Sacramento Valley Almond News
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Almond Management Considerations: Spring & Early Summer

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MAY

- **Irrigation**: The trees started the 2023 season with a full soil moisture tank. However, irrigation may need to start earlier than you would think under these circumstances, because of potential root damage from prolonged saturation this past winter. Despite it only being a couple weeks since the rains ended, in late April we are seeing an earlier than expected need for irrigation in almond (according to the pressure chamber). Waiting too long to apply your first irrigation can reduce yield. However you do it, monitor orchard moisture to avoid excessive stress from too much or too little irrigation. As noted above, pressure chamber readings are the most direct way to measure water status of trees and are a powerful tool when used in combination with ET and soil moisture sensors.
- **Nitrogen and Potassium:** Re-examine orchard nitrogen (N) and potassium (K) demand. Given poor set in many orchards after this February's poor bloom conditions, N and K demand will be lower this year in many orchards than hoped for, so don't spend precious dollars to feed a crop you don't have. Nuts use 80% of annual N budget by June; May is a time of high N use in orchards. See detailed information on nitrogen management in almonds from The Almond Board of California. Maintain leaf K levels in an adequate range (>1.4%) to reduce spur death and crop loss potential next year.
- **Spray coverage:** In lean years, make sure that the products you're paying for are getting to the part of the tree you want them to hit. See our spray coverage article in this newsletter for more tips.
- **Diseases:** Monitor for rust, scab, anthracnose and alternaria, treat as necessary. Many orchards were hit with severe bacterial blast and canker this year, resulting in twig and branch dieback. Don't bother to prune out these branches. Hot summer temperatures will kill the infection, and *Pseudomonas syringae* (the blast pathogen) is present in so much of the rest of the environment, sanitation pruning won't significantly decrease the inoculum load. Consider also the impact of wet spring conditions to your orchard's root system. See the article in this newsletter on water-logging and *Phytophthora*.
- **Mites**: Monitor orchards weekly and treat if pest and "friendly" mite numbers show a need.
- **Bugs:** Continue monitoring for navel orangeworm (NOW), peach twig borer, leaffooted and stink bugs. See article in this newsletter on setting a NOW biofix in a wet spring. Biofix at the Nickels Soil Lab in Arbuckle was April 22.
- **Gophers/ground squirrels:** Continue to monitor closely and apply steady control practices to active mounds/tunnels.
- Revising your **weed management** is a way to cut costs in a lean year, by reducing strip width and treatment intensity. See article in this newsletter for more information.

JUNE

- **Irrigation:** If an orchard has been fully irrigated, a strategic irrigation deficit at the onset of hullsplit offers *Rhizopus* hull rot management and a shorter, cleaner shake at harvest. Reduce irrigation set length as kernel fill completes. Deep, heavy soils with micro-sprinkler or solid set irrigation will have more soil moisture available and will respond more slowly to reduced irrigation compared to lighter soil and/or drip irrigation. For two to three weeks, beginning at the onset of hull split (late June or early July), SWP levels of 4 to 8 bars drier than the baseline (generally -14 to -18 bars) will promote hull split and uniform nut maturity leading to timely harvest. Once hull split is 90%, return the orchard to full irrigation until preharvest cutoff.
- **Fertilizer application:** Apply **potassium** as needed to maintain 1.4% range through July. Assess K fertilizer need using current crop set, last year's leaf analysis results, plus orchard observation. Finish **nitrogen** application in June.
- **Continue pest monitoring:**
  - Ants**:** Contact your PCA, check for ants and find a treatment plan. Some application programs start 10 weeks ahead of planned harvest. Apply bait promptly after purchase to dry ground to increase efficiency: product opened for 1-2 weeks no longer works.
  - Continue scouting for spider mites **and** their predators.
  - NOW**:** Check for hull split in the upper southwest canopy of edge trees. Early is better than later for hull split sprays.
- **Hull rot**: Best control combines adequate N management (2.4-2.6% N in summer leaf samples), moderate water stress (-14 to -18 bars on the pressure chamber) between kernel fill and end of early hull split, and 1-2 fungicides in June or early July.
  - ***Monilinia*:** For best control of *Monilinia* hull rot (tan lesion on the outside of the hull), spray in early June as hull split timing does not effectively control this hull rot pathogen.
  - ***Rhizopus*:** For orchards with a history of *Rhizopus* (black spores) hull rot, spray a fungicide at early hull split timing (tank mix with NOW insecticides).
  - ***Aspergilus niger*:** Fungicides are more effective once the hulls have actually split.
- **Equipment preparation**: Time and money can be saved by checking harvest equipment before hull split and harvest. Plan for a low-dust harvest.

Strategies for orchard weed management in hard economic situations

Brad Hanson, UC Cooperative Extension Specialist, UC Davis

I recently participated in a UCCE meeting focused on orchard management decision making when times are hard. This was in the context of the recent low prices facing producers in the state but given the cyclic nature of agriculture could easily apply to other perennial crops as the ups and downs of agricultural commodities respond to domestic and international markets.

When thinking about where weed control costs can be cut and gaming out the consequences of reduced weed management interventions, I think it's useful to step back and remember why we're controlling weeds in the orchard in the first place.

Generally, in tree crops we control weeds to:

1. reduce competition for resources, particularly water and nutrients,
2. reduce weed interference with crop management operations and practices, especially irrigation,
3. reduce plants and debris that can interfere with nut sweeping and harvest operations,
4. be good farmers and stewards of the land and the orchard.

In considering "lean" weed control programs, I tend to first think about weed competition in making decision about where to cut back. In a young orchard, say the first 3-5 years after planting, competition from weeds could be really problematic and might set the growth of the trees back in such a way that there are long-term impacts. I probably wouldn't cut back too much in those young orchards because of that risk. On the other hand, weed competition is

probably not so bad in a well-established orchard; sure, weeds will reduce water and fertilizer use efficiency to a degree but probably won't directly hurt the crop too much or cause long-term impacts on tree health.

Next, I think about weeds most likely to interfere with my irrigation system; tall weeds that block sprinkler patterns or interfere with water flow in some way need to be managed somehow. In this case the weed problem is indirect, but still a problem if it results in poor irrigation and fertilizer distribution. I'd focus here on making sure irrigation uniformity remains reasonable in spite of the orchard being a bit weedier than normal.

Wherever possible, consider the weed's life cycle and try to time any weed management practices to reduce seed set because those seeds will be the source of weeds for years into the future. Mowing or tillage operations can be timed to be implemented before mature seeds are formed. Likewise, if you've got significant problems with perennial weeds like Johnsongrass, bermudagrass, or nutsedges, you might focus resources to reduce their spread and proliferation.

So, if we're going to cut back somewhere on weed control practices, what are some thoughts and approaches?

First of all, weed identification, which is always an important part of good weed management programs, is even more important if you're deciding which weeds have to be controlled and which ones you might be able to live with. Not all weeds are equally problematic. I'd focus here on the perennial weeds, the new invaders, the hard-seeded species with long soil life, and the weeds that will result in large debris that will persist to harvest.

Second, stretch your retreatment intervals. This basically is reducing weed management intensity by mowing and spraying less frequently (and getting used to a few more weeds) in order to save a few trips though the orchard. I'd time any operation to reduce weed seed set but tolerate a little bit of age-appropriate competition. Consider here the year-round cost thought; if you skip a mowing but then have to spray and mow twice to clean up before harvest you might not actually save much at all.

In the reduce intensity category, I'd also suggest reducing the width of the tree row spray strips. Blocking a nozzle or two on the inside of the spray boom could reduce the treated area by 1/3 to ½; I'd consider the width of your mower and spray the minimal strip but still be able to mow in a single pass. This also has implications in less-lean times when we are thinking about general herbicide-reduction goals in the orchard. I think that doing a very good job on half the amount of area is a better strategy than doing a mediocre job on the whole area because the tree row is where competition will be most problematic and where weeds will interfere most with irrigation delivery. Also, in the reduced intensity category, think about your tankmix programs and if every component is really needed; I'd argue that a second (or third or fourth) product added to the tankmix to increase control from 95 to 99% may be one that could be left out in difficult times.

I'm occasionally asked about generic herbicides vs the main branded products because several of our important herbicide active ingredients are off-patent and distributed under many product names. Usually, when I've done head-to-head testing, I've found little, if any, performance differences. My caution here is to make sure that you're really making an apples-to-apples comparison about formulation concentration and surfactant packages. Of course, there are programs and packaging deals to be had in making your overall orchard management pesticide decisions so be sure to talk to your PCA and retailer about overall costs.

I summarized my thoughts on navigating lean weed management decision making as:

- Don't skimp on weed control in the young trees because of long-term impacts from competition.
- Really think about the weeds you have in orchard and their real impact on the orchard and operations.
- Reduce the intensely managed area by narrowing spray strips.
- Reduce treatment intensity and increase retreatment intervals.

Reducing weed control in orchards during difficult economic times is possible but comes with some tradeoffs. Give up a little in the short term and let it get a little ugly in terms of weediness but reduce the long-term impacts to the degree possible. Focus on maintaining the young orchards, reducing interference with irrigation and harvest, and try to time the weed control practices to minimize weed seed set. Integrated weed management approaches are still key, even when we are forced to move the goal posts due to (hopefully!) short term economic reality.

Navel Orangeworm Biofix in a Wet Spring

Sudan Gyawaly, Northern Sacramento Valley IPM Advisor
Franz Niederholzer, UCCE Farm Advisor, Colusa, and Sutter/Yuba Counties

Final wet and cool days are wrapping up as we quickly approach hot and dry weather. The extremely wet winter this year has likely helped growers to kill more overwintering navel orangeworms (NOW) than in warmer and dryer winter years. However, a wet, cold winter will not kill all NOW, and being complacent might result in a bad NOW year. Monitoring the NOW population to make management decisions this year is as important as in the years with low rainfall and warm winters.

The NOW flights in orchards are just picking up in our region, with a few males and a couple of females captured each week as of April 28 (based on six pheromone and six Peterson traps in the Chico and Orland area). Biofix in 2023 at the Nickels Soil Lab in Arbuckle was April 22.

Commonly used NOW monitoring traps in almonds are pheromone traps, bait-bag (Peterson) traps and egg traps. Pheromone and Peterson traps track the male and female moth, respectively. Both traps track seasonal activity and provide information about the beginning, peak, and end of each flight. Egg traps help to detect the beginning of the female egg laying, set the spring biofix, and calculate the heat units (degree days) to determine the potential insecticide treatment timing. Egg traps are typically placed in the orchard by March 15.

Getting the correct date for biofix in a particular orchard is very important to limiting NOW damage. Biofix and degree days are used to predict the start of egg laying for each generation. Shaking nuts ahead of the start of egg laying of later generations in August and September can reduce NOW damage (nuts on the orchard floor are harder for the female NOW to find and lay eggs on). Especially in the Sacramento Valley, the trick to getting this "free" NOW damage reduction is find the first eggs of the season in the egg traps.

According to UC IPM guidelines, spring egg biofix is marked by two consecutive detections of eggs on most egg traps when checking at least twice a week. However, in the Sacramento Valley, based on the research experience of Dr. Frank Zalom of the UC Davis Entomology Department, the first NOW egg catch is considered biofix. It is important to have traps up early to catch the first eggs and accurately estimate biofix. Details on NOW degree day calculation are available at UC IPM Guideline.

Dial-in spray coverage for cost-effective spraying

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

Summary.

The goal of airblast spraying is a uniform pesticide deposition of a known, prescribed pesticide rate throughout the entire target (tree canopy). Done right the first time, a good spray job saves the time and money of a second spray plus income lost due to crop damage in the case of a poor first spray. [In tough economic times, a second spray for the same problem may not be in the budget.]

There are several steps to achieving this goal. Skipping any step will reduce spray efficacy and efficiency.

Step 1: The sprayer should travel at an appropriate speed to allow spray to reach the treetops. Too slow sprayer speed wastes time, too fast costs money in poor spray coverage in the treetops. *Step 2*: Point larger nozzles at thicker canopy (more leaves and nuts). For most orchard crops, this means 65-80% of the spray flow (gallons per minute) should be applied through the top half of open nozzles.

Step 3: Measure gallons per acre sprayed and, using total spray tank volume, determine the amount of pesticide product to add to each tank, so matching your PCAs recommendation.

Step 4: Check coverage with water sensitive paper (WSP) placed in the canopy. Finally, spray mature (tall) trees when relative humidity is above 40% to limit droplet evaporation and allow good coverage in the upper canopy.

There will be an airblast sprayer coverage talk at the Nickels Field Day on May 18.

Details.

Ground speed. Airblast spraying uses air from the fan to distribute the pesticide throughout the tree. **If the fan's air doesn't reach the treetops, the pesticide won't either.** Ground speed is a simple and effective way to adjust air movement through the canopy, especially between bloom and harvest when spray coverage is most challenging.

The sprayer should travel just fast enough so air from the sprayer's fan reaches just above the tops of the tallest trees. To check this, at a time of day with little to no wind, tie a short (18") length of surveyor's ribbon to a section of PVC pipe or conduit and run the tubing up through the middle of a tree to a height just above the tallest trees in a planting. With the sprayer fan "on", drive the sprayer past the tree with the flagging at tractor and sprayer settings you think is appropriate (for example, full sprayer air delivery and 2.25 MPH sprayer speed). If the flagging flutters out to 45^{o} from the vertical as the sprayer passes the tree, the speed is appropriate for that planting at that time of the season. If the flagging just barely moves or doesn't move at all, repeat the process with slower tractor speed. If the flagging kicks up to the vertical (180^{o} from dead hang), repeat the process at a faster tractor speed. Record the tractor and sprayer settings that deliver air movement from the sprayer fan to just above the canopy. Calculate the acres per minute sprayed at that ground speed by multiplying ground speed (feet per minute) by the row width. Note: If spraying on a day with slight winds, drive more slowly, delivering more fan air to compete with the wind and better cover the upper canopy.

Nozzle selection: With a gallons per acre (GPA) target from your PCA and the appropriate sprayer speed measured with the "flagging on a pole" process mentioned earlier in this article, calculate the sprayer output (gallons sprayed per minute; GPM) needed.

Gallons per minute = (Gallons per acre) x (Acres per minute)

Now select nozzles to deliver the GPM you just calculated (on paper). More spray should be applied to areas of the tree with more leaf area. Upper canopy locations often hold more crop than the rest of the tree and are the toughest to cover. Extra spray volume with larger nozzle size targeted there will deliver more uniform coverage.

Step 1: Park the sprayer in the orchard and look where the different nozzle ports are located. Tying flagging to the nozzle ports and running the fan can help show you which ports point where (see picture below).

Step 2: Using the manufacturer's catalog and desired system pressure (for example, 150 psi), select nozzle sizes to locate on different nozzle ports. The goal, for mature trees, is 65-80% of the GPM should go out the top half of the open nozzles. That is, if there are 8 nozzles that should be open in a particular orchard based on the sprayer and tree size, the top four should have most of the total GPM. Using the same nozzle size at every nozzle port will, at best, over spray the lower canopy while delivering good coverage to the treetops (as long as the ground speed is right).

Gallons per acre. With the ground speed and nozzles selected, determine the GPA. Park the sprayer on flat ground and completely fill the tank with clean water. With the nozzles just selected on the sprayer and using the sprayer and tractor settings for the right/appropriate ground speed, turn on the spray booms for a measured amount of time (1 minute, 2 minutes, etc.). Refill the sprayer with clean water using calibrated buckets or a hose with a flow meter to measure how much water was sprayed in the time the sprayer ran. Calculate GPM from the volume sprayed and the run time. Adjust, as needed, the system pressure or nozzle sizes to deliver the GPA recommended by the PCA.

Check coverage. Water sensitive paper (WSP) are small cards with yellow coating on one side that turn blue where water (or fingerprints) touches the surface. Put WSP at different heights in the trees in the orchard. This can be done in several ways. If you have a pruning tower, use it to get up into one or more trees in the orchard and directly clipping WSP to leaves or attaching to nuts. Flag each WSP location so you can find it later. Another method is to attach WSP at different heights on a PVC pole and running the pole up through the middle of the tree canopy. Once the WSP are up in the canopy, spray clean water down the row where the WSP are placed using the tractor settings and nozzle selection/location determined earlier. Take down the WSP after and compare upper and low canopy locations to see if coverage is generally uniform. You can measure coverage with a smartphone camera and apps, but a general scan should be enough. Are the lower cards all blue? If so, the lower canopy is getting too much spray. One possible fix for this is to change out lower nozzles for a size smaller and repeat the test. If the upper cards are not getting much coverage, increase selective nozzle sizes and/or slow down the sprayer.

Lastly, spraying when relative humidity is low (<40%) can reduce spray deposition in the upper canopy by half. This can lead to poor control and/or resistance development. Especially in warm summer months with low daytime humidity, night and early morning spraying is important to achieving good spray coverage.

Effective pest control with pesticide(s) is a key backstop in a good, cost effective IPM program. Good spray coverage (and material selection/spray timing) ensures the backstop is solid.

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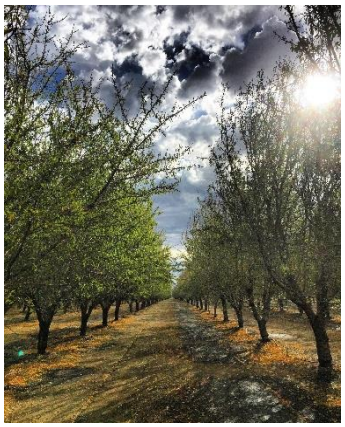

Irrigation Management with David Doll

Field Evaluation of Almond Varieties

The Dangers of Irrigation Leaks