



University of California

Agriculture and Natural Resources | Cooperative Extension

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Upcoming 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 and will cover a wide range of timely pest and orchard management topics. Meeting locations will be rotated throughout the Sacramento Valley each month. Please contact Emily Symmes to request topics or bring your questions to the meeting!

Upcoming meetings:

- Colusa: July 11th (Location TBA)
- Yuba-Sutter: August 8th (Perko's Restaurant)
- Tehama: September 12th (Rockin R Restaurant)
- Glenn: October 10th (Berry Patch Restaurant)
- Butte: November 14th (Location TBA)

Additional information for each meeting will be available on the events page at sacvalleyorchards.com or by contacting UC IPM Advisor Emily Symmes at (530) 538-7201 or ejsymmes@ucanr.edu.

****DPR and CCA Continuing Education hours requested****

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. As part of the internship



Submitted by:

Janine Hasey
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A Celebration of Science and Service

I contributed to UC Cooperative Extension walnut production research in Sutter and Yuba Counties with Farm Advisor Janine Hasey.

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 walnut 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.



In-Season Walnut Production Considerations

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

JUNE

- ✓ *Walnut Husk Fly* (WHF) traps should already be out, 2 traps for every 10 acres on the north side of the tree, hung as high as possible. Monitor traps at least twice weekly until first treatment. Treatment timing can be based on when females with eggs are found, or simply when trap catches increase sharply. For more on monitoring and treatment, see the Sac Valley Orchards article at <https://goo.gl/LTcL6K>.
- ✓ If only applying one *Bot canker and blight* fungicide spray, the second part of June to first part of July had the most effect in recent UC trials, when tested in both a low and high disease situation. For more on timing, see the Sac Valley Orchards Bot article at goo.gl/8aCxNA.

JULY

- ✓ *Codling moth* third flight occurs in late July to early August (on average, 1100 Degree Days after the second biofix). Check traps to look for the third flight. Treatment decision is based on a combination of factors including previous treatments, number of nuts infested in the previous generation, trap catches, and the ability to harvest early. See ipm.ucanr.edu/PMG/r881300211.html for more details.
- ✓ Monitor weekly for *WHF*. If spray residue from the previous spray has run out, harvest is more than 3 weeks away and eggs are present in trapped females, an additional treatment may be prudent. For more, see ipm.ucanr.edu/PMG/r881301211.html.
- ✓ Take *July leaf samples* to assess nitrogen, as well as potentially potassium and zinc deficiencies, and boron toxicity, depending on your circumstances. Sample a total of about 60 terminal leaflets from at least 16 trees on the same rootstock scattered throughout the orchard.
- ✓ Watch for *spider mites* by monitoring weekly through mid-August. Once a week, randomly select 10 trees per orchard, and from each tree take 5 leaflets from low branches and 5 leaflets from high branches. If more than half the leaflets with spider mites do not also have predaceous mites, this is cause for concern. Monitor again in 3-4 days to determine if populations are increasing and treatment is warranted. For more, see ipm.ucanr.edu/PMG/r881400111.html.

AUGUST

- ✓ Consider *ethephon* as a way to increase color quality and minimize the chances of multiple shakes in a modest price year. Ethephon application should take place when 100% of sampled nuts have reached maturity, as indicated by “packing tissue brown” (PTB). This occurs around mid-August for the earliest varieties and around mid-September for Chandler in most years. For more on sampling to track PTB and ethephon application, see the Sac Valley Orchards article at <https://goo.gl/PSvV8q>.
- ✓ Monitor for *Navel Orangeworm*. Healthy, intact walnuts are only susceptible to NOW damage at and after hull split. Consult with your PCA for monitoring and treatment options, bearing in mind pre-harvest intervals, duration of residual activity, and impacts of materials to your overall IPM program. See the Sac Valley Orchards article at <https://goo.gl/zhKfxw> for more information.

SEPTEMBER

- ✓ Collect a sample of at least 100 nuts at harvest for each block and freeze them. Compare them after harvest with grade sheet to evaluate different potential sources of damage and how to improve your IPM program for next year. For help evaluating the source of damage see photos and notes at ipm.ucanr.edu/PMG/C881/m881hppests.html.



Insect and Mite Updates – 2017

Emily J. Symmes, Sacramento Valley Area IPM Advisor

University of California Cooperative Extension and Statewide IPM Program

The impacts of such an unusually wet winter and prolonged spring rain events on insect and mite activity are still developing. This article summarizes some notable observations thus far and specific pest management considerations as we move into summer.

The first **codling moth** biofix generally ranged from early- to mid-April in 2017 in the Sacramento Valley (many of the same orchards observed first biofix in late March the previous two years). As this goes to print, we are nearing 1060 degree days (DD) in most blocks and are on the lookout for the second biofix. The first codling moth flight this year (1A and 1B peaks) were reported to be quite high in many orchards throughout the region, and applications targeting one or both of these flight peaks were common. Keep in mind that a good codling moth program can help minimize early-season infestation by navel orangeworm, so keep a close eye on your trap counts and the numbers of codling moth-infested dropped nuts in your orchards.

Although wet winters can cause increased overwintering mortality of **navel orangeworm**, significant survival was apparent in walnut mummies examined this spring (March 2017). Bear in mind that your neighbors may not have been able to execute their normal NOW sanitation programs last winter either, and these may be a source of populations moving into your orchard as the season progresses (in addition to any carry-over populations you may have in your orchard). Prior to husk split, NOW will go back into mummies and into this-season's damaged nuts (codling moth-infested and blighted nuts).

Significant populations of **frosted scale** were evident in a number of orchards throughout the Sacramento Valley this year. It is not entirely clear why this pest, which it typically present only at low levels, has increased so dramatically in recent years. Research is underway examining this phenomenon, as well as best practices and timings for effective population reduction. Frosted scale produces honeydew when feeding (walnut scale does not). This favors growth of

sooty mold, which increases the chances for sunburn damage, so keep an eye on this if your orchard was heavily impacted by frosted scale this spring. Frequent rains throughout winter and early spring limited the ability for many growers to get into the orchards to apply dormant/delayed-dormant scale treatments, necessitating applications targeting the spring crawler stage. Crawler emergence was observed late in the second week of May 2017 (compared to the first week of May 2015 and last week of April 2016), with peak crawler activity noted approximately two weeks later. This highlights the importance of monitoring the populations, rather than applying treatments based on “typical” calendar timing (which would have been too early this year to target peak crawler activity). Our research trials this year are examining efficacy of different treatment materials and timings specifically for frosted scale (walnut scale has been the focus of research in recent years). If treatments were applied for frosted scale (either dormant/delayed-dormant or crawler), monitor the populations next dormant period looking for the overwintering nymphs (photos and more information at ipm.ucanr.edu/PMG/r881300111.html). Frosted scale has only one generation per year, so the effects of this season’s spray program will be best observed at this time, and as next spring’s populations begin to develop.

Conversely, **walnut scale** populations have dropped off in many orchards, likely due to effective management programs over the past few years. We observed walnut scale crawler emergence during the last week of May 2017 (compared to first and second weeks of May in 2015 and 2016, respectively). Another reminder the importance that treatment timings should be supported by field observations of pest activity each year.

Walnut husk fly traps just beginning to hit the week of June 5 in Butte and Sutter counties. No activity noted as of that time in our trapping locations in Tehama county. Remember that WHF treatment decisions should be made on a site-specific basis and take the time to hang traps high in the tree canopy – this will provide better accuracy in detecting activity. If trapping indicates the presence of treatable WHF populations, all insecticides should be applied with a bait (i.e., molasses, Nu-Lure®, Monterey Insect Bait®). The exception is GF-120 which contains its own bait. For low- to moderate-populations, coverage is not critical and low-volume and/or partial coverage applications (e.g., alternate row) of bait with insecticide can be effective. However, in high population orchards with extensive previous damage, high-volume, full coverage, and/or multiple applications of bait with insecticide may be necessary to achieve adequate control. If you miss a timing and are observing fresh stings, full cover neonicotinoids that have some ovicidal (egg-killing) activity mixed with an adulticide will provide partial control of eggs if applied immediately after stings are observed. Generally, a short-residual insecticide-plus-attractant will kill walnut husk fly for 10 days. With the egg development period added to this time, there is about 3 weeks of protection after an application (GF-120 treatments often must be applied more frequently).

Spider mite activity remains low at press time, but will likely begin to pick up with sustained warmer temperatures. Prophylactic May applications of abamectin, while still favored by many almond producers, have shown to be less effective and economically-viable in most walnut orchard situations. Treatments should be based on thresholds of spider mites and their natural enemies (particularly predator mites and sixspotted thrips). In general, the goal is to manage the *ratio* of predators-to-spider mites (not just spider mite numbers alone) to achieve a balance in which predators can provide free control services. Also consider the impacts of other pesticides on spider mite and predator populations (organophosphates and pyrethroids are highly detrimental to spider mite natural enemies and often result in spider mite flare-ups). More information on treatment thresholds for mites and predators in walnuts is available at: ipm.ucanr.edu/PMG/r881400111.html. Best practices for getting the most out of your miticide in walnuts 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.) and obtaining optimal coverage (high volume, slow speed).

Flooded Orchard Damage Update and Management Considerations

Janine Hasey, UCCE Farm Advisor, Sutter/Yuba/Colusa Counties

Greg Browne, USDA Plant Pathologist, UC Davis

Astrid Volder, Plant Sciences, UC Davis

Bruce Lampinen, UCCE walnut Specialist, UC Davis

In 2017, high and fluctuating water flows, unprecedented for their duration, passed through the Sacramento and Feather Rivers. Orchards were hurt by these flows due to direct flooding, indirect flooding via under-levee seepage, and loss of land through river bank erosion. Many orchards had standing water from January through mid-May. In other orchards, ditches overflowed with nowhere to pump water out. Unlike previous years where floods occurred from levee breaks, such as 1986 and 1997, trees in 2017 had a much longer exposure to waterlogged conditions. This article details our observations on flooded orchard damage as of early June, research plans, management considerations, and an update on potential resources available for flood damaged orchards. For details on flooding damage generalities and past flood events, please see our article in the 2017 spring newsletter issue, which can be viewed in 3 parts at www.sacvalleyorchards.com/walnuts.

Thoughts and Observations to Date

- By early June 2017, many flooded or waterlogged walnut and peach orchards exhibited tree death or severe decline, but assessing losses should be delayed until the end of summer when the extent of damage will be clearer. There may also be effects seen next year and subsequent years.
- Since peach trees start blooming in late February and are very sensitive to wet conditions, the first peach tree damage was noticed in late March/early April. Walnut root activity begins in later spring, with waterlogging symptoms appearing in early May.
- Some peach and walnut trees had healthy crowns and roots in the top foot of soil even though they were leafing out late or had leafed out and died back. These symptoms were caused by waterlogging of deeper roots where soils were still saturated. In previous years, flooded trees usually had dead crown tissue and rot of shallow roots from waterlogging and/or *Phytophthora*.
- In early April, after a peach orchard on heavier soil bloomed and started to leaf out, shoots began to die (Photo 1). However, some buds (mainly on larger limbs) tried to push. Once the soil dried out, the trees began to recover (Photo 2). This illustrates why it is best to wait and leave trees through the summer to more fully evaluate potential recovery.
- Preliminary results show *Phytophthora* in several locations where we sampled surface water.
- In river bottoms where walnut trees were partially submerged for prolonged periods, we isolated *Phytophthora* species from bleeding root and aerial trunk cankers first noticed around mid-May (Photos 3 & 4).
- In a young Chandler orchard on RX1 rootstock, a third of the orchard had seepage from January to early May, whereby only the tops of the berms were not submerged. Flooded trees leafed out about a month later than those not flooded. Some trees are struggling while others are continuing to leaf out and grow (Photos 5 & 6).

Research Plans

Our approach is to study two potential problems of concern: 1) diseases caused by *Phytophthora* and 2) impact of waterlogging on the root system.

- We know the “water mold” *Phytophthora* is found in surface water and infested soils. In May, we sampled water in the Sacramento and Feather Rivers, in swales of standing flood water in the Feather River bottoms (Photo 7), and in seepage water from under levees along both rivers for the presence of *Phytophthora*.
- We sampled several walnut trees with symptoms of aerial *Phytophthora* and examined the crown and upper roots on declining trees. We will monitor these sites through the summer and backhoe trees to examine root systems.
- We will study the impact of long-term flooding from continued seepage on walnut root health and tree water status.

Management Considerations

- Flooded orchards will likely respond to irrigation differently than normal, since root systems are compromised.
- In saturated soils, fine roots die, and depending on the extent of flooding, larger roots can die as well. It takes time for the root system to regain functionality and re-start new fine root production after flooding.
- If the water table level below the soil surface drops gradually, trees may be able to continue to produce functional roots at increasingly deeper levels over time. Initial irrigation could be delayed for some time, as deeper roots may maintain water uptake.
- However, if the soil remains saturated at some level below the surface, the only functional roots may be at a very shallow depth and irrigation may have to be initiated earlier than normal. In this case, shorter but more frequent irrigations could help avoid further damage to roots in the upper zone.
 - Carefully monitor both soil water levels and tree water status so that the trees can be gradually brought back to health. Soil based monitoring, using Watermark® soil moisture sensors installed at different depths, will let you know the level where the soil is saturated as the water level drops, as well as the amount of water that is being moved up above this level of saturation by capillary rise. Apply enough water to bring the soil to field capacity to enable plant water uptake from the upper soil, but avoid prolonged periods of saturation that may damage roots. It is easy to saturate the soil, particularly when the water table is close, so irrigate judiciously, ideally using both soil moisture monitoring and plant pressure chamber data to aid in determining irrigation duration and frequency.
- Do not initiate irrigation until pressure chamber measurements show trees are 2-3 bars below the fully watered baseline (more dry) and only irrigate enough to bring the trees back up to about 0.5 to 1 bar below the baseline by applying short sets of irrigation.
- It is not a good idea to prune or fertilize trees after flooding. Pruning will reduce both carbohydrate reserves and leaf area, while fertilizer applications may mostly go to waste and delay or damage root production. The best approach would be to wait, and let the tree adjust to the altered environmental conditions while managing irrigation as described above to avoid further damage to the root system.

Potential Resources for Orchards Damaged by Flooding

We still don't know fully which programs are available and who will qualify for what programs. For more complete summaries of the resources available below and how to report tree damage visit:

<http://www.sacvalleyorchards.com/blog/almonds-blog/resources-for-flooded-orchards/>

1- Farm Service Agency (FSA)

All the programs available through the FSA can be accessed at <https://www.fsa.usda.gov/>

Contact your local office for program details and deadlines to qualify. Note that to qualify for FSA programs, dead trees from 2017 flooding/seepage need to be left in orchards for loss assessments that will be conducted later this summer.

Tree Assistance Program (TAP)

https://www.fsa.usda.gov/Assets/USDA-FSA-Public/usdfiles/FactSheets/2015/tap_fact_sheet_oct_2015.pdf

The TAP provides financial assistance to eligible nursery and tree crop growers to rehabilitate or replant eligible trees or vines lost by natural disasters. To qualify, there must be more than 18% (15% + normal 3%) mortality loss in an orchard block. Final date to submit an application and supporting documentation is **90 days after** the disaster event or **the date when the loss is apparent**.

Emergency Loan Assistance

A program which provides emergency loans to help cover production and physical losses in counties declared as disaster areas by the President.

Emergency Conservation Program (ECP)

Tehama County and Butte County FSA offices are waiting to hear final approval for the Emergency Conservation Program. This program may help assist with debris removal, releveling or grading, and restoring irrigation systems. Contact the respective office if you have land in Butte or Tehama counties. This program will **not** apply to orchards inside the levees.

2- County Assessor

The Revenue and Taxation Code allows reassessment of property damaged by misfortune or calamity. If there is at least \$10,000 worth of losses of tree value currently on the tax roll, you can obtain a claim form from the Assessor's office.

- 3- Tree loss calculators based on UCCE cost studies through Agricultural & Resource Economics at UC Davis. When an individual tree or vine is destroyed in an orchard or vineyard due to natural causes, vehicle accident, shaker damage, or other causes such as flooding, the link below provides workbooks on specific crops to calculate the value of a single tree or vine lost to any cause taking into account the loss of future income. There are two worksheet versions: "With Replanting" and "Without Replanting".

<https://coststudies.ucdavis.edu/tree-vine-loss/>



Photo 1. Peach collapse from waterlogging taken April 5, 2017. Photo 2. Same orchard on June 1, 2017 with new shoot growth after soil dried out.



Photos 3 & 4. Bleeding cankers associated with aerial *Phytophthora* on a river bottom walnut tree (taken on May 23, 2017).



Photos 5 & 6. Late leaf out of waterlogged Chandler on RX1 rootstock. The tree on the right appears to be recovering as soil dries out (taken on May 23, 2017).



Photo 7. Walnut in foreground collapsed in a swale of flood water that we sampled (background) in the river bottom (taken on May 23, 2017). All photos taken by Janine Hasey.



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Your source for orchard news & information in the Sacramento Valley



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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/.

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