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Fruit and Nut Notes

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SACRAMENTO VALLEY REGIONAL
PRUNE NEWSLETTER

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The "SACARAMENTO VALLEY REGIONAL PRUNE NEWSLETTER" is a collaborative effort of prune research specialists working together to provide Sacramento Valley growers and industry leaders the latest research and information effecting prune production in today's changing environment. This newsletter will be published quarterly, be sure to look for upcoming issues!

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

Prune Bloom Orchard Management Considerations

Katherine Pope, UC Farm Advisor Sacramento, Solano & Yolo Counties
Franz Niederholzer, UC Farm Advisor, Colusa, Sutter and Yuba Counties
Emily J. Symmes, UCCE Area IPM Advisor, Sacramento Valley

FEBRUARY

Order bees in February. Generally, you want to install one hive per acre.

Check the uniformity of your *irrigation system* and perform maintenance before the system is needed for frost protection, orchard cooling at bloom, or the irrigation season starts. How-to details at www.sacvalleyorchards.com/almonds/irrigation/irrigation-system-maintenance.

Get *air-blast sprayer* ready to apply bloom fungicides. Check calibration and do general maintenance (check sprayer filters, replace nozzles as needed, etc.)

If *San Jose scale (SJS)* dormant treatments were not applied, not effective, and/or SJS pressure is high, treatments targeting the late spring crawler stage can be effective. Place pheromone traps by mid- to late February. Apply crawler treatments 600-700 degree days after biofix (males caught on consecutive trap checks). More on SJS: ipm.ucdavis.edu/PMG/r606302111.html

MARCH

If it's cold at bloom, a closely mowed orchard floor is ready to minimize frost risk. A closely mowed orchard is warmer than one with tall weeds/cover crop. Freshly disked soil is the coldest.

If it's hot a bloom, consider irrigating to wet the orchard floor, and as much as the first foot of soil. Evaporation of this water provides some small temperature reduction (usually just a degree (^{o}F) or two). Run water when temperatures reach 70-75°F and shut off when they drop below those temperatures.

Plan for *brown rot* fungicide sprays if bloom weather is wet. In a wet bloom, two sprays (green bud and full bloom) are recommended. One spray at 40-50% bloom effectively controls brown rot in year with no rainfall, but there's a risk of brown rot infection when wetness is from dew. Flowers are susceptible beginning at green bud. Alternate fungicide classes (FRAC numbers) if spraying more than once. Consider bee safety when planning your sprays. More on bee safety: www.sacvalleyorchards.com/prunes/honey-bee-safety-during-bloom. More on Brown rot: ipm.ucdavis.edu/PMG/r606100411.html

Russet scab develops when there is significant rainfall during and immediately after bloom. Consider spraying captan or chlorothanil (Bravo/Echo) at full bloom to reduce scab at harvest, but pay attention to honey bee safety. More on Russet scab: ipm.ucdavis.edu/PMG/r606100511.html

If *aphid* control measures were not taken during fall or winter, two oil sprays (4 gal/acre) at bloom can be effective against mealy plum and leaf-curl plum aphids if applied 7-10 days apart at 1.5 mph. Oil should *not* be applied with or shortly before/after captan, chlorothalonil or sulfur because the combination can be phytotoxic.

More Leaf curl plum aphid info: ipm.ucdavis.edu/PMG/r606301811.html

More Mealy plum aphid info: ipm.ucdavis.edu/PMG/r606301711.html

Monitor for *Peach twig borer (PTB)* during and after bloom. Chewing damage on buds during bloom indicates PTB activity and may warrant treatment.

APRIL

If *San Jose scale (SJS)* dormant treatments were not applied, not effective, or SJS pressure is high, and you didn't put out pheromone traps to monitor SJS activity, put double-sided sticky tape around limbs beginning in April to detect crawler emergence and time spring treatments if necessary.

Begin post-bloom *Peach twig borer (PTB)* monitoring with pheromone traps (minimum 2 per block) no later than April 1 to determine biofix (moths caught on two consecutive trap checks).

Place *Obliquebanded leafroller (OBLR)* pheromone traps (minimum 2 per block) no later than mid-April to identify biofix (moths caught on two consecutive trap checks).

Measure crop load in mid-April, and use this information to plan your nitrogen (N) and potassium (K) fertilizer applications. (Cropload is the major driver in mature prune orchard N and K use.) For optimal nitrogen uptake, apply multiple applications avoiding a single heavy spring application, since rains and subsequent irrigation may leach nitrate from the root zone. Consider an N application before the end of April if there is a good crop set.

MAY

Monitor for PTB fruit feeding 400 degree days after the first biofix. In the orchard, look for larvae entry points on the fruit (ideally 15 fruit from 80 trees), especially where fruit contact each other or touch leaves. Treat if 2% or more (24+ of 1,200) of the fruit has damage. More PTB info: ipm.ucdavis.edu/PMG/r606300211.html

Begin sampling fruit for OBLR damage 930 degree days after biofix. As with PTB, look for damage on fruit in the orchard (ideally 1,200) and treat if 2% or more have damage. More OBLR info: ipm.ucdavis.edu/PMG/r606300511.html

Crop Load Adjustment (Thinning Prunes)

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

After the dismal cropping year in 2016, prune orchards have the potential to set a very heavy crop this year. The crop load (number of fruit per tree) has a large influence on the fruit size, sugar accumulation, drying ratio, and prices received. The goal is to set a good crop this year, without producing too many small fruit or depleting the tree of so many resources that it cannot also set a good crop next year. Other reasons you may consider adjusting the crop load is to reduce limb breakage, mitigate alternate bearing tendencies, and reduce damage associated with potassium deficiency (defoliation, bark sunburn and *Cytospora* infection).

The earlier the thinning is done, the greater effect it will have on final fruit size at harvest. However, if you try to shake too early, you may damage the trees without getting the desired number of fruit removed. Thinning should occur roughly around the same time as 'reference date'. Prune reference date is the point at which 80-90% of the fruit have a visible endosperm. The endosperm, a clear gel-like glob, will be found in the seed on the blossom end of the prune (Figure 1) and is solid enough to be removed with a knife point. Typically, the reference date occurs in late April or early May, approximately one week after the pit tip begins to harden.

Figure 1. Extraction of the endosperm on a developing prune.

Given the potential for excessive fruit set this year, you should estimate the number of fruit per tree needed to produce your desired crop, and compare that to your actual numbers of fruit to ensure the trees aren't carrying too much crop. These numbers will then be used to help determine how much fruit to remove from the tree if thinning is needed. Below I walk through the math, step by step.

First, calculate a targeted tonnage from a given block by considering orchard history, age, etc. Let's assume a target of 4 tons/ac, and shoot for 60 dry count/lb. From there, we calculate a targeted number of fruit per tree:

(Dry pounds per ac x Dry count per lb) ÷ Trees per ac = Target number fruit per tree

$$8{,}000\,\frac{lbs}{ac} \times 60\,\frac{count}{lb} \div 150\,\frac{trees}{ac} = 3{,}200\ fruit/tree\ \text{(target)}$$

Next, you need to estimate the actual number of fruit per tree and compare that number to the target of 3,200 fruit. Ideally, you would repeat this procedure on 3 trees to ensure accuracy. Place a tarp under a tree and mechanically shake off as much fruit as possible, then hand strip any remaining fruit. Collect all the sound fruit from the tarp and weigh them (we'll assume for this example math it weighs 100 lbs). Take a 1-lb subsample of the fruit and count how many sound fruit are in a pound (we'll assume 90 fruit/lb). Don't count fruit that look like it will not stay on the tree; these fruit are light green or otherwise look slightly "off" compared to the strong fruit that will "make" a fruit. Then use those numbers to estimate the total number of fruit per tree:

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

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

In this case, you have approximately 2.8 times the number of fruit on the tree as desired to hit the target of 60 dry count/lb, and you may consider thinning the orchard. You don't want to simply remove all those fruit though, because you need to account for natural fruit drop. Estimates of natural fruit drop range from 10%-40% - again, this is an area where you need to account for orchard history, as well as your own risk threshold.

It is much safer to under thin than to over thin! Because of that risk, many growers prefer to leave approximately 50% more fruit on the tree than the target amount. This means that we need 50% more fruit on the tree after mechanical thinning than we want remaining on the tree at harvest:

Target number prunes per tree ÷ (1- % fruit drop buffer) = Adjusted number fruit per tree

$$3{,}200 \div (1 - 0.5) = 6{,}400\ fruit/tree\ \text{(adjusted target)}$$

And finally, you can 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 fruit to remove

$$9{,}000\,\frac{fruit}{tree} - 6{,}400\,\frac{fruit}{tree} = 2{,}600\ fruit/tree\ to\ remove$$

Bad bloom weather options

Franz Niederholzer, UC Farm Advisor, Colusa/Sutter/Yuba Counties

Extreme weather at bloom can have damaging short and long term effect on prune growers in California and the entire California industry. Excessive heat (2004, 2005, 2007 and 2014) or prolonged cool, wet weather (2016) can dramatically reduce prune production. These losses harm growers' bottom line as well as the local economy, and force the industry to struggle to recover market share for years afterwards. The following are the conditions of most concern to prune growers at bloom and what, so far, are options to manage extreme weather at prune bloom.

> Prune fruit set is vulnerable to a short duration(s) of high temperatures (greater than 80°F) at full bloom or extended periods of low temperatures (less than 60°F) throughout bloom.

What can growers do if flowers are beginning to swell and hot weather (>80°F) is forecast?

Run water. Running micro-irrigation sprinklers reduces orchard temperature 1-2°F. This might be enough to allow for better fruit set if high temperatures don't exceed 82-83°F. Deep watering is not necessary. Just the surface foot of soil needs to be wet. If temperatures for the day are forecast to come near 80°F, run sprinklers only when temperatures reach 70-75°F and shut off when they drop below those temps later in the day. Since the goal of running sprinklers at bloom is to drop orchard temperatures by evaporation of irrigation water and evaporation is greatest under warm temperatures, there is no benefit to running water once temperatures cool off in the evening. Don't wait too long (when temps are past 75°F) to start water, as temperatures may change faster than it takes for maximum cooling benefit from sprinklers.

What can growers try if extended cool (<60°F) weather is forecast during bloom?

Include boron (equivalent of 2 lbs Solubor®/acre) in green bud spray. This practice improves set in almonds during extended, wet bloom weather. No trials with prunes and boron have been done during wet, cool springs, but boron is cheap and will not harm bloom if applied at green bud. Avoid spraying boron at full bloom.

Closely mow any weeds or cover crop. A closely mowed orchard floor is warmer than one with tall weeds/ cover crop. But don't disk. Freshly disked soil will not hold and re-radiate warmth.

What could growers consider if hot (>80°F) or cool (<60°F) weather is forecast during bloom?

Spraying the orchard with a heavy oil rate (for example, 4 gallons 440 oil per acre at first flower) can delay opening of some flowers a day or two. This might, depending on the timing of bloom and bad weather, extend some bloom beyond the period of bad weather. If hot or cool weather extends longer than late oil delays bloom, there will be no benefit. With a good quality oil and proper spray tank agitation, no flower damage should occur with his rate of oil.

What should growers consider if good bloom weather is forecast (temperatures 65-80°F)?

Line up shaker(s) to check cropload at reference date and start thinning if needed.

Fungicide efficacy:

The following tables provide information on fungicide efficacy, FRAC group, and treatment timing for controlling prune diseases. Additional information on general properties of fungicides, antibiotics, biologicals, oils, salts, and natural products registered on deciduous tree fruits and their chemical classes can be found at the UC IPM website: http://www.ipm.ucdavis.edu/PDF/PMG/fungicideefficacytiming.pdf

PRUNE (DRIED PLUM): FUNGICIDE EFFICACY

Fungicide	Resistance risk (FRAC#)[1]	Brown rot		Russet scab	Rust
		Blossom	Fruit[2]		
Adament**	medium (3/11)	++++	++++	----	+++
Bumper/Tilt[2]	high (3)	++++	++++	----	+++
Distinguish**	medium (9/11)	++++	++	----	++
Elite**/Tebucon/Teb/Toledo[2,7]	high (3)	++++	++++	----	+++
Indar[2]	high (3)	++++	++++	----	+++
Inspire Super	high (3/9)	++++	++++	----	+++
Luna Sensation*[2]	medium (7/11)[4]	++++	++++	ND	ND
Merivon	medium (7/11)[4]	++++	++++	ND	ND
Pristine[2]	medium (7/11)[4]	++++	++++	ND	ND
Quash [2]	high (3)	++++	++++	----	+++
Luna Experience*	medium (3/7)[4]	++++	++++	ND	++++
Quadris Top[2]	medium (3/11)[4]	++++	++++	ND	++++
Quilt Xcel[2]	medium (3/11)[4]	++++	++++	ND	++++
Rovral[5] + oil	low (2)	++++	NR	----	NR
Scala[6]	high (9)[3,4]	++++	+++[6]	----	ND
Topsin-M /T-Methyl/Incognito+ oil[2,4]	high (1)[4]	++++	++++	----	----
Vangard[6]	high (9)[3,4]	++++	+++[6]	----	ND
Fontelis	high (3)	++++	+++	----	+++
Elevate[2,7]	high (17)[4]	+++	+++	ND	----
Rovral[5]/Iprodione /Nevado	low (2)	+++	NR	----	NR
Topsin-M/T-Methyl/Incognito [2,3]	high (1)[4]	+++	+/-	----	----
Abound	high (11)[4]	++	+	----	+++
Oso/Tavano**	high (19)	++	++	----	ND
Botran	medium (14)	++	++	ND	ND
Bravo/Chlorothalonil/Echo/Equus[8,9,10]	low (M5)	++	++	++	----[9]
Captan[7,8,10]	low (M4)	++	++	+++	----
Gem[7]	high (11)[4]	++	+	----	+++
Rally[2]	high (3)	++	++	----	----
Sulfur[10]	low (M2)	+/-	+/-	----	++

Rating: ++++= excellent and consistent, +++= good and reliable, ++= moderate and variable, += limited and erratic, +/- = often ineffective, ---- = ineffective, ? = insufficient data or unknown, NR=not registered after bloom, and ND=no data

*** Registration pending in California.**

**** Not registered, label withdrawn or inactive in California.**

[1] Group numbers are assigned by the Fungicide Resistance Action Committee (FRAC) according to different modes of actions (for more information, see http://www.frac.info/). Fungicides with a different group number are suitable to alternate in a resistance management program. In California, make no more than one application of fungicides with mode-of-action Group numbers 1, 4, 9, 11, or 17 before rotating to a fungicide with a different mode-of-action Group number; for fungicides with other Group numbers, make no more than two consecutive applications before rotating to fungicide with a different mode-of-action Group number.

[2] Fruit brown rot treatments for fungicides in FRAC Groups 1,2, 3, 17, 7/11 are improved with the addition of 2% light summer oil. The oil is "light" summer oil (1-2% vol/vol). If applied in summer, fruit will loose their waxy bloom and look red. They will dry to normal color.

[3] Strains of *Monilinia fructicola* and *M. laxa* resistant to Topsin-M and T-Methyl have been reported in some California prune orchards. No more than two applications of Topsin-M or T-Methyl should be made each year. Resistant strains of the jacket rot fungus, *Botrytis cinerea*, and powdery mildew fungi have been reported in California on crops other than almond and stone fruits and may have the potential to develop in prune with overuse of fungicides with similar chemistry. Subpopulations of both *Monilinia* spp. have been shown to be resistant to AP (FRAC 9) fungicides on prune in CA.

[4] To reduce the risk of resistance development, start treatments with a fungicide with a multi-site mode of action; rotate or mix fungicides with different mode-of-action FRAC numbers for subsequent applications, use labeled rates (preferably the upper range), and limit the total number of applications/season.

[5] Blossom blight only; not registered for use after petal fall.

[6] High summer temperatures and relative humidity reduce efficacy.

[7] Registered for use on fresh prunes only.

[8] Do not use in combination with or shortly before or after oil treatment.

[9] Do not use after jacket (shuck) split.

[10] Do not use sulfur, captan, or chlorothalonil in combination with or shortly before or after oil treatment.

PRUNE (DRIED PLUM): TREATMENT TIMING

Note: Timings listed are effective but not all may be required for disease control. Timings used will depend upon orchard history of disease, length of bloom, and weather conditions each year.

Disease	Green bud	White bud	Full bloom	May	June	July
Brown rot[1]	+++	+++	+++	----	+	++
Russet scab[2]	----	----	+++	----	----	----
Rust[3]	----	----	----	+	++	+++

Rating: +++ = most effective, ++ = moderately effective, + = least effective, and ---- = ineffective

[1] Flowers are susceptible beginning with the emergence of the sepals (green bud) until the petals fall but are most susceptible when open.
[2] A physiological disorder; no pathogens involved.
[3] More severe when late spring rains occur.

2017 UC Cooperative Extension Meetings

March 1st **8:00am-noon**	**Sacramento-Solano-Yolo Walnut Day** Norton Hall, Woodland *Topics include: orchard replanting and nematodes, mites, scale and Bot*
March 3rd **8:00 am-12:00 pm**	**South Sacramento Valley Prune Meeting** Veteran's Hall, Yuba City, CA Hosted lunch to follow *Topics include: new rootstocks, wood decay, canker diseases, flower/leaf/fruit diseases, cropload mgmt., regulatory updates* Contact: Franz Niederholzer fjniederholzer@ucanr.edu
May 10, 2017 **8:00am—2:00pm**	**NICKELS SOIL LAB ANNUAL FIELD DAY** Marine Ave., Arbuckle, CA *Location and Topics to be announced in an upcoming issue*

FRUIT & NUT NOTES

SACRAMENTO VALLEY REGIONAL PRUNE NEWSLETTER

Cooperative Extension Work in Agriculture and Home Economics, U.S. Department of Agriculture, University of California, and County of Tehama, Cooperating.

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