit Irrigation (RDI)* promotes earlier, more even hull split and reduces hull rot. Beginning at hullsplit initiation, shorten normal irrigation time by 50% for the first two weeks. Then catch up the last two weeks before harvest by providing full irrigation (matching ETc). Moderate water stress can be achieved and monitored by keeping mid-day stem water potential between -14 to -18 bars using a pressure chamber. For more, see http://thealmonddoctor.com/2012/08/05/irrigating-from-hull-split-to-harvest/.
- *Take leaf samples* mid-July to measure nutrient status. Adjust your nutrient management plan for the rest of the season based on July leaf sample results. For more on collecting samples and interpreting results, see http://thealmonddoctor.com/2014/07/04/leaf-analysis-salinity-monitoring.

AUGUST

- *Watch for rust in young orchards.* Prevent early defoliation that can negatively affect flower bud formation for next. For more, see www.ipm.ucanr.edu/PMG/r3100711.html
- *At harvest, collect nut samples for damage analysis.* Grab them now and think about them later. Gather and freeze at least 100 nuts per orchard after shaking, but before sweeping. These samples will allow you to better understand damage results on your grade sheets and adapt IPM strategies for next year. Sampling and pest damage diagnosis help can be found at: www.ipm.ucanr.edu/PMG/C003/m003hcharvstsmpl.html take nut samples.
- *If boron toxicity is a concern*, collect and submit hull samples at harvest for B analysis. For more information, see http://thealmonddoctor.com/2014/07/12/hull-sampling-for-boron.
- *Apply a last shot of nitrogen either shortly before or just after harvest to support bud development for next year.* Generally, no more than 20% of the total season's nitrogen should be applied between hull split and early post-harvest. Decrease planned application if July leaf levels were higher than 2.8% N. See https://apps1.cdfa.ca.gov/FertilizerResearch/docs/Almonds.html for more on rate and timing of nitrogen applications.
- *Manage post-harvest irrigation to minimize water stress.* Water stress in late August to early October can interfere with flower bud development for the following spring. Defoliation reduces tree vigor by reducing sugar production. This is particularly important for orchards with a long window between harvest of Nonpareil and late pollinizers.

Almond Variety Trial Field Day

The UC Regional Almond Variety Trial is hosted by Chico State University. Come by the University Farm to hear about the newest varieties, see some of the preliminary data, and judge which trees you want in your next orchard. For more information, call or email Dani at 865-1153 or dmlightle@ucanr.edu .

Date: June 22, 2017
Time: 9-11am
Place: CSU Chico University Farm, Nicholas C Shouten Lane

Monthly IPM Breakfast Meetings

Join Area IPM and Farm Advisors to discuss current pest management and production issues. We will largely focus on orchard crops (but everything is on the table for discussion!). These meetings are open to all interested growers, consultants, PCAs, CCAs, and related industry.
Meetings will be held the second Tuesday of each month from February through November & locations will be rotated throughout the Sacramento Valley each month.

Additional information for each meeting will be available at sacvalleyorchards.com/events or by contact-

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Almond Newsletter

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