Sacramento Valley Almond News

Winter, 2018

University of California
Agriculture and Natural Resources | Cooperative Extension

In This Issue

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With special thanks to
Barbara Bechtel
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2018 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 third Friday of each month (7:30-9:00 am) from March through October 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:

- Butte County: March 16th (Red Rooster Café, Durham)
- Yuba-Sutter-Colusa Counties: April 20th (Perkos Café, Yuba City)
- Tehama County: May 18th (Rockin R Restaurant, Red Bluff)
- Glenn County: June 15th (Berry Patch Restaurant, Orland)

Full 2018 schedule is available on the events page at sacvalleyorchards.com or by contacting UC IPM Advisor Emily Symmes at (530) 538-7201 or ejsymmes@ucanr.edu.

Seating is limited – please RSVP to Emily prior to the meeting date ☺

DPR and CCA Continuing Education hours requested
(No-host breakfast)

Cooperative Extension Butte County ♦ 2279-B Del Oro Avenue Oroville, CA 95965
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Bloom Almond Orchard Management Considerations

Franz Niederholzer, UCCE Farm Advisor; Colusa, Sutter & Yuba Counties

It's been a warm winter and bud development on early blooming varieties was progressing in early January. This could mean an early bloom (with greater chances for frost damage) and early pest biofixes.

FEBRUARY

Consider honeybee health and safety when applying fungicides during bloom. UC fungicide trials and tables showing effective control are conducted with nothing in the tank at bloom but fungicide (no surfactant unless the label specifically calls for it). Time sprays after pollen has been stripped from the flowers (late afternoon through the night). For bee BMPs, see: sacvalleyorchards.com/almonds/pollination/honey-bee-safety-during-bloom-2/

Frost protection: If freezing temperatures are forecast, turn on sprinklers when the wet bulb, not the dry bulb, temperature up wind of the orchard approaches the critical damage temperature. Don't turn water off until the wet bulb temperature upwind of the orchard is above the critical damage temperature (or all the ice has melted). If rainfall has not been sufficient to wet the top foot of soil, run irrigation water a couple of days before expected frost risk—if water is available. If the top foot is moist but the surface has a dry crust, run water to moisten the surface so heat can be stored during the day prior to frost. A moist soil surface will absorb more heat during the day – and release the heat at night – than if it is dry. Drip irrigation doesn't provide much frost protection during a cold event, but can help if it is used to wet the soil surface ahead of cold – for example, early in the day before cold weather is forecast. Flood irrigation can provide frost protection as long as the flow is sufficient to prevent the water surface from freezing during the frost event. If insufficient water is available to run water during the freeze, wetting the soil in advance will allow the soil to store more heat during the day to keep the orchard warmer at night.

If peach twig borer (PTB) was a problem in last years' harvest, B.t. (Dipel®, Javelin®, etc.) sprays will provide control with minimal impact on honeybees. Spraying any other insecticide than B.t. at bloom risks hive health. Thresholds and treatment timings are available here: ipm.ucdavis.edu/PMG/r3300211.html. PTB can also be controlled with a May spray or at hull split, so bloom insecticide is not essential to controlling this pest (see article on PTB in this newsletter).

Brown rot occurs with warm, wet (dew, rain, or fog) weather. Flowers are susceptible from pink bud until petal fall, but are most susceptible when fully open. Management differs depending on rainfall. Guidelines are available here: ipm.ucdavis.edu/PMG/r3100111.html

Anthracnose management in orchards with a history of anthracnose, or if weather is warm and rainy during bloom, begins with bloom treatments. Photos and management guidelines are here: ipm.ucdavis.edu/PMG/r3101111.html

Green fruit rot is caused by several organisms and can be a problem, especially during wet bloom seasons. Management guidelines can be found at: ipm.ucanr.edu/PMG/r3101711.html.

Bacterial spot can be reduced to low levels with a single full bloom or petal fall application of copper + Manzate timed ahead of warm, wet weather. If warm, wet weather persists, use low or a reduction in the rate of copper with each subsequent application to reduce the risk of leaf phytotoxicity. This disease, which overwinters in mummies and infested peduncles, can be a significant problem in Fritz, but present also in Nonpareil, Butte, Carmel and Price varieties. Management guidelines can be found at: ipm.ucanr.edu/PMG/r3101911.html

If scab or rust was a problem last season and inoculum is present in your orchard, monitor scab twig lesions for scab sporulation and leaves on new shoots for the presence of rust. Treat as soon as observed but prior to the next rain. Scab twig lesions typically sporulate in April. Dormant applications of chlorothalonil + oil or copper + oil may delay sporulation on scab twig lesions until after rainfall ceases thus avoiding the need to treat. Five weeks after petal fall is often an optimum timing for control of rust and scab. Control measures can be found at the following links. Scab: ipm.ucdavis.edu/PMG/r3100411.html; Rust: ipm.ucdavis.edu/PMG/r3100711.html

Hang San Jose scale pheromone traps by the end of February to track male scale activity and relative amounts of beneficial wasps. See details and photos at: ipm.ucanr.edu/PMG/r3300811.html

MARCH

Hang navel orangeworm (NOW) traps no later than mid-March. Pheromone traps track adult male flight activity, egg traps track egg-laying activity (most useful in establishing a biofix, ipm.ucanr.edu/PMG/C003/m003bceggtrapsnvl.html), and kairomone (bait-bag) traps track flight activity of gravid (egg-laying) adult females. See article in this newsletter on NOW control considerations for info on egg trap biofix in the Sacramento Valley.

Hang peach twig borer pheromone traps by March 15 for monitoring populations and to help with spray timing. Info at: ipm.ucanr.edu/PMG/r3300211.html.

Start planning your nitrogen and potassium budgets for the upcoming season. Nitrogen management tools based on UC research are available at sustainablealmondgrowing.org. Approximately 20% of the year's predicted nitrogen needs should be applied in *late* February or March.

When is peach twig borer a concern?

Joseph Connell, UC Farm Advisor Emeritus, Butte County

Peach twig borer (PTB) larvae damage new shoots and, if the timing of their generations is just right, can feed on almond kernels at hullsplit causing shallow surface groves on the kernel. Oriental fruit moth (OFM) damage looks similar and its best to monitor both pests with pheromone traps to determine if either of them have the potential for nut damage. Peach twig borer adult moths have gray mottled forewings. Females lay eggs on shoots, fruit, and leaves. Eggs hatch in 4 to 18 days. Larvae are small, brown caterpillars with white bands and a black head capsule. They go through four to five growth stages. Pupae are dark brown, without a cocoon and are found in tree bark crevices, between hull and shell, or in debris on the ground. They have four generations per year.

Non-bearing trees. Both PTB and OFM larvae prefer to feed in new shoots; young trees are particularly attractive to these pests. Damage to new shoots in early spring in first leaf orchards disrupts primary scaffold development, distorts growth, and makes scaffold selection in the first dormant season more difficult. The May spray timing for peach twig borer often adequately protects developing primary scaffolds on new trees from shoot strikes. Protecting new shoot growth on new trees in early spring is money well spent. Shoot strikes occurring at other times on vigorous non-bearing trees stimulates branching and doesn't set trees back or warrant control.

May sprays are timed using pheromone traps and degree-days. Peach twig borer pheromone traps should be placed in orchards by March 15. Depending on the insecticide used, optimum timing for first generation larvae (the May spray) is between 300 and 400 degree-days after the first male is trapped in April. To calculate degree-days from your biofix, use the degree-day calculator on the UC IPM website (select PTB under Pest and plant models): http://ipm.ucanr.edu/WEATHER/index.html

The second time PTB control is important is in the first dormant season. Primary scaffold branches are selected at the first dormant pruning. PTB can overwinter as larvae in the crotches of these selected primary scaffolds; overwintering larvae emerge during bloom and can graze on buds up and down along the primary scaffolds. When extensive, this feeding can disrupt the development of secondary branching along the primaries. If severe, the twig borer feeding can mimic the appearance of non-infectious bud failure because so many bud positions are eaten, thus failing to produce new shoots. A dormant insecticide spray following the first dormant pruning prevents this potential problem.

Bearing trees. In bearing orchards, PTB can be controlled with two well-timed treatments of *Bacillus thuringiensis* (Bt). For Nonpareil, we recommend the first Bt spray be applied between popcorn and full bloom, with the second spray applied at petal fall. If the bloom spray can't be applied due to rain, a petal fall spray followed by a second application 7 to 10 days after petal fall is recommended. In cool years with an extended emergence period, or if there is a high population, the post-petal fall spray might also be considered. This timing has the least negative impact on the environment and natural enemies. Insecticides other than Bt should never be applied to almonds when bees are present in the orchard.

Understanding PTB behavior makes a difference in determining potential risk to the crop and the need for treatment later in the season. When pheromone trap monitoring indicates the bulk of the second generation will occur before hullsplit, hatching larvae will feed primarily on shoots rather than causing nut damage. If larvae hatch well after hullsplit and kernels have begun to dry, they are less attractive to PTB and damage may be avoided. Once nuts are drying, this pest is more likely to return to feeding on tender shoots.

If monitoring indicates hatching larvae of the second generation will coincide with early hullsplit, PTB may feed in the hull and move into the nut. When newly split hulls, shells, and kernels are moist, larvae are more likely to cause feeding damage on kernels. Timing is critical for good control and sprays should be applied at 1% hullsplit on sound nuts. This timing will also help reduce navel orangeworm damage and will pick up OFM if they happen to be present. PTB resistance to organophosphates and pyrethroids has been identified in the Sacramento Valley.

Nut damage from OFM is rare since they prefer moist tissue and the timing of a generation's hatch must coincide precisely with early hullsplit. OFM larvae can often be found feeding in moist hulls after hullsplit, but rarely is the timing just right for kernel feeding to occur.

In summary, all techniques require multiple applications to maximize control. Recognize that re-invasion into orchards will occur. Regular long-term monitoring and removal of invaders before they multiply and re-establish is just part of good orchard management. For additional information, check out the UC IPM Pocket Gopher Pest Note at http://ipm.ucanr.edu/PMG/PESTNOTES/pn7433.html, you can also visit https://www.youtube.com/watch?v=iDW0l6eeG0M&feature=youtu.be.

Navel Orangeworm Considerations 2018

Franz Niederholzer, UCCE Farm Advisor; Colusa, Sutter & Yuba Counties
Emily Symmes, UC IPM Advisor; Sacramento Valley

Navel orangeworm (NOW) damage in the 2017 almond crop was painfully bad in many blocks in the Sacramento Valley. It cost some growers hundreds of dollars per acre, slowed crop processing (more money lost) and may be an issue in some international markets due to *aflatoxin* concerns. Ugly, ugly, ugly. While bloom (Feb-March) is a "quiet" time for NOW management (other than destroying mummies), it's a good time to review the pest and your options as the season begins. The following is a chronological menu of management options for NOW management and/or control for growers to consider from now until pollinizer harvest, though not all activities are necessary in every orchard every year.

- *Sanitation*
  - Mummies on the ground so that 0.5-2 mummies per tree is all that's left (January)
  - Mummies blown, windrowed and destroyed (flail mower, shallow rototiller, etc.) by March 1
- *Hang NOW traps no later than March 15* (err on the side of "too early is better than too late" in years with mild winters and early bloom, as 2018 is shaping up to be at this point)
  - pheromone traps for adult males
  - egg traps for female oviposition
  - kairomone (bait-bag) traps for adult females
- *Hang mating disruptants:* Manufacturer specifications indicate that these should be up before the first female moths emerge from mummies in late-March or early/mid-April (depending on the year).
- *May spray:* A May spray should be considered **only** where there is evidence of very high in-orchard populations during the first generation, based on populations in last year's mummies, mummy density, and monitoring. The goal with May sprays for NOW is to minimize early-season population build-up, reducing the number of crop-damaging moths at or near hull split. If the orchard faces high NOW pressure from outside sources, growers may get better value from an additional hull split spray instead of a May spray. Research by Dr. Frank Zalom at UC Davis states that certain insecticides applied within days (100 DD of spring egg biofix can help reduce spring mummy infestation. Spring egg biofix is (theoretically) marked by two consecutive detections on the majority of egg traps when checking at least twice a week. However, in the Sacramento Valley, history has shown that often a single sampling date with eggs present can represent biofix (potentially due to low NOW populations and/or high competition from orchard mummy nuts). Remember that pyrethroids in May are a great way to flare spider mite populations. Altacor® or Intrepid® provided the longest control (3 to 4 weeks) with minimal mite flaring in Dr. Zalom's research.
- *Edge spray as blanks start to split:* If sound nuts in trees on the edges of your orchard split first, treating the edge trees ahead of the bulk of the orchard may help keep NOW from infesting the edges of the orchard (before the first hull split spray is applied across the orchard) and becoming a source of moths, eggs, and damage through the rest of the season.
- *Early Nonpareil (NP) hull split spray:* Spray the NP as the first sound nuts within the orchard just begin splitting. Too early is better than too late. No pollinizers should be split at this time (check to make sure) so there's no need to spray the pollinizers.
- *Second NP hull split spray:* Come back and spray the NP a second time 2 to 3 weeks after the first hull split spray. If pollinizers are starting to split, make it a solid (every row) spray.

- *Harvest NP as soon as possible.* A timely harvest at 100% hullsplit may leave a few nuts in the lower interior of the tree, but this yield loss is less than the additional NOW damage the crop (and you!) will suffer if you wait.
- *Pollinizers hull split spray:* Using a short PHI material, spray the pollinizers as soon as the NP nuts are picked up if the NP harvest samples are showing damage.
- *Harvest pollinizers as soon as possible.*

Remember that not all of these activities are needed in every orchard every year. Work closely with your Pest Control Adviser(s) to evaluate the pressure in your particular orchard blocks and adjust your management plan accordingly. The timing and number of sprays needed to achieve successful (or at least tolerable) control of NOW will depend on multiple factors, and can be informed by a number of risk assessment methods (monitoring of both pest densities and crop phenology, historical/previous season damage, location of external sources of NOW, etc.).

Know your enemy.

- NOW is a strong flier (at least a quarter of a mile, maybe more) and has dozens of hosts, including walnuts, pistachios, and pomegranates. Remember that mummies in your orchard (even if not infested heading into the season) can become infested from outside of your orchard during the early flights. Therefore, your nearby neighbors' problems can become yours if you leave mummies in your trees this winter, ultimately damaging your new crop as it begins to split. Growers with big, remote blocks and good sanitation are much better off than growers with small block(s) and abandoned or non-sanitized almonds (or other hosts) nearby.
- NOW has evolved to tolerate very poor living conditions (*aflatoxin* mold, etc.) and can rapidly adjust/develop resistance to pesticides. It is rapidly developing resistance to - or at least tolerance of - pyrethroid pesticides (Asana®, Warrior®, Brigade®, etc.) Tank mixing with more effective and expensive pesticides (Altacor®, Intrepid®, Intrepid Edge®) is a short-term and risky solution with no effective pesticides in development.
- Given the pest, dense orchards, and the tools available, it is not possible to eliminate the pest. The aim is to minimize its damage by using all of the tried-and-true methods available: keeping your orchard clean (using winter sanitation) until hull split, reducing NOW pest levels with hull split sprays, and harvesting and picking up the crop as soon as 100% hull split arrives.

Additional things you can do to reduce NOW damage in tough years:

- Manage irrigation so hull split is less variable across the orchard, allowing treatments to be timed more consistently and provide more effective control.
- Shake nuts as soon as 100% hull split has occurred and get them out of the orchard as soon as they are dry.
- Fumigate stockpiles if you have to wait for hulling.
- Calibrate sprayers to deliver the best coverage possible. Buy/lease/borrow enough sprayers to get across your orchards in less than a week. You can't spray your way out of the trouble that arises from a lack of sanitation, but you can keep damage lower with good coverage and timing. A spray application provides about 50-60% control of the population at best.
- Consider mating disruption if NOW pressure is high due to poor/no winter sanitation, dirty neighbors, etc. But do not consider mating disruption (or sprays for that matter) a replacement for winter sanitation.

Honey Bees and Bloom Sprays

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

It's time for your annual pollinator safety reminder. It is safe to say that most everyone knows to avoid insecticides when honey bee colonies are in the orchard. The only insect pest that could potentially be considered for treatment when honey bees are in the orchard is peach twig borer (PTB). Applications of *Bacillus thuringiensis* during this time have been shown to be non-toxic to honey bees and this material is the only viable option to control PTB during bloom and petal fall while protecting the pollinators you pay so dearly for. There are also alternative timing(s) for managing PTB under different circumstances (see article in this newsletter).

The bigger considerations are bloom disease sprays that, in most years (depending on environmental conditions), are needed to protect the developing crop. Ongoing research continues to examine the impacts of fungicides and adjuvants on acute adult bee toxicity (how damaging sprays are to actively foraging adults), and also the effects on the developing brood that are fed pesticide-contaminated pollen. As you can imagine, there are a huge number of potential combinations of fungicides, adjuvants, and tank mixes that bees may be exposed to in the orchard during bloom.

Below are some take-home messages for bloom fungicide applications and links to resources:

Fungicides – how many sprays are needed?

Conditions will dictate the number of bloom sprays needed for disease management. If the weather is dry and clear throughout bloom, there will be minimal need to apply fungicides during this period. Under environmental conditions not conducive to disease development, UC researchers (Adaskaveg et al. 2017 – link below) suggest minimizing the total number of fungicide applications during bloom by making a single delayed bloom application at 20 to 30% bloom.

ALMOND: TREATMENT TIMING

Note: Not all indicated timings may be necessary for disease control.

Disease	Dormant	Bloom			Spring[1]		Summer	
		Pink bud	Full bloom	Petal fall	2 weeks	5 weeks	May	June
Alternaria leaf spot	—	—	—	—	—	++	+++	+++
Anthracnose[2]	—	++	+++	+++	+++	+++	+++	++
Bacterial spot	+	—	++	+++	+++	++	+	—
Brown rot blossom blight	—	++	+++	+	—	—	—	—
Green fruit rot	—	—	+++	++	—	—	—	—
Hull rot[7]	—	—	—	—	—	—	—	+++
Leaf blight	—	—	+++	++	+	—	—	—
Rust	—	—	—	—	—	+++	+++	+[6]
Scab[3]	++	—	—	++	+++	+++	+	—
Shot hole[4]	+[5]	+	++	+++	+++	++	—	—

Rating: +++ = most effective, ++ = moderately effective, + = least effective, and — = ineffective

Under wet bloom conditions, additional bloom sprays may be warranted. Practice sound integrated pest management practices – treat only for those pathogens that are best controlled during bloom (see table below) and those you know are a potential threat in your particular orchard or block based on monitoring or history. The recently-updated UC IPM guidelines (ipm.ucanr.edu/PMG/selectnewpest.almonds.html) provide details on monitoring and treatment timings for key almond diseases. Additional details and footnotes related to this table can be found at: ipm.ucanr.edu/PMG/r3902111.html#TREATMENT

Adjuvants – are they needed?

- According to the authors of the annual *Fungicides, Bactericides, And Biologicals for Deciduous Tree Fruit, Nut, Strawberry, And Vine Crops* (Adaskavag, Gubler, and Michailides 2017, ipm.ucanr.edu/PDF/PMG/fungicideefficacytiming.pdf), "most fungicides are formulated with adjuvants including wetting agents, spreaders, and stickers. Unless a material specifically indicates on the product label that an adjuvant should be added, the fungicide product does not need additional adjuvants mixed into the sprayer tank to improve performance. With few exceptions, adjuvants do not statistically improve the efficacy of fungicides for managing diseases of fruit and nut commodities."
- All University of California efficacy trial results (+++'s in the efficacy table) are based on this premise and materials are tested without addition of adjuvants unless expressly indicated on the product label.
- Adjuvants may increase the potential toxicity of fungicides to honey bees, so it is best to adhere to a conservative approach and only put in the tank what is absolutely necessary.

Choosing materials:

- Know the impacts of particular fungicides on honey bees and choose materials accordingly.
- Visit the University of California IPM Program's "Bee Precaution Pesticide Ratings" at www2.ipm.ucanr.edu/beeprecaution/
- Use this database to find precaution ratings for any material you are considering applying during bloom (searchable both by common name and trade name).
- These precaution rankings (I, II, III) have been created based on all of the currently available scientific studies, including adult bee toxicity and effects on bee brood. As there are many materials and tank mix combinations yet to be examined, use the information contained here conservatively and always proceed with caution (err on the side of bee safety).

"Bee-safe" applications:

- Apply fungicides when available pollen is at the lowest possible levels (late afternoon through very early the following morning). Pollen is released in the mornings when temperatures reach 55°F, and is often removed by foraging honey bees by mid-afternoon. The "bee-safest" time to apply fungicides is in the evening or at night when temperatures are less than 55°F.
- Never spray hives or bees directly with any material. Contaminated foraging worker bees will carry the fungicide back to the hive where other worker bees will clean them and contaminate the hive's food supply. Aside from these toxicity concerns, bee flight ability can be impacted from the weight of any spray droplets (even water – which is why they don't effectively pollinate during inclement weather) and any water, from sprays or rain, can cause pollen grains to burst affecting pollination.

The Almond Board of California pollinator resource pages (www.almonds.com/pollination) provide additional information and links to Best Management Practices for protecting honey bees during almond bloom.

How is Band Canker Infecting Young Trees?

Dani Lightle, UCCE Orchards Advisor, Glenn, Butte & Tehama counties; Themis Michailides, UC Plant Pathology Specialist, Kearney Agricultural Research and Extension Center

Band canker has been an increasing problem in young almond orchards in recent years. Some hot spot areas in Glenn County have suffered high damage and occasionally required the replanting of an entire pollenizer variety. Symptomatic trees have gumming on the trunk. In the first year of infection, gumming may show as a ring or band around the trunk (hence its' common name), though multiple years of infections can result in a gummy mess up and down the entire length of the trunk (Figure 1). Cankers do not necessarily extend entirely around the tree, nor are they limited to the trunk. Pruning wounds elsewhere on the tree can be a point of infection and bands of gum can also occur on primary scaffolds.

Most cultivars can be infected by band canker, though certainly some are more susceptible than others. In my experience, Wood Colony seems to be extremely susceptible. Artificially inoculated trees developed the largest cankers in the Sonora, Carmel, Padre, and Nonpareil cultivars (Wood Colony was not tested). Trees are typically most susceptible from 4th – 6th leaf, though infections in 2nd and 3rd leaf orchards are becoming more common in recent years. There is a complex of *Botryosphaeriaceae* fungal species responsible for development of cankers. A handful of these species can also infect pistachio and walnut, while others infect almond but not the other tree nuts. The two most pathogenic species are *Neofusicoccum nonquaesitum* (a newly isolated species from almond) and *N. parvum* (also found in walnut and pistachio).

In past research, disease symptoms were associated with proximity to inoculum sources – an old walnut orchard, a riparian area with blackberries, eucalyptus groves – and/or irrigations wetting the trunks. However, I'm now observing orchards severely infected with band canker that are not located near typical inoculum sources and are on drip irrigation which maintains dry trunks. These observations have spurred new research by Dr. Themis Michailides, UC Plant Pathology Specialist, into what conditions have changed that are allowing for infection, and what management strategies can be implemented to help prevent severe infections.

What are the roles of latent infections in disease development? Latent infections are infections detectable in the plant without displaying the visual symptoms (in this case, cankers). In 2017, Dr. Yong Luo, a Postdoctoral Researcher in Dr. Michailides' lab, did a survey of 1st leaf, 2nd leaf, and 3rd leaf orchards in Glenn County. Molecular tests on new shoots and 2 year-old shoots revealed that latent infections were detected in the three orchards sampled, including 1st leaf orchards (Figure 2). We also sampled shoots and cankers from symptomatic trees to see whether the species causing the latent infection was the same as the canker causing species – results are pending.

Are shakers helping spread inoculum through an orchard? We sampled shaker pads from asymptomatic orchards, as well as immediately after shaking an infected tree. Two samples had very weak signals for *Cytospora* (sampled from the asymptomatic orchard) and *Botryosphaeria dothidea* (sampled from the symptomatic trees) while the remaining samples were all negative for all pathogens tested. These test results do not show strong evidence that shakers are responsible for spread of disease inoculum.

What preventative strategies can be undertaken? We will begin a fungicide trial this spring to evaluate materials that may help prevent or reduce the size and severity of cankers. In the meantime, keep water off trunks with stream splitters, moderate growth of young trees to prevent severe growth cracks that are a common entry point for infection, prevent damage and injury to the trunk from activities such as herbicide drift, and minimize pruning activities during key infection periods of March-May.

Figure 1. Left: Tree showing band canker symptoms after infection events over multiple seasons. Photo: T. Michailiades.

Right: Growth cracks provided an entry point for infection in this tree. Photo: G. Browne.

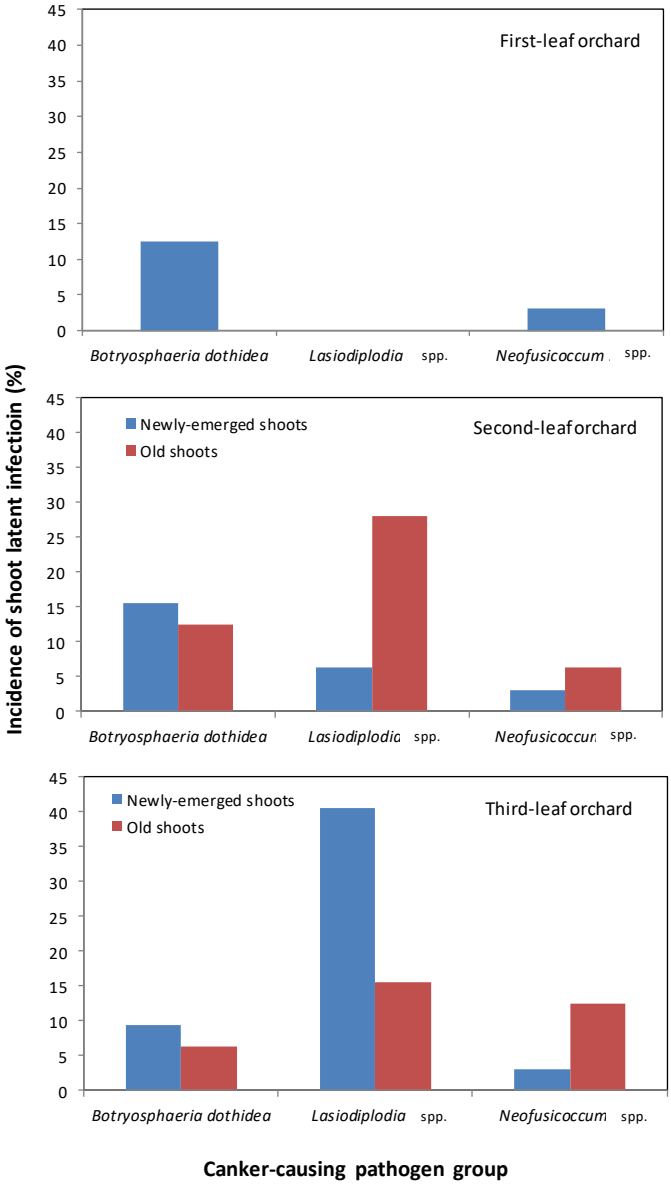


Figure 2. Right: Percent of shoots with latent infections of three different canker-causing genera of fungi. Latent infections were found in 1st leaf orchards, and the incidence of latent infections continued to increase with orchard age.

Missing the Target: Why you Should Irrigate Potted Trees Directly onto Potting Media

Dani Lightle, UCCE Orchards Advisor, Glenn Butte & Tehama Counties

Generally, when I am working with growers on a problem related to potted-tree establishment, the cause is lack of water movement into the potted media, creating tree stress. This results from the difference in soil particle size at the boundary between the orchard soil and the tree's potting soil. When you plant a potted tree in your orchard, it has a substrate – some mix of peat and vermiculite – that is very different than your soil type. The change in texture and pore size inhibits water movement from the surrounding soil into the potting media. As a result, Irrigation water applied outside the potted soil media isn't getting to the roots.

The sequence of photos in Figure 1 demonstrates this phenomenon. I set up a mock orchard condition with soil (Tehama series silty loam) next to a potted tree (potting soil) in a ½ inch wide frame. I then slowly added water to match the soil infiltration rate, similar to a drip emitter, approximately 4 inches away from the potting soil in the 'orchard' soil.

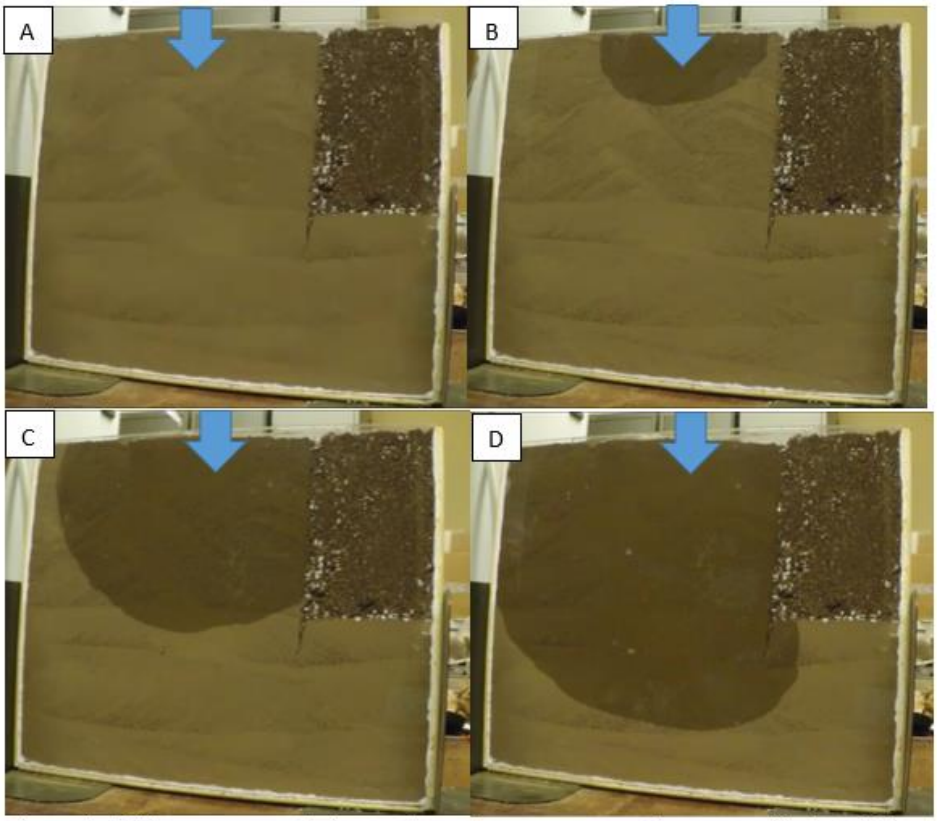
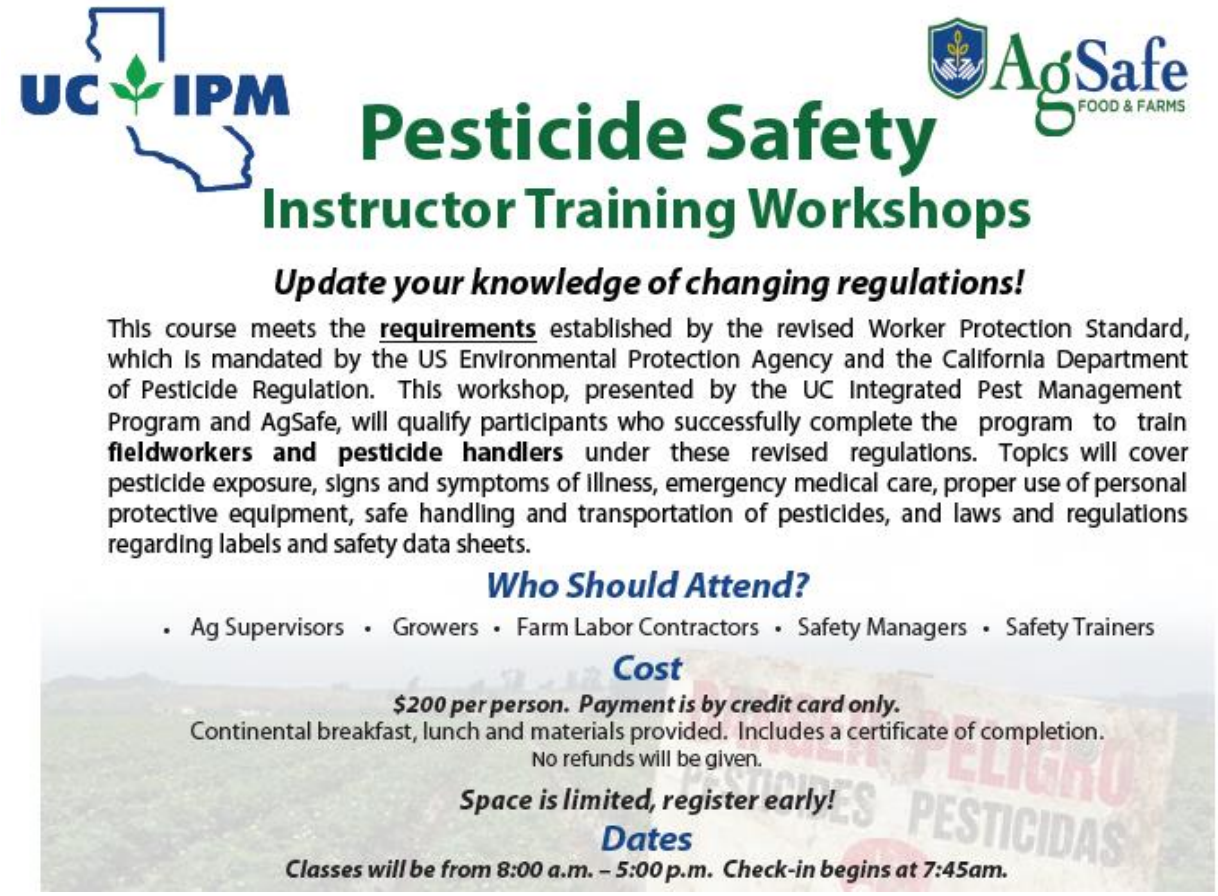


Figure 1. This sequence of photos show the movement of water applied to Tehama series silty-loam soil. Water was applied at the blue arrow, approximately 4 inches from the potting soil. Total elapsed time was 51 minutes. Water moved downwards and laterally, but did not cross the boundary into the potting soil.

You will see that the water does not move into the potting soil (Figure 1C & D). Two forces – gravitational pull and capillary action – move water downward and laterally in the soil. Since the potting soil is not below the orchard soil, gravity does not move water into the potting soil. Capillary action is not strong enough to move water into the potting soil because the difference in pore size is too great. So, irrigation water goes where it can easily flow – downwards and laterally into dry, native soil but *not* into the potting soil. More water does not solve the problem, it will just move past your newly planted trees and wet more native soil.

For about the first month of growth, irrigation emitters should be located at the base of the potted tree to ensure the potting medium receives water. Frequently check to ensure that the potting soil stays wet – not the soil somewhere else in the tree row or mound – before, after, and between irrigation sets. The best way to do this is with a small trowel and your hands. Water will need to be applied at the base of the tree until the tree roots grow beyond the potting soil and into your orchard's native soil. The time required for this to happen will vary depending on factors such as temperature, but it should take roughly a month.



Local meeting dates:

March 28, Oroville (English) & **March 29**, Oroville (Spanish)

Continuing Education Hours will be available through California Department of Pesticide Regulations (DPR).

Registration

Registration is only online. For details and to register, visit www.ipm.ucanr.edu/events or www.agsafe.org.

Questions

Contact us by email at pesticidesafety@ucanr.edu

Updates to Train-the-Trainer instruction & materials funded in part by DPR. California Department of Pesticide Regulation

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Persons with special needs wishing to attend a program should contact the Cooperative Extension Office in advance at 538-7201. Efforts will be made to accommodate your specific need.