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Submitted by:

Dani Lightle,
UCCE Farm Advisor

When To Apply the First Irrigation?

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

Wet soils for extended periods after leaf out can result in yellow trees due to a cold root zone and low soil oxygen levels. Spring rains can be responsible for wet soils and yellow leaves; that can't be avoided. However, irrigation - before it's needed- also causes this problem and should be managed to keep root systems (and the crop they support) as healthy as possible.

Timing of first irrigation of the year is an important early season decision in almond production. If irrigation is delayed too long and trees become water stressed, spur and shoot growth along with current and future yield may be reduced. If water goes on too soon in the season, before trees use much water, early irrigation can harm orchard health, as saturated soil conditions can be followed by root/crown *Phytophthora* infection and/or oxygen-starved roots. Root systems stressed by early season saturated soil conditions may not be healthy enough to deliver the water necessary to meet tree needs in the summer. In addition, saturated soils are less warm than well-drained soils and this reduces nutrient availability and/or the rate of nutrient absorption by roots. Locally-variable spring rains can complicate irrigation planning, so timing of first irrigation requires careful attention.

The short answer is to irrigate when net soil water depletion is equal to the amount of water delivered in your first irrigation set or, put another way...

Season-to-date orchard water use (ET) - Rainfall = Amount in first irrigation set

The timing of first irrigation varies from year to year depending on leaf-out date and weather conditions, including rainfall, so don't use a calendar to time first irrigation. For the best possible timing for first irrigation, you need to know the following:

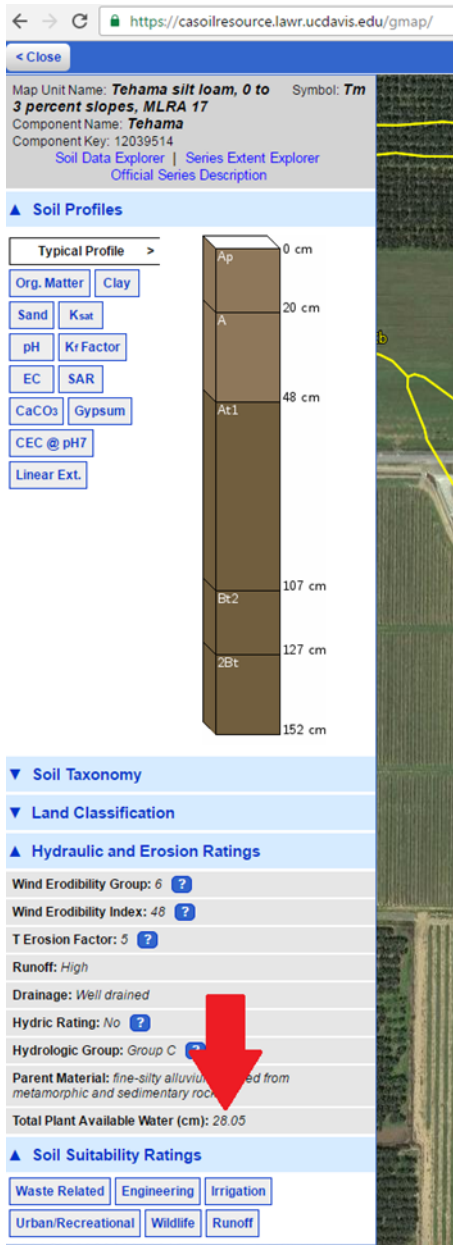
- *How much plant available water will your soil hold after rainfall or irrigation?* Ballpark estimates of this number can be found in the NRCS soil survey

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University of California, and the United States Department of Agriculture, Cooperating with Butte County

To simplify information trade names of products have been used. No endorsement of named products is intended nor is criticism implied of similar products which are not mentioned.

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The tip of the arrow shows where to find Plant Available Water from the interactive website: <https://casoilresource.lawr.ucdavis.edu/>

for your county or online. Ask your local UCCE Farm Advisor for advice on how to use this valuable publication. Look in the table containing “physical properties” (sometimes labeled “engineering properties”) to find the “Available water holding capacity” of the soil. If you are using the interactive version of the NRCS maps through <https://casoilresource.lawr.ucdavis.edu/gmap/> or GoogleEarth, click on the soil series name, then look under “Hydraulic and Erosion Ratings” to find total plant available water (cm)” (2.54cm = 1”). The free SoilWeb app (iPhone & Android) also provides plant available water data.

- *How much water are the trees using?* Estimates of water use by tree crops in the Sacramento Valley are available at <http://www.sacvalleyorchards.com/et-reports/>. Water use is measured as acre inches of Evapotranspiration (ET) for mature trees. Water use by young trees can be estimated from canopy volume; see the publication “Irrigating Young Trees” available at <http://cesutter.ucanr.edu/files/102712.pdf> or from your local UCCE office.

- *How much water do you apply per hour or per set?* If you are using a pressurized system – drip, micro-sprinkler, or impact sprinklers – the company that put in the system should have this information. You could also measure output in the field.

Here’s an example of how the information listed above fits together. Suppose:

- Your orchard soil holds 5” of plant available water in the root zone (0.14” per inch of soil with a 36” deep root zone);
- Your irrigation system puts 2” of water in the soil per set; and,
- It rained 0.5” after the trees had used 1” of moisture from the soil.

Put on your first irrigation after the orchard has used at least 2.5” of water based on ET (using the equation above: 2.5” ET - 0.5” rainfall = 2.0” water delivered in irrigation set). If you are using a micro-sprinkler system with 85% efficiency*, apply 2.35” of water to deliver 2.0” to the soil profile. If using flood irrigation, the first irrigation should go on when plant available moisture in the rootzone is 50% depleted.

If spring weather is wet, consider applying a dry nitrogen (N) fertilizer in the herbicide strip ahead of forecast rain instead of fertigating. The rain will dissolve the fertilizer and move the N into the soil. This practice delivers N to the root zone without adding more water to saturated or near saturated soil. If using a fertilizer containing ammonium and/or urea, apply it as close to the start of rainfall as possible to avoid nitrogen loss by ammonia volatilization. An ammonium-only N source (for example, ammonium sulfate) will move the shortest distance into the soil from the soil surface (leach the least) with the rain (or irrigation) water that moves it into the soil compared to urea or nitrate.

*General guidelines for irrigation system efficiency (from Alan Fulton, UCCE Water Advisor): 80-95% efficiency for drip irrigation; 80-90% efficiency for micro-sprinkler irrigation; 70-85% efficiency for sprinkler irrigation.

Winter & Bloom Almond Orchard Management Considerations

Katherine Pope, UCCE Farm Advisor, Sacramento, Solano and Yolo Counties

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

JANUARY

- *Remove mummy nuts no later than February 1.* To minimize the over-wintering population of navel orangeworm (NOW) and reduce early generation development sites, sanitation should be completed in January. For more, see www.sacvalleyorchards.com/almonds/insects-mites/orchard-sanitation-for-navel-orangeworm-control-2/.
- *Avoid pruning prior to heavy rainfall* since wind driven rain can result in costly canker disease spread and infection of fresh pruning wounds. Minimizing training and pruning can increase early almond yields. For a video on UC almond pruning research and how-to's, see <https://youtu.be/ldl68pNOydg>.
- *Conduct dormant spur sampling for scale and mite eggs* before mid-January, if you didn't get to it in December. Dormant spur sampling guidelines: <http://ipm.ucanr.edu/PMG/r3900211.html>

FEBRUARY

- *Consider honeybee health and safety* for any disease control measures taken during bloom. For bee BMPs, see Protecting Honey Bees During Bloom (*this newsletter*):
- If *peach twig borer (PTB)* was a problem in last year's harvest, B.t. sprays will provide control with minimal impact on honeybees. This is the only acceptable insecticide for bloom-time application for any insect pest. Thresholds and treatment timings are available here: ipm.ucdavis.edu/PMG/r3300211.html.
- *Anthracnose management* should be considered beginning with bloom if weather is warm and rainy when there is a previous history of this disease. Photos and management guidelines are here: ipm.ucdavis.edu/PMG/r3101111.html.
- *Brown rot* occurs with warm rainy weather. Flowers are susceptible from pink bud until petal fall, but most susceptible when fully open. Management differs depending on rainfall. Guidelines are available here: ipm.ucdavis.edu/PMG/r3100111.html.
- Extended wet, cool weather during full bloom into petal fall can lead to *green fruit rot*. If these conditions are forecast, select fungicide(s) for full bloom application that controls this problem (caused by up to three organisms). Note: FRAC Group 3 fungicides do not provide good, consistent control of green fruit rot. See details and photos at: <http://www.ucipm.ucdavis.edu/PMG/r3101711.html>.
- If *shot-hole* fruiting bodies were found in the orchard in fall 2016, select a fungicide with shot-hole activity for a petal fall 2017 application. If no fruiting bodies were found in the orchard last fall, there is no need to spray for shot-hole unless disease symptoms (fruiting bodies) are found on new leaves after bloom. More info on shot hole is available online: <http://ipm.ucanr.edu/PMG/r3100211.html>.
- *If scab or rust was a problem last season* monitoring should begin about two weeks after petal fall. Over-wintering scab twig lesions typically begin to sporulate in April. If subsequent rain is expected, initiate control. 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 during the last week of February.
- *Remove or mow weeds and cover crops before bloom to aid in frost protection.*

MARCH

- *Hang navel orangeworm (NOW) egg, peach twig borer (PTB) pheromone and NOW pheromone traps* by March 15. NOW Egg Trap How-To at <http://ipm.ucanr.edu/PMG/C003/m003bceggtrapsnvl.html>. PTB and SJS pheromone trap info at <http://ipm.ucanr.edu/PMG/C003/m003bcphrmontrap.html>.
 - *Start planning your nitrogen budget* for the upcoming season. An initial estimate of nitrogen needs can be based on an average crop year for your almond block. Nitrogen management tools based on UC research are available at www.sustainablealmondgrowing.org. Approximately 20% of the year's predicted nitrogen needs should be applied in *late* February or March.
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Focus on Honeybees, Colony Strength, and Beekeeper Responsibilities

Joseph Connell, UCCE Farm Advisor Emeritus, Butte County

Always be aware of honey bees when they're in your orchard to pollinate your crop. After all, you're paying good money for the bees to do a critical job! You can go a long way toward protecting the health of honey bee colonies by avoiding contamination of pollen and pollen foragers and by avoiding products with potential toxicity to honey bees or their larvae while bees are in your orchard. This is good husbandry and it's in the interest of both the grower and the beekeeper.

Read the rest of this article covering hive numbers, colony strength & beekeeper challenges at: <http://www.sacvalleyorchards.com/almonds/pollination/honeybees-colony-strength-and-beekeeper-challenges/>

Best Fungicide Options and Timings

Which fungicide is most efficacious for anthracnose? How about brown rot? And what are the best timings for these materials? See the Fungicide Efficacy and Treatment Timings at ipm.ucanr.edu/PMG/r3902111.html for the most up-to-date efficacy and timing information.

SWEEP Grant Recipient Irrigation Training

Recipients of grant funding from the State Water Efficiency and Enhancement Program (SWEEP) by the California Department of Food and Agriculture (CDFA) are encouraged to attend the SWEEP Grant Recipient Irrigation Training and develop the foundation to make efficient irrigation decisions. In addition to SWEEP grant recipients, the training is open to any interested almond growers and allied industry members serving them.

The training is from 9 to 11:30 a.m. on Feb. 20, at Granzella's Banquet Hall in Williams and includes a complementary lunch.

Speakers include:

ET Scheduling - Allan Fulton, UC Extension

Distribution Uniformity - Kevin Greer, Tehema RCD

Understanding Capacitance Soil Moisture Sensors - Bryan Fontes, Sentek Industries

Spencer Cooper, Almond Board of California

Please **RSVP** to Spencer Cooper at scooper@almondboard.com by **February 14, 2017**.

Butte & Glenn County Almond and Walnut Day
in conjunction with North Valley Nut Conference
January 19th, 2017, 7:30am-1:30pm
Silver Dollar Fairgrounds
2357 Fair St., Chico

Main Session

- 7:30am **Registration/Trade Show**
- 8:00am **Laws and Regulations Update:**
TBD, Butte County Agricultural Commissioners Office
- 8:30am **Spider Mite Control in Almond & Walnut Orchards:**
Dr. Jhalendra Rijal, UCCE IPM Advisor, Stanislaus County
- 9:00am **Symptoms of Nutrient Deficiencies (and How to Correct Them):**
Richard Buchner, UCCE Orchards Advisor, Tehama County
- 9:30am **Break/Trade Show**
- 10:00am **California Walnut Board Update:**
TBD, California Walnut Board
- 10:15am **Almond Board of California Update:**
Spencer Cooper, Almond Board of California
- 10:30am **Phytophthora, Crown Rots & Root Rots:**
Dr. Dani Lightle, UCCE Orchards Advisor, Glenn, Butte & Tehama Counties
- 11:00am **Almond Disease Control:**
Dr. Jim Adaskaveg, Dept. of Plant Pathology, UC Riverside
- 11:30am **Butte-Yuba-Sutter Water Quality Coalition Updates:**
Kayla Zilch, Program Coordinator, Butte County Farm Bureau
- 12:00pm **Free Industry Tri-Tip Lunch**
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Butte & Glenn County Almond and Walnut Day

in conjunction with North Valley Nut Conference

January 19th, 2017, 7:30am-1:30pm

Silver Dollar Fairgrounds

2357 Fair St., Chico

Hands-On Breakout Sessions

Breakout sessions are *limited to 25 people* each.

Session registration will be available beginning at 7:30am.

8:30, 10:30, 11:30am Navel Orangeworm Control Using Mating Disruption:

Dr. Emily Symmes, UCCE IPM Advisor, Sacramento Valley.

Join Emily to learn more about different puff-er and mating disruption technologies and their role in a successful almond or walnut IPM program.

9:00, 10:00, 11:00am Using Dendrometers for Irrigation Management Decisions:

Allan Fulton, UCCE Water & Irrigation Resources Advisor, Tehama County.

Allan will have a tree dendrometer on hand, demonstrate how this new technology is used and share data supporting its utility.

9:00, 10:00, 11:00am Understanding and Optimizing your Spray Coverage:

Dr. Franz Niederholzer, UCCE Orchards Advisor, Colusa County.

Having problems with your herbicide coverage? Franz will have a Spray Tray on hand to demonstrate why your application procedure may be the problem and give you some pointers on troubleshooting.

8:00-11:30am Irrigated Lands Program – Question and Answer Table:

Have questions on your Irrigated Lands forms? Not sure which ones you're responsible for completing to be in compliance? Can't figure out what to fill in that blank? Representatives from the Butte-Yuba-Sutter Water Coalition and the Colusa Glenn Subwatershed Program will be available to help and answer your questions. Just stop by anytime during the morning.

Protecting Honeybees During Bloom

Emily J. Symmes, UCCE Sacramento Valley IPM Advisor

With almond bloom on the horizon, it is time to revisit best management practices for protecting pollinators during this critical time. Remember that communication is key during the bloom period. All parties should be kept informed so that beekeepers are aware of impending applications and applicators are aware of the requirements related to notification, materials, timing, location, and method of application. This includes growers, beekeepers, land owners-lessees, PCAs/CCAs, pesticide applicators, and county Agricultural Commissioners.

General guidelines:

- Employ sound IPM practices:
 - Apply pesticides only when absolutely necessary based on monitoring and treatment thresholds.
 - Know all of the available materials and application timings. For insect pests, there are effective alternative timings for insecticide applications aside from the bloom period. If the weather remains dry and clear throughout bloom, there should be minimal need to apply bloom fungicides. One solid, every row application just ahead of full bloom should be adequate for good disease control under these conditions.
 - Be aware of the impacts of any treatments on pollinators and other non-target organisms.
- Always provide adequate clean water for bees:
 - Cover or remove water sources prior to any application.
 - Keep water clean and fresh ensuring bees spend more time pollinating the crop than searching for water. Bees can forage up to 5 miles away seeking food and water if not available in the orchard, increasing risk of contact with harmful pesticides.

- Do not spray hives directly with any pesticide. Ensure the spray-rig driver turns off nozzles when near hives.
- Do not spray flying bees with any applications. Aside from toxicity concerns, bees will not be able to fly because of the weight of spray droplets on their wings. Even water can impact their flight ability (and will also cause pollen grains to burst affecting pollination).
- Avoid pesticide application or drift onto blooming weeds in or adjacent to the orchard.
- Avoid applying systemic pesticides or those with extended residual toxicities pre-bloom.
- Agree on proper hive removal timing. Bees should be removed from the orchard when 90 percent of flowers on the latest blooming cultivar are at petal fall. Past this point, no successful pollination is taking place.
- After removal of bees from an orchard, communication with neighbors remains important since other bees may still be foraging in the area.

Insecticide guidelines:

- Do not apply insecticides during bloom. Much of the information and labeling related to honey bee toxicity is based on acute toxicity of foraging adults. In recent years, more research has indicated adverse effects of pesticides on developing brood, so even materials with “softer” reputations toward honey bees should be avoided.
 - One exception is *Bacillus thuringiensis* (Bt), which may be used at petal fall and shortly after for control of peach twig borer. For more information on monitoring and treatment of PTB using Bt during bloom, refer to the UCIPM Pest Management Guidelines for PTB in almonds at: <http://www.ipm.ucdavis.edu/PMG/r3300211.html>

- Rely on other effective timing options (delayed dormant, post-bloom, in-season) for pest management. UCIPM Pest Management Guidelines for almonds provide monitoring information and insecticide and treatment timing options: <http://www.ipm.ucdavis.edu/PMG/selectnewpest.almonds.html>

Fungicide guidelines:

- Avoid tank mixes with insecticides, adjuvants, other fungicides. Increasing evidence shows that synergistic effects among materials can be more detrimental to both adult bees and the developing brood than applications of individual materials.
 - Addition of adjuvants for bloom fungicide applications are not necessary unless specified on the label, and may harm bees by increasing fungicide toxicity to the bee and/or impact their behavior directly. Limited canopy development should allow good spray coverage as long as the sprayer is well calibrated and properly set up, so addition of adjuvants should not be needed at bloom.
 - University of California trials are generally conducted without adjuvants, and excellent disease control is obtained with several fungicides in these trials. The most recent publication is available at ipm.ucanr.edu/PDF/PMG/fungicideefficacytiming.pdf
- Know the impacts of particular fungicides on honey bees and choose materials accordingly.
- The University of California IPM Program has published a new online resource, “Bee Precaution Pesticide Ratings.” www2.ipm.ucanr.edu/bee precaution/
 - 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, but are still largely based on adult bee toxicity. The table does include effects on bee brood if that information is available. If the table does not indicate toxicity to honey bee brood, that does not suggest the material has no impact on the brood, only that such data is not available yet. Always proceed with caution and err on the side of bee safety.

- The output table also lists known harmful synergistic mixtures based on IRAC and FRAC mode of action (in the column “Other Effects on Bees”). Again, absence of noted synergistic effects between materials only means that the data is not yet available (there are many possible combinations that still need to be investigated). Proceed with caution.
- Apply fungicides in the late afternoon or evening when bees and pollen are not present. Each morning new flowers and anthers open to release pollen. Pollen-collecting bees often collect all of this pollen and leave the almond blossoms by mid-afternoon. Pollen that will be collected the next day is still protected inside closed flowers or anthers, which will not open until morning. It is important to ensure that fungicides have time to dry before new flowers open, anthers shed pollen, and bees begin foraging the following day.

If you suspect pesticide-related damage to honey bees, immediately report this to your county agricultural commissioner. Preserving some adult bees, brood, pollen, honey, nectar, and/or wax by immediately collecting and freezing in clean, labeled containers may be helpful for follow-up on the incident.

Signs to look for:

- Excessive numbers of dead or dying adult honey bees in front of hives
- Dead newly-emerged workers or brood (developing larvae) at the hive entrance
- Lack of foraging bees on a normally attractive blooming crop
- Adult bees exhibiting stupefaction (dazed, unconscious, etc.); paralysis; jerky, wobbly, or rapid movements; spinning on the back
- Disorientation and reduced efficiency of foraging bees
- Immobile or lethargic bees unable to leave flowers
- Bees unable to fly and crawling slowly as if chilled
- Queenless hives

Links to additional resources can be found at:

www.almonds.com/growers/pollination#tc-honey-bee-protection and links therein
www.almonds.com/growers/pollination#tc-BeeBMPs
www2.ipm.ucanr.edu/beeprecaution/

New this Year!

Monthly IPM Breakfast Meetings at various locations throughout the Sacramento Valley

Meetings will be held the second Tuesday of each month from February through November and will cover a wide range of timely pest management topics. Meeting locations will be rotated throughout the Sacramento Valley.

- Colusa: February and July
- Yuba-Sutter: March and August
- Tehama: April and September
- Glenn: May and October
- Butte: June and November

Meeting locations and more information will be available at sacvalleyorchards.com or by contacting UC IPM Advisor Emily Symmes at (530) 538-7201 or ejsymmes@ucanr.edu

Almond Orchards Sought for Flower Microbe Survey

The labs of Drs. [Rachel Vannette](#) and [Neal Williams](#) at UC Davis (Department of Entomology and Nematology) are seeking almond orchards for participation in a research project. We aim to characterize the diversity of microbes that colonize almond flowers throughout bloom. Our goals are to 1) understand whether such diversity could be leveraged for sustainable protection against diseases such as blossom brown rot and 2) to assess the influence of flower microbes on pollinators (which are sensitive to microbes) and the pollination they provide. During this survey, researchers from our labs would visit your orchard and collect flowers, as well as observe pollinators for a short period of time. Upon completion of the survey, we will provide growers with a report highlighting findings on microbial diversity for their particular orchard. If interested and willing to let us have access your orchard during the busy bloom season, please contact Dr. Robert Schaeffer, a postdoctoral researcher that will be leading this effort. He can be reached by e-mail at schaeffer.robert@gmail.com. Thank you for your consideration.

2017 UCCE Almond Meetings

Date & Time	Meeting	Location
January 19, 7:30am-1:00pm	Butte & Glenn County Almond and Walnut Day (in conjunction with the North Valley Nut Conference) AGENDA INCLUDED WITH THIS NEWSLETTER!	Silver Dollar Fairgrounds, 2357 Fair Street, Chico
February 7, 8:00am-12:00pm	Sacramento-Solano-Yolo Almond Meeting	Norton Hall, 70 Cottonwood St, Woodland
February 8, 8:00am-12:00pm	Colusa County Almond Day (held during the Colusa County Farm Show)	Stagehand Theater, Colusa County Fairgrounds <i>Map to theater is available at www.sacvalleyorchards.com/ events</i>
For a list of all other orchard related UCCE Meetings, see the event calendar at: www.sacvalleyorchards.com/events		

Save the Date! Nickels Field Day is May 10, 2017.

The Nickels Field Day will be Wednesday, May 10 on the Green Bay Road (Arbuckle) location. Agenda will be circulated in the next almond newsletter & posted online when available.



Persons with special needs wishing to attend a program should contact the cooperative extension office in advance. 538-7201. Efforts will be made to accommodate your specific need.

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