Sacramento Valley Prune News
Spring, 2023
University of California
Agriculture and Natural Resources | Cooperative Extension

In This Issue

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

Spring & Early Summer Orchard Considerations

Luke Milliron, UCCE Farm Advisor, Butte, Glenn and Tehama Counties
Franz Niederholzer, UCCE Farm Advisor, Colusa, Sutter and Yuba Counties
Becky Wheeler-Dykes, Orchard Researcher, Chico State
Katherine Jarvis-Shean, UCCE Farm Advisor Sacramento, Solano & Yolo Counties

May

✓ **Got a big crop?** In late April a clearer picture of the 2023 crop is coming into focus. The very late bloom this year was accompanied by excellent (65-80 °F) weather. Be ready to check cropload and shaker thin (potentially in multiple rounds), once reference date arrives, around 7-10 days after pit tip hardening. Thin early for best fruit size improvement. See the thinning article in this newsletter for details on cropload checking and thinning.

✓ **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 or between irrigation sets can produce fruit end cracking.

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.

✓ **Fertilization program starts:** The main objective in mature orchards is to feed the crop. It looks like it could be a big crop this year. Don't fall behind with orchard nitrogen (N) or potassium (K) nutrition.

✓ **Nitrogen**: Consider a soil N application (UN32, CAN17, urea, etc.) as soon as possible if you didn't get one on before the end of April. Multiple (3-4) "shots" are more efficient than one or two.

✓ **Potassium:** If using only foliar potassium nitrate sprays as your entire potassium program or to supplement soil applied K, begin spraying by early May make additional applications every 2-3 weeks. If a good rate of dry K fertilizer was applied in the fall (300-500 lbs fertilizer/acre), only 1-2 sprays maybe needed all season, and the best timing is later in the season. For more details of potassium nutrition in prunes, click HERE.

✓ **Aphid:** Monitor for leaf curl plum aphid and mealy plum aphid since colonies can grow soon after bloom. Oil sprays anytime from petal fall to May 15 can reduce mealy plum aphid to acceptable levels with good to excellent coverage. Oil is not effective

against leaf curl aphid during this period as the spray can't reach inside the curled leaves where the aphids are feeding. Other pesticides are effective in controlling aphids during the spring: Movento® and BeLeaf® can provide excellent aphid control when monitoring shows a need but be careful to avoid flaring mites with pyrethroids (Asana®, Warrior®, etc.) or neonics (Actara®, Provado®, etc.).

Leaf curl plum aphids move to summer hosts in May, but mealy plum aphid stay in orchards until mid-July. Heavy infestation of mealy plum aphid can limit flower bud development this year, which can mean less crop next year.

- ✓ **Rust:** Monitoring begins in May. Survey 40 trees every 1-2 weeks. Pay close attention to non-bearing replants, exceptionally vigorous trees, and previous hot spots. Consider treating when the first leaf with rust is found. Keep a close eye out for rust in orchards not treated with fungicide prior to the early May rain.
- ✓ **Peach twig borer (PTB) and Oblique-banded leaf roller (OBLR):** These worms feed on the fruit surface later in the season, damaging the fruit skin and "opening the door" for fruit brown rot infection. Don't assume earlier sprays (for example, dormant spray) worked to control these pests. Inspect fruit at 400 degree days after the first PTB biofix. In the orchard, look for larval entry points on the fruit (ideally 15 fruit from 80 trees), especially at fruit to fruit or fruit to leaf contact points. Treat if 2% or more (24+ of 1,200) of the fruit have damage. For OBLR, begin fruit inspections at 930 degree days after biofix for that pest, following the same sampling protocol and treatment threshold.

June

- ✓ Continue monitoring for **aphids** and **rust**.
- ✓ **Spider mites:** Begin scouting by checking two different sections of the orchard each week. Spend about five minutes in each section, checking 2-3 leaves (some inside and outside of the canopy) on 10 trees. Look for spider mites and predators (predaceous mites and sixspotted thrips). Treatment decisions should be based on population levels of both mites and predators. If more than 20% of leaves have mites, but less than 50% of the leaves have predators, treat for mites. If more than 60% of leaves have mites, treat even if most leaves have predators.
- ✓ **Irrigation:** Mild to moderate tree water stress (-12 to -16 bars, measured by a pressure chamber) helps avoid excessive vegetative growth and associated pruning costs next winter without slowing fruit sizing this season. Maintain this water stress until fruit has reached physiological maturity (when fruit averages 4lbs internal pressure), typically in early to late August. Click HERE to see more information on pre- and postharvest irrigation.

  Note: In late June, consider the weather forecasts when deciding on irrigation through early July. Traditionally, many growers reduce irrigation going into the 4th of July holiday to reduce orchard humidity and chances of fruit side cracking caused by dew events if the weather suddenly cools. Reduced irrigation to reduce side cracking may increase the risk of fruit sunburn if the weather stays hot. The weather is hard to get right but adding sunburn risk to the conversation along with side cracking risk is suggested. Side cracking is more of an economic risk in years with light crop and larger fruit while sunburn may be a higher economic risk in heavier crop years with less extra-large fruit. To see more information on sunburn ("blue prune") click HERE.

July

- ✓ **Preventing defoliation:** Continue monitoring for late summer (preharvest) outbreaks of **rust** and **spider mites**. Infestations of these pests can cause leaf drop that weakens trees, reduces sugar levels, and slows harvest. In very hot weather, mite populations can double in a week.

- ✓ **Fruit brown rot**: Clustered fruit is more vulnerable to brown rot infections as harvest approaches.
- ✓ **Monitoring fruit maturity:** Fruit should be mature in roughly 30 days after the first color shows on the suture. Begin measuring fruit internal pressure once fruit shows color.
- ✓ **July leaf samples:** Mark your calendar for July leaf sampling.
- ✓ **Clean up orchard ahead of harvest for faster operation.**

Weather in 30 days after bloom helps plan thinning and harvest.

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

Summary: Cooler weather in the 30 days following 50% full bloom generally leads to a longer growing season and larger fruit size potential in peaches, plums, and prunes. The heat units used in research comparing early season temperatures, harvest date, and fruit size are called Growing Degree Hours (GDH).
Generally, GDH30 accumulation looks to be lower this year in the Yuba City area than in the past few years. This means harvest could start in the Yuba City area in the last week of August and sizing potential should be better than in, for example, 2019 when bloom was also late but GDH30 was high. We'll have to see how the season plays out, but experience favors these predictions (late harvest, better fruit sizing potential).
Bloom date and cropload per tree still have the largest influence on harvest date and fruit size potential, respectively, but knowing GDH30 accumulation can be used to fine tune harvest and thinning planning. See the thinning article in this newsletter for examples of how GDH30 can be used in thinning planning.

Details: Almost 20 years ago, UC Davis Professor Ted DeJong, working with fresh market peaches. showed that warmer weather in the first month after full bloom was related to earlier harvest, earlier reference date, and smaller fruit at both reference date and harvest compared to cooler spring weather. Since then, Dr. DeJong and team have shown a similar relationship between GDH30 and harvest date in prunes.

Why does temperature matter like this? The theory goes like this…Temperature drives development in plants, but growth is influenced most by carbohydrate (sugar) availability. Sugars from winter storage and/or current photosynthesis are both the raw material of plants as well as the energy to fuel growth. When temperatures are warm in the spring, trees develop rapidly but carbohydrate availability lags and growth potential isn't met even as higher temperatures drive fruit development (pit hardening, reference date, etc.). Conversely, later harvest from cooler springs means the fruit is on the tree longer and so has more time to grow compared to earlier harvests linked to warmer springs. Bottom line? The experience shows later harvests with cooler temps in 30 days after harvest and that can mean slightly bigger fruit at harvest. Check out the GDH30 calculator at the UC Davis website linked above.

Why thin prunes?

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

Increasing grower profit by maximizing production of large, high-quality fruit is the goal of fruit thinning. For example, in the table below the crop load that produces the most A & B screen fruit (2000-6000 fruit per tree) also includes some C screen and smaller fruit (around 10-30% of the total production). The goal of fruit thinning is not to eliminate small fruit. The crop load that nearly eliminated low value small fruit (1000-2000 fruit/tree) produced lower tonnage of A&B screen fruit and made less compared to slightly higher crop loads (2000-6000). At reference date, if the crop load (fruit/tree) is greater than the orchard can size to profitable market value, growers must decide on a thinning (target) fruit count per tree based on experience in a particular orchard, GDH30, and information from their packer about the expected value of smaller fruit at harvest.

Please note, crop load (fruit/tree) is the main driver of fruit size. GDH30 plays a smaller but an important role in the final fruit size equation. For example, in a cool spring (low GDH30) a grower might leave 4500-5000 fruit/tree compared to 3500-4000 fruit per tree in a high GDH30 season. (Note: this is just an example to show how GDH30 might be used. Growers should develop their own understanding of GDH30 and fruit size in a particular orchard.) **Final note**: In my experience, return bloom next year is reduced at flower counts/tree **THIS YEAR** more than 6,000 fruit/tree in orchards similar to the one used in the example (table) below. Growers should evaluate return bloom in each orchard at a specific fruit/tree target and build that important production factor into future crop load planning.

****

Fruit/tree and fruit size data from individual trees in a well-managed Sutter County orchard (151 trees per acre (16' x 18') in 2017. The "sweet spot" for production in the current market is shown in green, but individual growers, in discussion with their packer, should decide for themselves what fruit/tree numbers work best for each orchard.

Fruit per tree at harvest	% A & B screen	Dry tons/acre A & B screen	Dry tons/acre C screen or less	Gross income ($/acre)*	Gross income ($/acre)**
1,000-2,000	94	2.0	0.1	4040	4000
2,000-4,000	83	2.8	0.6	5840	5600
4,000-6,000	71	3.8	1.6	8240	7600
6,000-8,000	46	2.6	3.0	6400	5200
8,000-10,000	23	1.5	6.5	5600	3000
10,000-14,000	13	1.0	7.3	4920	2000

*Assuming $2000/dry ton for A&B screen and $400/dry ton for C screen and smaller.
**Assuming $2000/ dry ton for A&B screen and nothing for C screen and smaller.

The most important task of the year.

Franz Niederholzer, UCCE Farm Advisor, Colusa and Sutter/Yuba Counties
Dani Lightle, former UCCE Orchards Advisor, Glenn, Butte & Tehama Counties

There is no more important activity in prune growing than checking the crop load in late April (or early May this year?). Knowing the crop load (fruit/tree) in an orchard is the most critical piece of data needed to decide if shaker thinning is needed. [Knowing the crop load can also help growers plan nutrition programs for the year.]

When needed, shaker thinning can significantly improve a grower's bottom line this year and next year. Careful, timely thinning increases A & B size fruit production, limits small, lower value prunes in the bin at harvest and improves return bloom next year.

To find out if thinning is needed, check crop load from 2-3 trees per orchard at or just before reference date, which usually falls between April 20th and May 10th, depending on bloom dates and weather since bloom (see article in this newsletter on GDH30). Reference date occurs when 80 to 90% of the fruit have a visible endosperm (see Figure 1), which is approximately one week after the pit tip begins to harden. The endosperm, a clear gel-like glob, the beginning of the developing seed, will be found in the seed cavity on the blossom end of the prune (Figure 1) and is solid enough to be removed with a knife point.- The warmer the spring, the earlier reference data arrives.

Figure 1. *Extraction of the endosperm on a developing prune. When 90% of the fruit cut as in this photo shows endosperm, then the fruit can be shaker thinned if there are too many fruit on the trees.*

Highlighted (grey background) text shows the example numbers used in the five steps.

Please insert your own numbers.

Step 1. Estimate the targeted tonnage from a given block by considering orchard history, age, etc. Let us assume a target of 3 tons/ac, and a goal of 55 dry count/lb fruit in an orchard spaced 16' x 18' (151 trees/acre). From there, calculate a targeted number of fruit per tree at harvest:

(((Dry tons/acre) x 2,000 pounds/ton) x Dry count/lb.)) ÷ Trees per ac = Target number fruit/tree

$$(3\frac{tons}{acre}x\,2{,}000\frac{lbs}{ton})\times 55\frac{count}{lb}\div 151\frac{trees}{ac}=\ 2{,}185\ fruit/tree\ \text{(target)}$$

Step 2. Determine the actual number of fruits in a sample tree and compare that number to the target of 2,185 fruit (from step 1). Ideally, repeat this procedure on 3 representative trees to ensure accuracy. Place tarps under the tree and mechanically shake off as much fruit as possible, then hand strip any remaining fruit. Hand stripping takes extra time but is the most accurate way of knowing how much fruit is in the tree. Some growers estimate what is left after shaking.

Collect all the sound fruit and weigh them (for easy math in this example, let's assume this weight is 100 lbs.). Take a 1-lb subsample of the fruit and count how many sound fruit are in a pound (easy math assumption: 90 fruit/lb.). Don't count fruit that looks like it wouldn't have stayed on the tree until harvest: these fruits are light green or otherwise look slightly "off" compared to the strong (larger, dark green) fruit. Then use those fruit/pound numbers to determine the total number of fruits per tree:

Total tree fruit weight x Number of prunes per lb. = Total number of fruits per tree

$$100lbs \times 90\frac{fruit}{lb} = 9{,}000\ fruit/tree \text{ (actual)}$$

Step 3. Decide if you need to thin. Subtract the target number of fruit (at harvest) from the number of good fruits on the tree now (reference date). In this example, there is roughly 4 times the number of fruits on the tree than desired to hit the target of 55 dry count/lb. You don't want to simply remove all those extra fruits, because you need to account for natural fruit drop and variability in fruit per tree across the orchard. Estimates of natural fruit drop range from 10% to 50%. Selecting the appropriate drop percentage should account for orchard history, as well as your own risk threshold. Many experienced growers prefer to leave approximately 50% more fruit on the tree after mechanical thinning than they want remaining on the tree at harvest:

Target number prunes per tree x 1.5 (= 50% fruit drop buffer) = Adjusted number of fruit per tree

$$2{,}185\ x\ 1.5 = 3{,}278\ fruit/tree \text{ (adjusted target)}$$

Step 4. Calculate how many fruit to remove by subtracting the adjusted target number from the actual number of prunes on the tree:

Actual fruit per tree – Adjusted target fruit per tree = Number of fruit to remove

$$9{,}000\frac{fruit}{tree} - 3{,}278\frac{fruit}{tree} = 5{,}722\ fruit/tree\ to\ remove$$

Step 5. Shaker thin (if needed). Use harvest machinery (shaker) to remove the approximately 5,700 excess fruits. Shake a tree for one second, and following the steps above, calculate how many fruits were removed. If needed, increase the shaking time until the desired fruit numbers are removed. Typical shaking time is 2 to 4 seconds; avoid shaking for longer than 6 to 7 seconds to prevent unnecessary tree damage. Once you've calibrated your shaking time, go through and thin the block. If you are thinning for more than a week, check fruit per tree and green fruit per pound every few days to make sure that your shake time doesn't need to be adjusted down as fruit grow, weigh more, and shake off faster.

Twelve ways to ruin a prune orchard.

(Pitfalls to avoid wherever possible)

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

Orchard economics are increasingly tight. Good production of large fruit and sustained tree health are critical to maintaining profitable production. The following points highlight problems I've seen in orchards in the region over 20 years. Doing some of these "don'ts" shouldn't mean the orchard is doomed, but each of these points can contribute to orchard decline.

1. Prune or hedge when rain is in the 10-day weather forecast.
2. If pruning or hedging ahead of rain, don't apply fungicide (Topsin-M, etc.) on pruning cuts.
3. Use bench cuts to "open up" the interior of the tree to sunlight (and sunburn and disease).
4. Don't monitor orchard moisture status (tree or soil) through the season.
5. Don't check crop load at reference date.
6. Don't thin if crop load check shows too much crop.
7. Don't control gophers in the orchard.
8. Don't use white paint on SW side of tree trunks to reduce sunburn, especially on young trees.
9. Don't monitor for/control scale.
10. Don't take summer leaf samples.
11. Don't apply potassium when leaf samples show a need. Don't supervise harvest operation in person, especially the new hire shaker operator.