Sacramento Valley Prune News
Pre-Harvest, 2018
University of California
Agriculture and Natural Resources | Cooperative Extension

In This Issue

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Sutter, Yuba, Colusa Counties

Prune Rootstock Trial Field Day

Thursday, July 26, 2018

Head out to the field to check out for yourself 14 rootstocks in two Sacramento Valley trials!

Starting Location: **Miki Orchards, 10204 Hwy 70, Marysville, CA 95901**
Actual location (enter into Google Maps) **39.249, -121.589**
(turn east off Hwy 70 off onto Boyer Rd., follow UC signs)

6:45 AM Registration, First CCA sign-up sheet, Coffee and Doughnuts

7:00 AM Discussion and walking tour of Yuba County prune rootstock trial
UC host: Franz Niederholzer (UCCE Sutter/Yuba and Colusa)

8:15 AM Begin making your way up to Butte County site
(carpool with a friend or fellow attendee if possible)

Deseret Farm of California: **6100 Wilson Landing Rd, Chico, CA 95973**
Actual location (enter into Google Maps) **39.7968, -121.9878**
(500 yards W. of Deseret offices, follow UC signs)

9:15 AM Registration (second CCA sign-up sheet), water, refreshments
UC host: Luke Milliron (UCCE Butte/Tehama/Glenn)

9:30 AM Discussion of Deseret Farms of California prune orchard spacing
Walking tour of Butte County prune rootstock trial

11:00 AM Wrap

RSVP to this free event at:
https://ucanr.edu/survey/survey.cfm?surveynumber=25079

Pre-Harvest & Harvest Prune Orchard Considerations

Katherine Jarvis-Shean, UCCE Orchard Advisor Yolo, Solano, & Sacramento Cos.

July

- ✓ *Start anticipating harvest timing.* The UC prune harvest prediction model anticipates harvest in the Sacramento Valley starting roughly in the third full week of August (18th – 22nd), based on regional bloom dates and CIMIS weather station data. The exact date will vary from block to block. In mid-July, start watching for when the first healthy fruit in the orchard start changing color. Harvest can be expected roughly 30 days after this change. For more on harvest timing, see the article in this newsletter.
- ✓ *Time your irrigation cut-off* to improve dry-away ratios, reduce premature fruit drop and decrease shaker bark damage at harvest. The sweet spot of when to cut irrigation varies by soil type and other considerations. Keep in mind that dry soil reduces potassium (K) uptake and stressing trees may encourage sunburn and growth of *Cytospora* cankers. The pressure chamber is a great tool for judging whether trees are overly stressed for lack of water. Moderate to high tree stress (-16 to -20 bars) may be tolerated a week or two before harvest. However, for July and August prior to harvest, stress should be mild to moderate (-12 to -16 bars). Read more on using the pressure chamber for prune irrigation decisions at http://anrcatalog.ucdavis.edu/pdf/8503.pdf.
- ✓ *Collect leaf samples* to gauge what nutrients are sufficient, deficient and perhaps over-supplied. Adjust the rest of the year's nutrient management and next year's nutrient plan accordingly. Collect from at least 25 trees, gathering 1-2 leaves per tree. See the article in this newsletter on leaf sampling for more details.
- ✓ *Brown rot treatment*, where deemed necessary based on observations and block history, begin sprays 4-6 weeks before harvest. These preventative sprays are only useful on uninjured fruit. For more on fruit brown rot, see http://www.sacvalleyorchards.com/prunes/fruit-brown-rot/.
- ✓ *Monitor for mites and rust* weekly until July 15th to avoid leaf drop and potential for sunburn. If no rust or spider mites are found by July 15th, treatment is unlikely to be necessary. To monitor for mites, spend about 5 minutes examining 2-3 leaves on 10 trees, noting presence or absence of both spider mites and their predators (both predaceous mites and sixspotted thrips). For more on monitoring and treatment decisions, see http://ipm.ucanr.edu/PMG/r606400411.html. For rust, UC IPM guidelines recommend monitoring 40 trees each week and treating at the first sign of rust in the orchard. More on rust at http://ipm.ucanr.edu/PMG/r606100611.html.
- ✓ *Apply 20% of your total nitrogen* budget in June or July to match the timing of tree demand. Lower rates in June may be prudent if you have a history of hard-to-manage brown rot. See https://apps1.cdfa.ca.gov/fertilizerresearch/docs/Prune_Plum.html for more on rate and timing of nitrogen applications.

August

- ✓ *Monitor fruit maturity development* with a pressure gauge. Randomly sample five fruit from five trees per block (25 fruit), making sure fruit come from both the inner and outer canopy. Measure pressure on both sides (cheeks) of each fruit (25 fruit x 2 pressures/fruit = 50 readings). Average all 50 pressure readings. Ideal fruit pressure at harvest is 3-4 pounds. Fruit pressure drops roughly 1-2 pounds per week, but hotter conditions results in a slower decrease in fruit pressure (cooler weather results in faster softening). While you have your fruit samples, take one half from each fruit and blend them to obtain a juice sample to use on the refractometer for sugar tests.
- ✓ *Clean the orchard* before harvest of dead and dying limbs and significant suckers. This will help minimize tree damage during shaking and make for a more efficient harvest.

- ✓ *Collect pre-harvest samples* to evaluate fruit damage. About two weeks before harvest, evaluate 40 fruit per tree from 25 trees throughout the orchard for worm, scale and brown rot damage. Fruit can be picked or evaluated on the tree. If you just take samples at harvest, you may miss damaged fruit that dropped early that may indicate potential improvements to your IPM program. Find a grade sheet for evaluation at http://ipm.ucanr.edu/PMG/C606/prune-fruitdamagesample.pdf
- ✓ *Consider if running a field sizer* makes sense for your harvest. A small sizer (e.g. 15/16") is useful for all operations to remove garbage and damaged fruit. Talk to your packer. Different sizers may be useful to those whose packers won't pay for small fruit. When thinking about targeted fruit size, remember to account for change in size during drying.
- ✓ *Manage post-harvest irrigation* to minimize stress. Following harvest, stress should be mild to moderate (-12 to -16 bars).

Managing canker diseases in prune orchards: what we have learned so far.

Franz Niederholzer, UCCE Farm Advisor in Colusa and Sutter/Yuba Counties
Themis Michailides, UC Davis Plant Pathologist and Lecturer

Cytospora, bacterial canker or Botryosphaeria canker infections limit production and shorten the life of a prune orchard. Cytospora and Botryosphaeria cankers are caused by fungi, such as *Cytospora* and *Botryosphaeria* species, while bacterial canker is, of course, a bacterial disease. Recent research in Dr. Michailides' lab provides information growers can use to help manage *Cytospora* and *Botryosphaeria*. Rootstock trials in Yuba and Butte Counties may provide information on selections that limit future bacterial canker infection. This article briefly reviews this information and suggests practices to limit infection from these damaging diseases. While the times of greatest infection risk are late and early in the year, when pruning wounds are exposed to rain, now is a good time to cut out infected wood and plan to limit future infection risks before the harvest season arrives.

Disease infection requires the presence of a pathogen, a vulnerable host and certain environmental conditions, including an extended period of moisture on the host.

The pathogen, especially *Cytospora*, is present all the time. Molecular approaches detected the DNA of both *Cytospora* and *Botryosphaeria* species in young trees, however, more research is needed to determine whether the presence of DNA of these pathogens in tissues of prunes with no symptoms ("latent infection") can lead to symptomatic Cytospora and/or Botryosphaeria canker diseases. *Cytospora* infections can be found in virtually all mature prune orchards in California. Spores of these fungi, as well as other pathogen species, were found in rainwater collected within the canopies of prune orchards in Sutter and Yuba Counties in the past two winters.

Cytospora and Botryosphaeria cankers infect prune trees through breaks in the protective bark caused by sunburn, bacterial canker, and/or pruning wounds. Pruning produces multiple disease entry points, while moisture (rain) provides the environmental conditions for infection. Severity of canker development in pruning wounds -- made the first week of March -- is highest in spring (March) and generally decreases through the summer. Trials in Yuba County over a two year period show that Cytospora canker infections of pruning wounds can be significantly reduced when Topsin®-M fungicide is applied after pruning. Topsin®-M and Rally® WP now have 2EE labels for treating pruning wounds in stone fruit and almond.

Fungicides are generally considered effective for about 2 weeks after application. **Pruning just ahead of rain on young trees without protecting the pruning wounds with an effective fungicide is especially risky**. Pruning followed by an extended dry period should provide less risk for infection. Growers with

young trees interplanted in mature blocks should be especially careful to schedule pruning of interplants when no rain is in the forecast and treat with Topsin®-M or Topsin®-M and Rally® WP after pruning and before rain. (Rally® WP, alone, has not best tested for pruning wound canker control in UC trials on prune trees.) Check with your PCA regarding rates, timing, and application methods. Read the label, carefully, before treating. Research on managing fungal cankers in prunes continues in Dr. Michailides' lab with funding from the California Dried Plum Board.

The bacterium causing bacterial canker infects prune trees weakened by root zone stressors including ring nematodes (the biggest factor) as well as low nitrogen status. Commonly, *Cytospora* infections can follow bacterial canker infections, providing a lethal "tag team" effect on orchard health. There are no known "silver bullets" to control or protect stone fruit, including prunes, from bacterial canker. Soil fumigation, if ring nematodes are present, is highly recommended. Rootstock selection is an important piece of bacterial canker management, with Lovell, Viking, Atlas and Krymsk 86 showing very good survival in the current Yuba County UC prune rootstock trial, while plum roots (Myro29C, M2624 and Myro seedlings) show significant losses of up to 50% in some reps. M40 has shown better survivability than traditional plum roots, but some losses have occurred.

One practice to limit, but not eliminate, bacterial canker in stone fruit is the use of fall urea sprays. Research by Roger Duncan, UC Farm Advisor in Stanislaus County, has shown a late October application of a HIGH rate of low biuret urea (100 lbs of urea in 100 gallons of water) significantly reduced the spread of bacterial canker in trees of a 2nd leaf peach orchard on a very sandy soil. This research has not been repeated in prunes. Whether this treatment might be effective in prunes, as well as whether standard urea (with a low biuret level) could be used safely instead of low biuret urea (and at what rate) is unknown.

Progress is being made in understanding practices to limit damage from canker diseases in prune orchards. While the times of greatest infection risk are after harvest (fall through spring), we suggest that growers and PCAs begin planning now to manage canker diseases postharvest.

Prune Harvest Timing

Franz Niederholzer, UCCE Farm Advisor, Colusa and Sutter/Yuba Counties
Wilbur Reil, UCCE Emeritus Advisor, Yolo/Solano Counties

Based on late bloom and a mild spring, it's a good bet that prune harvest won't really get started until the second half of August this year. If July and August temperatures are hot, it might be the last week of August before prunes are mature in the Sutter/Yuba area.

Harvest can be a nerve-wracking time in the prune business. The finish-line – when the entire crop is in the bins – may be in sight, but there are still tough decisions to be made that influence your bottom-line. One of the most important decisions to be made is when to start harvesting. With trucking, dryer space, and a custom harvester lined up – and perhaps pressuring you so they can go to shake pistachios – there is an understandable urge to get started early. However, harvesting too early can cost you money.

French prunes are mature when flesh pressure falls below 4 pounds; until then, the fruit is still increasing sugars --gaining dry weight (Figure 1) – and putting money in your pocket. Once fruit reaches 4 pounds pressure, soluble sugars continue to increase, but only due to natural dehydration of the fruit and not to movement of sugar into the fruit from the rest of the tree. Using refractometer measurements (sugar levels) to time harvest can be misleading, as sugar levels are primarily influenced by crop load, NOT fruit maturity. Waiting for sugar levels to climb in heavily cropped orchards while fruit becomes excessively

soft (less than one pound fruit pressure) risks excessive fruit drop and/or reduced quality due to development of gas pockets and flesh darkening. The key tool to schedule harvest is a fruit pressure gauge, with a refractometer to measure sugar levels providing important details.

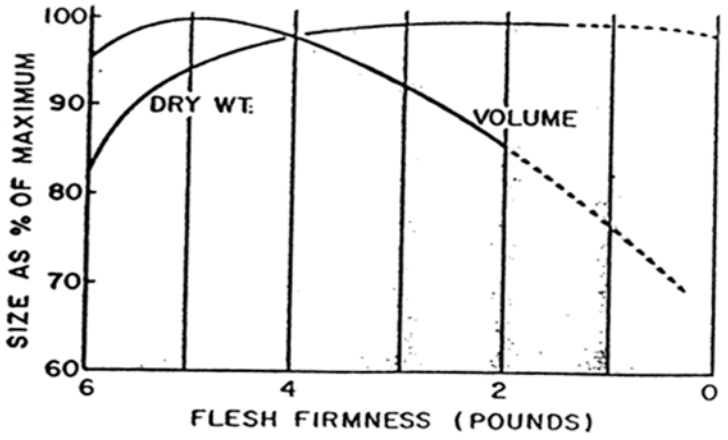

Fig. 1. Dry weight and volume of fresh French Prunes in relation to flesh firmness. (0ptimum) harvest would be done when flesh firmness is 3 to 4 pounds.

The recommended approach to timing prune harvest is to measure fruit pressure once a week beginning once the fruit skin first shows purple. Fruit pressure generally drops 1.5 pounds pressure (faster rate in cool weather, slower rate in hot weather) and sugars increase around 2% per week. Sampling details are found in Chapter 24 of the Prune Production Manual (UC ANR publication No. 3507; anrcatalog.ucanr.edu)

In a year like this, with variable crop loads from block to block, growers can help deliver the best quality and most valuable crop by starting to harvest orchards with lighter crops (and higher sugars) first. Let more vigorous blocks with a heavy crop load wait to accumulate more dry weight (sugars). Growers must balance the income gain from waiting to harvest with the logistical pressures from custom harvesters and handler, as well as the potential risk of weather changes (wind and/or rain) when deciding which orchard and when to begin harvest. Choosing when to harvest is one of the most important decisions for your bottom-line you will make all year.

July Leaf Sampling: A Critical Task in Prune Production

Luke Milliron, UCCE Orchard Systems Farm Advisor, Butte, Tehama, and Glenn Counties
Franz Niederholzer, UCCE Orchard Systems Farm Advisor, Sutter/Yuba, and Colusa Counties
Joe Connell, UCCE Farm Advisor Emeritus

As the bulk of your prune fertility program for the season comes to an end, it's time to get the report card on how you did. Although little corrective action can be taken this season, this report card will help inform next year's program. Published July critical values established for prune by UC researchers can help guide you in your fertilization practice. Analysis reveals specific nutrient deficiencies and alerts you to developing trends when results are compared from one year to another. Keeping mature trees below excessive levels for nitrogen can save on fertilizer costs, reduce brown rot risk and avoid excessive vegetative growth. Potassium (K) fertilizer is expensive, but K deficiency in a single season can damage orchard health for years to come. Leaf analysis results help keep an orchard between excess and deficiency, which means the most efficient use of your fertilizer dollar!

Excessive amounts of chloride and sodium should be monitored if water quality is poor and/or chloride is a component of the fertilizers frequently used in the orchard. Depending on your location and water source in the Sacramento Valley, your boron levels could be toxically excessive or deficient.

Most laboratories group several key macro and micronutrients together in one easily requested analysis. Note that if micronutrients have been applied in a foliar spray, contaminated leaves will show excessively high levels of those nutrients and the reported levels should be disregarded. Check that the laboratory you

use washes leaf samples before analysis and that you promptly send in leaf samples (i.e. desiccated leaves cannot be washed). Although micronutrient spray residues may not be possible to wash off, laboratory washing of the leaves has value because micronutrients in dust can also skew results.

When comparing lab results from one year to the next, it is important to consistently use the same sampling methods. The following methods should be followed:

- Define sampling block based on uniform soil type, age, and management.
- Sample uniform, representative trees across the block.
  - Consider flagging the trees and going back to those same trees for annual sampling.
  - For each sample, collect a minimum of 50-75 fully expanded leaves on well exposed, non-fruiting spurs at 5 to 7 feet above the ground. Sample 1-2 leaves per tree.
  - Collecting leaves from fruiting spurs could show erroneously low nutrient (e.g. potassium) levels, which may result in an incredibly expensive and wasteful fertilizer response.
- Ignore interplants or sample separately.
- Avoid sampling leaves that are regularly "hit" by irrigation water, as irrigation water can leach some nutrients like potassium and leave salt deposits that can skew the analysis report.
- Take notes while sampling, noting relative vigor and other observations between blocks, to better inform the analytical results.

Leaves selected for analysis should be free of obvious tip burn, insect or disease injury, mechanical damage, etc., and should be from normal, healthy trees. If you have a weak area and you'd like to diagnose the problem, sample that area and compare the results with those of a sample from your best area to see if tree nutrition might be involved. This type of troubleshooting analysis can be done at any time during the season. Keep in mind that nutrient deficiency might be a symptom of another problem, like compromised root health.

Critical values for July leaf samples are shown in Table 1. Keep the results with your fertilizer application and yield records to better evaluate and estimate future fertilization needs. For more information on nutrient deficiencies and toxicities, sampling procedures, and critical values, see Chapter 16 in the Prune Production Manual, Publication 3507, or the CDFA Fertilizer Research and Education Program site for prune and plum: apps1.cdfa.ca.gov/FertilizerResearch/docs/Prune_Plum.html

Leaf analysis is one of the many helpful report cards we receive in orchard management. When responding to leaf levels, include orchard appearance and growth before corrective action is taken. Visual observation is an excellent complement to any lab analysis. Make sure that a deficient element is really the problem before you seek fertilizer applications as a solution. Learning from the report card of July leaf samples is one more way of taking an analytical approach to farming and continually improving your production practices each year.

How can maximum value at minimum cost be achieved from leaf analysis? If money is tight, reduce the number of nutrients requested for analysis, but don't abandon leaf sampling/nutrient analysis for the year. Key nutrients for analysis in every sample, every year, are nitrogen, potassium, and zinc.

Table 1. Critical nutrient levels for prune leaves* sampled in July.

Nutrient	Deficient	Adequate	Excessive/ over
Nitrogen (N)	< 2.2%	2.3-2.8%	
Phosphorous (P)		0.1-0.3%	
Potassium (K)	< 1.0%	1.3%-2.0%	>2.0%
Calcium (Ca)		> 1.0%	
Zinc (Zn)	< 18 ppm		
Manganese (Mn)		> 20 ppm	
Copper (Cu)		> 4 ppm	
Magnesium (Mg)		> 0.25%	
Sodium (Na)			> 0.2%
Chlorine (Cl)			> 0.3%
Boron (B)	< 25 ppm	25-80 ppm	> 100 ppm

*Fully expanded leaves from non-bearing spurs sampled in July
(Prune Production Manual; UC ANR Pub. 3507)

Listen to the new podcast from UC tree crop researchers!

Growing the Valley

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