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Fruit and Nut

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PRACTICAL • CONNECTED • TRUSTED

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SACRAMENTO VALLEY REGIONAL PRUNE NEWSLETTER

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Full color articles and photos are available on our Website: cetehama.ucanr.edu

Pre-Harvest & Harvest Prune Orchard Considerations

Katherine Jarvis-Shean, UCCE Orchard Advisor Yolo, Solano, & Sacramento Cos.
Emily Symmes, UCCE IPM Advisor, Sacramento Valley

August

* *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 sacvalleyorchards.com/prunes/horticulture-prunes/prune-harvest-timing/.

* *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 anrcatalog.ucdavis.edu/pdf/8503.pdf and/or sacvalleyorchards.com/manuals/stem-water-potential/.

* *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.

* *Examine fruit pre-harvest to evaluate damage*. Two to four 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. An evaluation form is available at: ipm.ucanr.edu/PMG/C606/prune-fruitdamagesample.pdf

* *Consider running a field sizer* at 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 for those whose packers won't pay for small fruit. When thinking about targeted fruit size, remember to account for change in size during drying. For more, see the article on fruit sizing in this newsletter.

* *Manage post-harvest irrigation* to minimize stress. Following harvest, stress should be mild to moderate (-12 to -16 bars).

Post-Harvest

- When making fall nutrient management decisions consider your July leaf sample results and crop load. If nitrogen levels in your July leaf sample were below the critical value, consider a fall foliar nitrogen spray, especially in young orchards where low nitrogen can predispose the trees to bacterial canker infection over a wet winter. Soil applied nitrogen, especially after September, is vulnerable to leaching because of limited root activity. Soil applied potassium (K) should be banded in the fall.

- Plan for pruning to remove *Cytospora* cankers, cut out branches damagers during harvest, tame tree size and manage next year's crop load. To make sure you're cutting all infected wood from the tree, see photos of a "clean" pruning at sacvalleyorchards.com/prunes/pruners-pocket-guide-for-cutting-out-cytospora. Avoid pruning two weeks prior to a rain event. Consider protecting pruning wounds, especially if rain is in the forecast with a fungicide spray (e.g. Topsin-M® or Topsin-M + Rally®). See article on cankers in this newsletter.

- Fall and winter preventative management for *aphids* can be an effective and ideal time to treat orchards *with a history of problems,* particularly if no dormant sprays will be applied for scale or peach twig borer. Fall aphid sprays are not effective for *scale* and don't provide the same level of control as dormant timings for *peach twig borer* populations. During the dormant period, a moderate rate of pyrethroid is effective on aphids and peach twig borer, but keep in mind water quality risks when timing dormant pyrethroid applications. Adding oil to a dormant pyrethroid treatment can provide additional (moderate) efficacy for scale populations. For additional detail, see articles on prune aphid management at: sacvalleyorchards.com/prunes/

- Dormant spur samples can be used to scout for San Jose scale and European fruit lecanium, evidence of parasitism in both species, as well as aphid eggs and European red mite eggs in this sample. More information on dormant sampling and treatment thresholds ipm.ucanr.edu/PMG/r606900511.html.

- Conduct a post-harvest weed survey (ipm.ucanr.edu/PMG/C606/prune-fallweeds.pdf) to evaluate your 2019 weed control program efficacy. Pre-emergence herbicide should be applied shortly before a moderate rain event (0.25") to move material into the soil. Avoid application prior to a large rain event (> 1"), which can move the product too deep into the soil for good weed control.

- Late fall to early winter is prime *gopher* control timing because populations are generally lowest at this time of year. See gopher control strategies at: ipm.ucanr.edu/PMG/r105600211.html

2019 Canker Review

Luke Milliron, UCCE Orchards Advisor, Butte, Tehama & Glenn Counties;
Franz Niederholzer, UCCE Orchards Advisor, Sutter-Yuba & Colusa Counties;
Dani Lightle, UCCE Orchards Advisor, Glenn, Butte & Tehama Counties

In prune production, a new mantra has become "some years are bacterial canker years, while every year is a *Cytospora* year". Bacterial canker infections are caused by *Psyudomonas syringae* (same bacterium that causes bacterial blast in almond). While *P. syringae* is ubiquitous across surfaces in the orchard, it only causes infections and damage in certain years, under the right environmental conditions. Wet and cold springs are conducive to bacterial canker infections, which although severe and often lethal, die out as the weather warms and do not continue to spread the following year (i.e. annual disease, not perennial). Going into this spring, we knew the wet and cold conditions in late winter could mean that we were likely headed into a bacterial canker year. However, diagnosing the dieback (cankers) we observed this spring brought some surprises. One surprise was observing dieback at the tops of trees associated with horticultural oil use during dormancy.

For more information and photos of canker observations in 2019, see: sacvalleyorchards.com/photos-from-the-field/spring-cankers-in-prune/

Oil Damage. Some tip dieback at the tops of trees was observed in many orchards this spring. This discrete dieback of upright branch tips occurred in orchards that received a dormant horticultural oil application and is consistent with how oil burn presents (photo 1). Oil was applied to this block during dormancy (2-3 gallons December/January). Although oil can help provide effective control of scale insects, drying weather before application (e.g. a drying north wind) can lead to phytotoxicity "burn" and dieback.

Photo 1. Orchard with branch tip dieback (see arrows) suspected to be from a dormant oil application (photo: Luke Milliron).

Bacterial Canker. Although not every year is a bacterial canker year, we found on our spring farm calls, that 2019 was indeed one of those years. As we expected, the wet and cold conditions in late winter appeared to be conducive to infections. For example, in one orchard select patches of trees showed the extensive dieback consistent with bacterial canker (photo 2). Bacterial canker was very likely the cause of this dieback due to the tell-tale signs of flecks (photo 3), as well as the fermented/ sour smell associated with the sour sap phase of bacterial canker decline. Other stressors in combination with the wet/cold late winter, predispose trees to bacterial canker. Typical predisposing factors include ring nematode, sandy or low pH soils, clay/shallow hard pans, and low nitrogen. Therefore, alleviating stressors where possible by keeping trees healthy and vigorous is key. Other possible management strategies include spot fumigation for ring nematode and rootstock selection. A late October application of a HIGH rate of low biuret urea reduced the spread of bacterial canker in young peaches but is untested in prunes. You can read more about managing cankers at: sacvalleyorchards.com/prunes/diseases-prunes/managing-canker-diseases-in-prunes/

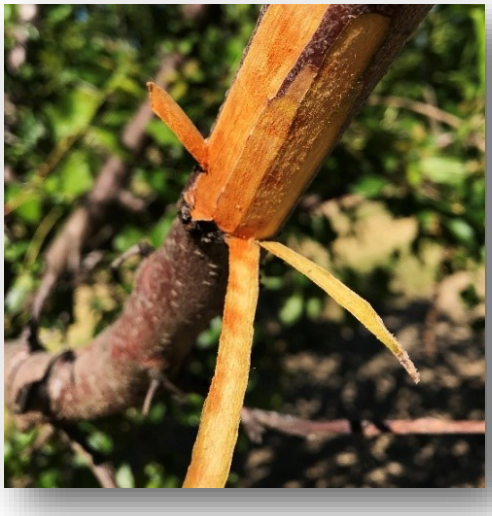


Photo 2 & 3. Select patches of trees in this orchard show the extensive dieback (photo 2) consistent with bacterial canker. The field diagnosis of bacterial canker was supported by the tell-tale signs of flecks (see arrow, photo 3), as well as the fermented/sour-smell associated with the sour sap phase of bacterial canker decline (photos: Luke Milliron).

Cytospora. *Cytospora* infections can be found in virtually all mature California prune orchards. Predisposing damage that allows for *Cytospora*, as well as *Botryosphaeria* canker infection, include breaking of the bark from sunburn, potassium dieback, bacterial canker, ring nematode, and pruning wounds. Canker infection through pruning wounds is an especially great concern when there is mechanical hedging or topping that make thousands of indiscriminate pruning wounds that are potential entry points for rain-splashed fungal spores. For example, in one orchard that was mechanically boxed in the fall of 2017, *Cytospora* was subsequently diagnosed during the following 2018 bloom when some trees were not flowering out, except low in the canopy (photo 4). Because *Cytospora* cankers are perennial and will continue to grow and spread unless they are cut out, one year later during the 2019 bloom, the canker on one tree had spread all the way down to a primary scaffold (photo 5).

In this particular orchard the hedging cuts in the fall of 2017 are presumed to be the entry point of *Cytospora* infections during subsequent rainfall events. The severely affected trees in this orchard were on the most vigorous rootstocks (e.g. Atlas) which would have had the largest cuts made to them when mechanical (boxed) hedging cuts were made. Approximately 30 days of dry conditions are required after a pruning cut is made for the surface to callus over and not be susceptible to infection, and during this window larger cuts remain susceptible to infection longer than small cuts. Cutting out cankered wood during the dry period late in the growing season and early in the posharvest period, is the only method of stopping the spread of damage in the tree. Cutting out infected wood is also critical for reducing the production of inoculum available for future rain-splashed infection events.

When cutting out cankers, it is critical to cut past the infection and into healthy wood, in order to stop disease spread. A visual pocket guide on cutting out cankered wood can be found at: sacvalleyorchards.com/prunes/pruners-pocket-guide-for-cutting-out-cytospora/

To help prevent new infections, spraying with protectant fungicides such as Topsin®-M, or Topsin®-M and Rally® WP after pruning and before any rainfall can reduce canker infection.

Photo 4 & 5. Orchard with canker dieback was first noticed last year when trees were not flowering out, except low in the canopy (photo 4). Cutting back one tree to see how extensive the canker damage had spread (photo 5) showed that damage continued to grow down to a primary scaffold (photos: Luke Milliron).

We want to thank the laboratory of Dr. Themis Michailides for their support in diagnosis.

Delivering the largest fruit possible this year.

Franz Niederholzer, UCCE Farm Advisor, Colusa and Sutter/Yuba Counties
Luke Milliron, UCCE Farm Advisor, Butte, Glenn and Tehama Counties
Drew Wolter, UCCE Hort Intern (supported by the CA Prune Board and the Almond Board of CA)
Rick Buchner, UCCE Farm Advisor Emeritus (Retired), Tehama and Shasta Counties

Many growers have been notified by their packers that there will be little to no value in fruit smaller than 72 ct/dry lb (C's and smaller) this year. With harvest around the corner, the only management options left to growers to maximize size of delivered fruit and increase net income will be harvest decisions, in particular harvest timing and field sizing.

Harvest timing: Fruit is mature when average internal pressure drops to 3-4 lbs. Above 4 lbs pressure, sugar is still being moved from the leaves to the fruit and the fruit dry weight (what it will be after drying) continues to increase. If fruit pressure is above 4 lbs when harvest starts, fruit quality (size and sugar) will be less than if harvested at a lower pressure.

Field sizing: In a year like this, deciding on field sizing practices will be very challenging. Each grower must make their own decisions based on the crop in their orchard and information from their packer.

Before we get into sampling details in a particular orchard, here is a critical point that growers must understand. **Perfect field sizing, delivering only certain size fruit, is an impossible task.** Dry fruit size is related to fresh fruit size and sugar concentration (listed as % Soluble Solids in Table 1) in the fruit (see Claypool Table 1). Fresh fruit sugar levels vary between fruit of the same fresh fruit weight and the range is particularly wide for small and medium sized fresh fruit (see Figure 1). In the field, the only tool currently available to grade fruit is fresh fruit size. A medium sized fresh fruit (27 ct, for example) is predicted to be anywhere from 71 ct (26% sugar) to 81 ct dried fruit (20% sugar). One fruit has value this year whereas the next one may not, but it's impossible to tell by fresh fruit size, alone, which will be which. Eliminating small and keeping large fruit is fairly straight forward, but growers must decide how aggressive they want to be with field sizing to separate medium sized fruit.

Here are some factors to consider when planning to field sort. First, know what the crop looks like in your orchard. Use the Claypool Table (Table 1) to estimate the average dry fruit size in your orchard. This table is not perfect and tends to predict larger average dry fruit size for lower sugar values, but it is all that is available. The following is a sampling program to estimate average dry fruit size in an orchard suggested by Bill Olson (UCCE Farm Advisor, Butte Co, retired) in a 1999 newsletter.

- At the beginning of harvest, take several 100 fruit samples from each orchard. Each sample = 100 fruit (20 fruits from each of 5 trees being sure to sample both fruit clusters inside and outside of the tree at eye level).
- Weigh each fresh sample.
- Divide the number of fruit in each sample (100) by the weight of the sample (in lbs) to determine number of fruit per pound.
- Determine percent soluble solids (a good way is to puree halves of all fruit from a sample in a blender and filter drops of juice through cheesecloth onto a refractometer). Ask your field man or dryer to help if you do not own a refractometer*.
- Average the fresh count and soluble solids values for all samples to determine the orchard average. Different areas in the orchard could be treated separately if differences in crop exist that may require different harvest strategies.
- Use the Claypool Table to predict your dry count/lb based on your average fresh count/lb and soluble solids for the orchard.

It will be important to check the results of field sizing before and during harvest. Set a chain size, collect the fruit dropped through that chain size at that pressure by placing a tarp on the ground under the sizer. Run a fresh fruit count and sugar check to compare with Claypool Table to see what size fruit is being dropped. Adjust chain size up or down as needed in that orchard. Once harvest has started, check size and sugar of fruit dropped through the chain several times during the season. This is especially important later in the season as the fruit softens and sugars increase so valuable fruit isn't lost.

Growers who thinned in the spring should have less small fruit than if they hadn't thinned. However, even if the expected average dry fruit count in an orchard is in the 50's, there could still be a significant amount of medium and smaller sizes in the delivered crop. For example, a thinned block in the Yuba City area several years ago had an average dry ct/lb of 57 for a 2.6 dry ton/acre crop, with 15% of that crop, by weight, at 72 count or smaller. There was 6% C screen, 5% D screen and 5% undersized in that thinned orchard. At a 3:1 dry away, that's an estimated $580 per dry ton for harvest, hauling and drying, that 15% of the crop would cost the grower $226/acre in 2019. In a 50 acre block, that comes to $11,300 loss.

Finally, during harvest, make sure the belts feeding the sizing chain are run slowly enough that all the fruit is run across the sizer in a single layer -- so it can be sized. If the sizing chain has too much fruit on it, all fruit will not be sized and some smaller fruit that should have dropped out will be delivered to the dryer.

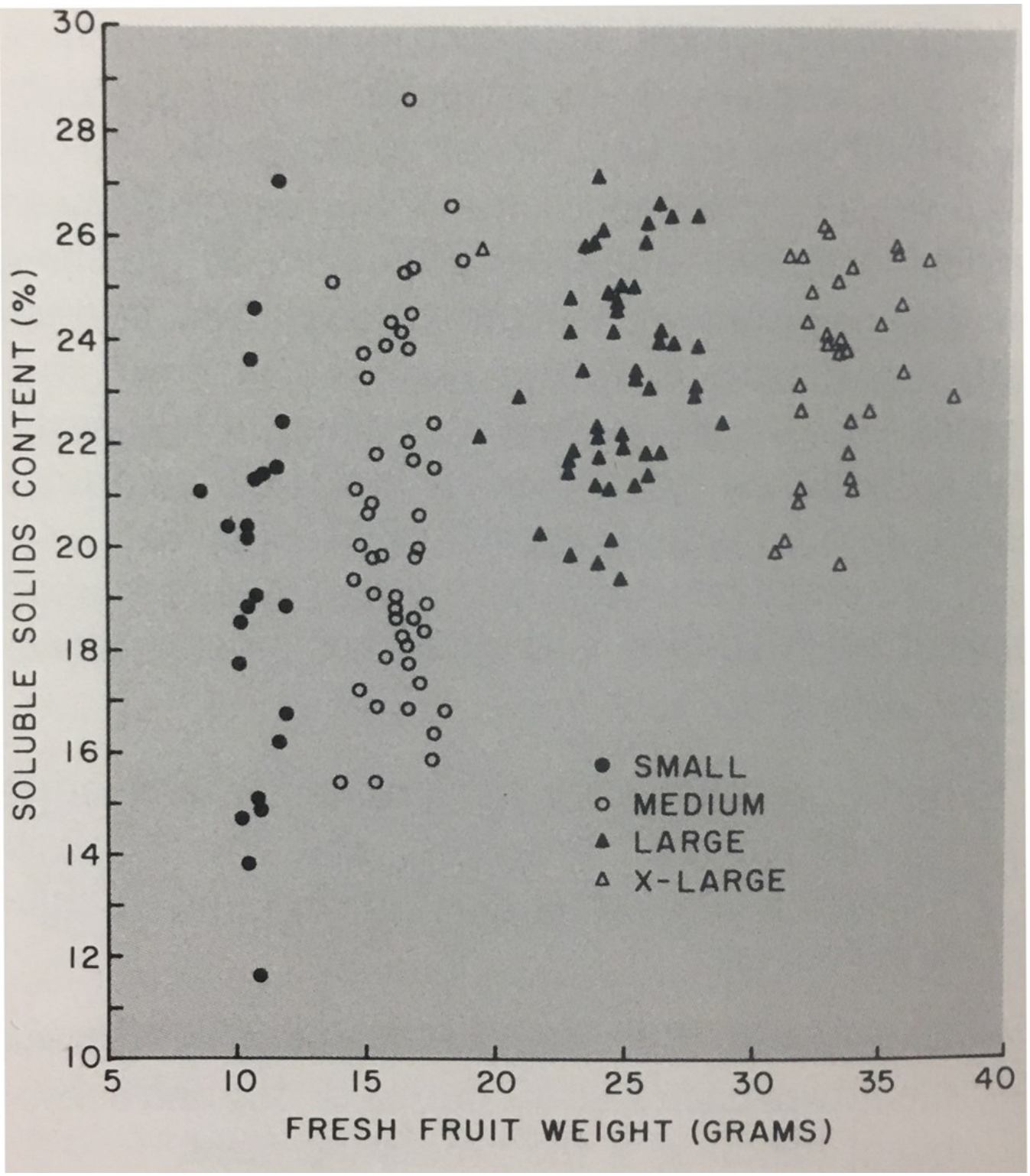
Table 1. The "Claypool Table" developed by Dr. L.L. Claypool,UC Davis in the 1950's. Recent research shows that this table can overestimate dry fruit size by an average of 10% and so should be considered only a guideline in estimating average dry fruit count/lb before harvest.

TABLE 1
DRIED PRUNE SIZE
Count per Pound of Dried Prunes (18% moisture) based on
Count per Pound and Percent Soluble Solids of the Fresh Fruit*

ct/lb Fresh	% Soluble Solids									
	16	18	20	22	24	26	28	30	32	34
13	51	48	46	43	41	39	38	36	35	33
14	53	50	48	46	44	42	40	38	37	35
15	56	53	50	48	46	44	42	40	39	37
16	58	55	53	50	48	46	44	42	41	39
17	61	58	55	53	50	48	46	45	43	41
18	64	61	58	55	53	51	49	47	45	43
19	66	63	60	58	55	53	51	49	47	45
20	69	66	63	60	57	55	53	51	49	47
21	72	68	65	62	60	57	55	53	51	49
22	75	71	68	65	62	60	57	55	53	52
23	77	74	70	67	65	62	60	57	55	54
24	80	76	73	70	67	64	62	60	58	56
25	83	79	76	72	69	67	64	62	60	58
26	86	82	78	75	72	69	66	64	62	60
27	88	84	81	77	74	71	69	66	64	62
28	91	87	83	80	77	74	71	68	66	64
29	94	90	86	82	79	76	73	71	68	66
30	97	92	88	85	81	78	75	73	70	68
31	100	95	91	87	84	81	78	75	72	70
32	102	98	94	90	86	83	80	77	74	72
33	105	101	96	92	89	85	82	79	77	74
34	108	103	99	95	91	88	84	81	79	76
35	111	106	101	97	93	90	87	84	81	78
36	114	109	104	100	96	92	89	86	83	80
37	116	111	107	102	98	95	91	88	85	82
38	119	114	109	105	101	97	93	90	87	84

*To convert dried count per pound at 18% moisture to other moisture content multiply table value by $\frac{(100-\%H_2O)}{82}$

Figure 1. Sugar concentrations within different size classes of fresh prune fruit. Small fruit = >40 count/lb; medium = 25-40 count/lb; large = 15-25 count/lb and extra large = 11-15 count/lb. Graph is from Prune Orchard Management, 1st Edition.



2019 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 from 8:00-9:30am and will cover a wide range of timely pest and orchard management topics.

Please contact Emily Symmes to request topics or bring your questions to the meeting!

2019 meeting dates:

September, 2019 (Yuba-Sutter-Colusa County area): Date & Location TBA
(contact Emily or see website below for updates)

October 11th, 2019: Berry Patch Restaurant, Orland

Additional details will be posted on the events page at sacvalleyorchards.com

RSVPs required at (530) 538-7201 or ejsymmes@ucanr.edu
DPR and CCA Continuing Education hours requested
Industry Partners: Sponsorships for venue and refreshment costs are welcome and appreciated. If you would like to sponsor one or more of these meetings, please contact Emily Symmes to inquire.

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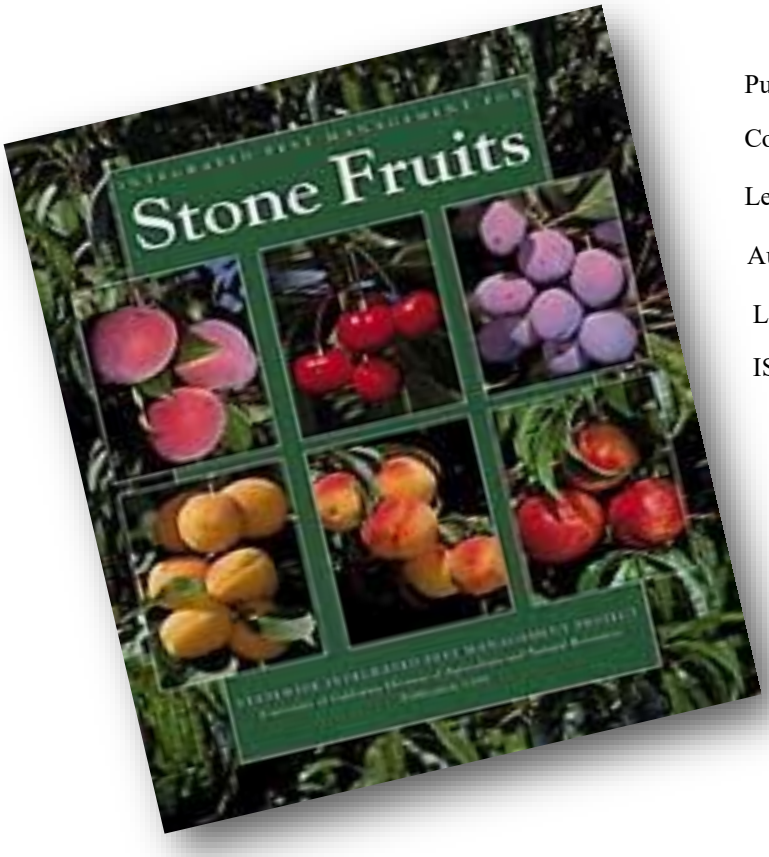

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…Electronic Newsletters!!

Tehama Cooperative Extension will soon be transitioning to electronic newsletters where they will be in **full color**, with quicker delivery. In the upcoming months we will begin transitioning over to electronic versions, and we are looking to update our client list. Many of you are already receiving our electronic newsletter and you will continue to receive them, you do not need to complete this process unless your email has changed. If you do not have email the alternative will be to access the newsletter through our website, or pick them up at our office.

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