Sacramento Valley Prune News
Bloom, 2024
University of California
Agriculture and Natural Resources | Cooperative Extension

In This Issue

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UCCE Farm Advisor
Butte, Glenn, and Tehama Counties

Bloom 2024 Prune Orchard Considerations

Jaime Ott, UCCE Tehama, Shasta, Glenn, and Butte Counties

LATE FEBRUARY

Bees: Order bees, usually at a 1 hive/acre stocking rate. Employ best management practices for maintaining hive health. Before making fungicide application, check for bees nearby using the 'Bee Check' tool on the BeeWhereCalifornia app or website. For more information, contact your county's ag commissioner's office.

Irrigation Maintenance: Check your system's distribution uniformity and perform maintenance prior to possible heat at bloom, as well as the coming irrigation season. Contact your local Resource Conservation District Mobile Irrigation Lab for free system evaluations:

- **Tehama, Butte, Glenn, or Shasta Counties:** Kevin Greer, 530-727-1297 or kevin@tehamacountyrcd.org
- **Yolo County:** Conor, higgins@yolorcd.org
- **Solano County:** Higgins Kevin Young-Lai, kevin.young-lai@solanorcd.org or 707-678-1655 ext. 123
- **Sutter-Yuba-Colusa:** Karandave Kang, scrcdoffice@gmail.com

Sprayer Calibration: Calibrate your spray equipment prior to applying bloom disease sprays, and take the time to check your sprayer for worn or broken parts (nozzles, strainers, pressure gauge(s), etc.).

San Jose Scale (SJS): Delayed dormant sprays are preferred timing for treatment, but if they were not applied or were unsuccessful, monitor with pheromone traps beginning in mid- to late February.

Chill: To date, chilling is roughly equal to three of the last five years at the Gerber South CIMIS station. Check your winter chill accumulation with this calculator.

Protect new trees: For both replants and new orchard plantings, protect trees from sunburn and herbicides with white interior latex paint diluted 2:1 water to paint, plus tree wraps. If tree wraps are used without painting trees, the boxes should be flattened (◊ from the top, not □) to avoid "wrapper burn". Research in almond shows that trunk cartons can provide protection from herbicide injury for young trees. However, paint alone does NOT provide protection from herbicide.

MARCH

If forecast is cold at bloom: a closely mowed, moist orchard floor is warmer than one with tall weeds/cover crop, while freshly disced soil is the coldest.

If forecast is hot at bloom: If temperatures climb above 80°F during or soon after full bloom, fruit set may be reduced and crop loss can occur. To cool the orchard as much as possible, run sprinklers during bloom (especially full bloom and the next 2-3 days after full bloom) when

temperatures reach 75°F and keep them on until they drop below 75°F. The evaporative cooling delivered by this practice can reduce orchard temps.

Brown rot: In a wet bloom, two fungicide applications (green bud and full bloom) are recommended. If there's no rainfall in the forecast, there is still a risk of brown rot infection from dew, but one spray at 40-50% bloom will provide effective control.

Russet scab: This disorder develops when significant rainfall occurs during or immediately after bloom. If a single bloom spray is applied for brown rot, before 50% bloom, scab material can also be included in that spray. Once the fruit is through the jackets, the risk of scab is mostly gone. Consider spraying captan or chlorothanil (Bravo®/Echo®) at full bloom to reduce scab at harvest but pay attention to honeybee safety (both those fungicides are tough on bees).

Aphids: If control measures were not taken during fall or winter, two 440 oil sprays (4 gal/acre/spray) at bloom can be effective against mealy plum and leaf curl plum aphids if applied at slow ground speeds (for example 1.5 mph) 7-10 days apart. Oil has a level II precaution for bee safety, meaning it should only be sprayed between sunset and midnight, ideally when temperatures have dropped below 55°F to avoid foraging bees.

Peach twig borer (PTB): Monitor during and after bloom. Chewing damage on buds during bloom indicates PTB activity and may warrant treatment. To protect bees, avoid any insecticide in the spray tank at bloom, except Bt (Bacillus thuringiensis formulations such as Dipel®, Javelin®, etc.).

APRIL

Measure crop load at reference date to determine if thinning is needed. Reference date is 7-10 days after pit hardening. Check for pit hardening starting in mid-April. If a sharp knife catches, even briefly, when cutting across the blossom end of the flower, the fruit has reached pit hardening. Once reference date is reached, check crop load in representative trees in the orchard and, if needed, thin as early as possible for best size results.

Plan your nitrogen (N) and potassium (K) fertilizer applications. Crop load is the major driver of N and K use in mature prune orchards. For optimal N uptake, apply in multiple doses starting after bloom. Consider an N application before the end of April if there is a good crop set. If considering foliar potassium nitrate applications as your K program or to supplement soil applied K, begin spraying in late April and make additional applications every 2-3 weeks.

Irrigation: Monitor orchard moisture (soil moisture sensors and/or pressure chamber readings) to track orchard moisture status and determine when to apply first irrigation. Irrigating too early can saturate soils, leading to leaf yellowing from iron chlorosis.

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 but is also very damaging to parasitoid wasps. Oil is not effective against leaf curl aphid during this period as the spray can't reach inside the curled leaves.

Insecticide	Effective rate
Asana	5 oz/a
Warrior (11.4% a.i.)	2.56 oz/a
MustangMaxEW	1.28 oz/a
BeLeaf	2.5 oz/a
Assail 30SC	3 oz/a

Another option is to control aphids using insecticides at low rates. Lower rates of certain insecticides controlled aphids in UC research trials without harming parasitoid wasps feeding in the aphids.

**Mention of a product does not constitute a product endorsement or a pesticide recommendation. Work with your PCA to determine the correct product and rate for your needs.*

Obliquebanded leafroller (OBLR): Place pheromone traps (minimum 2 per block) at the beginning of April to establish a biofix (moths caught on two consecutive trap checks) and begin accumulating degree days to inform when to begin fruit inspections.

Peach twig borer (PTB): Continue monitoring post-bloom for PTB biofix. (Traps should be up in March.) PTB biofix in prune orchards is often later than in almond orchards. PTB damage can give brown rot disease entry into fruit. If you set a heavy crop, beware of PTB populations.

San Jose Scale (SJS): If dormant treatments were not applied, the dormant spray didn't do a good job, or spring SJS pressure appears high, consider treating at 600-700 degree days after pheromone trap biofix to target emerging crawlers. (Traps should be up in February.) Alternatively, SJS crawler activity can be monitored using double-sided sticky tape around limbs beginning in April to detect crawler emergence and time spring treatments if necessary. Caution: If you use neonic pesticides for aphid control (Actara®, Assail®, Leverage 360®, etc.) scale populations may increase.

MAY

Rust: Monitor for leaf rust beginning May 1. Treat at the first sign of rust. Effective materials for rust control are found at the UC IPM website in a free pdf. Scroll to the bottom of the page to find the link.

Peach Twig Borer: 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 have damage.

Obliquebanded leafroller: 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.

Irrigation: Continue irrigation monitoring to maintain adequate orchard moisture. Adequate irrigation improves fruit sizing and avoids fruit damage like end cracking and sunburn.

Bloom weather and prune fruit set: what we know so far.

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

Extreme bloom weather (cool or hot) can ruin a crop. A new bloom weather model is a good starting point to predicting crop potential and, eventually, managing risk of crop failure.

The simple answer

All crop failures have been in years with early bloom driven by late February heat (temperatures in the 70's). Later bloom has not produced crop failures (see Figure 1).

In years with early bloom and crop failure, the weather followed one of two patterns:

- Steady, cool weather: A week of extended cool (<60°F daily max temperatures) w rainy weather before and after full bloom
- Irregular weather: very hot (>80°F) temperatures at full bloom to two days after full bloom with cool temperatures early in the week just before full bloom or later in the week right after full bloom.

The full story

Crop failure lowers grower income and reduces world market position for California prunes, further lowering grower returns. Understanding the how/why of prune crop failure and developing management practices to maintain production are critical steps to economically viable prune production in California.

In the last 17 years, prune crop failures in California (statewide or regionally) occurred in 2004, 2005, 2007, 2013, 2016, and 2020. Unusually cool or hot weather during bloom in those years coincided with low production (a state average of less than 1.5 dry ton/acre). In all these years, full bloom occurred before March 15 (See Figure 1).

Observations in prune orchards following extreme bloom weather showed similar patterns of fruit development and drop. Fruit grew to pea size in the first 2-3 weeks after full bloom and then yellowed and fell off the tree. These consistent observations suggests that crop failures were due to problems with processes in flowers, not external conditions such as pollination/bee activity.

Setting a prune (or other stone fruit) requires successful completion of a series of carefully timed events. Once prune pollen arrives on the flower stigma from hitchhiking on honeybees and/or other pollinators, the pollen grain must germinate and

grow down the style to the ovary at a time that the ovule is viable to successfully fertilize the ovary and set fruit (see Figure 2). Extreme weather at bloom somehow interferes with these steps and fruit is not set.

What can growers do if high temperatures are forecast for full bloom or a few days afterwards? Growers with sprinkler irrigation can cool the orchard by 1-2°F by running water when air temperatures exceed 75°F. Orchards thinned the year before should have more return bloom compared to unthinned orchards, and therefore more fruit if bloom conditions favor low fruit set. Some growers add extra hives with the goal of pollinating flowers more quickly. Research into practices that improve set continues this year.

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Figure 1. Prune fruit set and bloom date for the past 15 years at different orchards from Winters to Red Bluff. All years with low fruit set (<10%) have been years with early bloom, although early bloom doesn't guarantee crop failure. March 1 is DOY 60; April 1 is DOY 91.

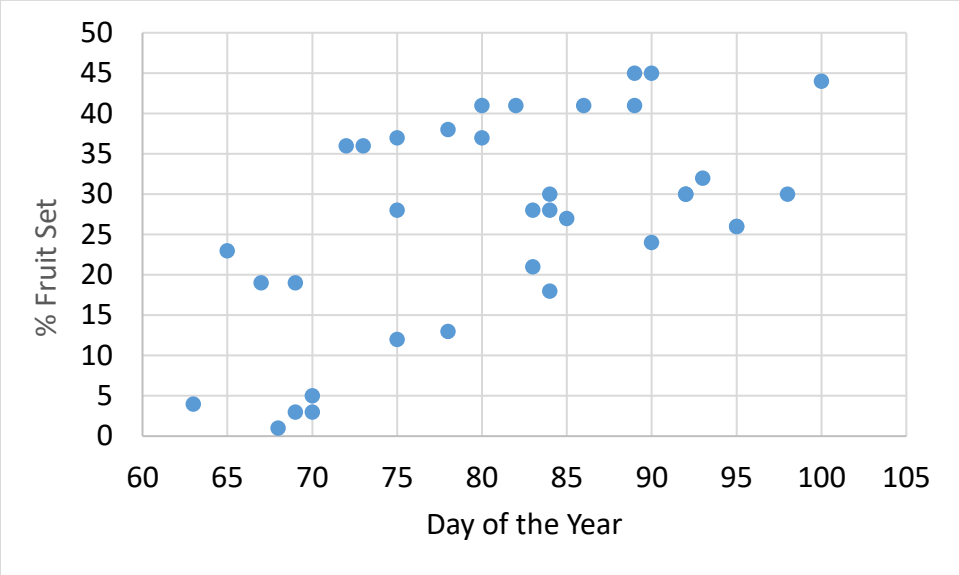

Figure 2. Prune flower cut-away to expose the ovule (tiny fruit at the base of the style - the flower part topped with the stigma). Pollen moves from the anthers to the stigma with bee activity. On the stigma, the pollen germinates and grow down to the ovary. If a pollen tube arrives at a healthy ovule, a fruit can be set.

Potassium Management Options in Prunes

Becky Wheeler-Dykes, UCCE Orchard Systems & Weed Ecology Advisor, Glenn, Tehama, and Colusa Counties
Franz Niederholzer, UCCE Orchard Systems Advisor, Colusa, Sutter and Yuba Counties

A prune grower's potassium (K) program can be one of the most critical components of an orchard management plan. Potassium deficiency in a single season can negatively affect tree health for years to come. In addition to the direct effects of K deficiency, such as defoliation and reduced crop quality, secondary symptoms like increased disease susceptibility and canker infection can be costly for several seasons.

Potassium basics

Unlike nitrate, K does not leach out of most soils. Potassium cations (K^+) are held on the soil exchange phase, allowing growers to build a soil 'K bank' of plant available K. However, the flipside is that K added to soil can be fixed as nonexchangeable K in certain soil minerals and be unavailable for plant use at least in the short term. K fixing soils are generally associated with weathered granitic minerals in the eastern San Joaquin Valley and Sacramento Valley.

Potassium at the root surface is readily absorbed into plants. It is movement to the root surface that limits plant access to otherwise available soil K. There are three paths: root interception, diffusion, and/or mass flow by which potassium can arrive at root surfaces. Researchers report that most K arrives at root surfaces by diffusion. Diffusion is aided by high local soil K levels, adequate soil moisture and root growth. Early in the growing season, fall banded soil K, good soil moisture levels and good root growth allow potassium to reach roots and meet tree K demand. Later in the season there is the possibility, especially under heavy cropload where root growth is limited, that less K reaches the root surface than is needed by the plant. When this happens, and since fruit K demand is the priority for the plant, leaf K may be remobilized and moved to the fruit to meet the needs of the crop. Unfortunately, this can lead to K deficiency in the leaves and a cascade of trouble from the start of K deficiency to increasing leaf yellowing with further reduction of leaf K, to leaf drop, sunburn of shoots and limbs, and eventual infection by bark cankers, especially *cytospora*. Maintaining adequate plant K through the season is important for good fruit production and tree health.

Potassium fertilizer programs historically centered on a heavy rate (400-700 lb/acre 0-0-50 SOP) of fall applied, dry fertilizer banded on the soil down the tree row. Supplemental foliar applications of potassium nitrate helps maintain good leaf K levels through the season. With the widespread adoption of micro-irrigation, many growers have moved to in-season K fertigation as their main fertilizer program or as a supplement to fall banded K fertilizer. Many growers prefer the fall banding plus in-season supplements as the fall application provides a foundation for later programs at an easier time for labor management.

How much Potassium to apply

Cropload is the major determining factor setting prune K need. Natural conditioned dried prunes contain about 1% potassium or 25 lbs K_2O (potash) in a dry ton of prunes. So, a 3 dry ton/acre crop will remove 75 lbs K_2O, equivalent to 150 lbs 0-0-50 SOP fertilizer. A larger crop removes more K and generally needs more K fertilizer to avoid deficiency. A smaller crop removes less K. In the fall, when deciding how much potassium to put on the soil, no accurate information exists about the crop size the next spring. Applying 400-700 lbs SOP as a maintenance rate in the fall before the crop is set risks spending hundreds of dollars per acre on fertilizer on a crop that may not set. In a case like this, the excess K may not be lost, but it isn't a good investment in the current crop. Research will start this season to see if banding of dry SOP fertilizer is effective in delivering adequate K to prune trees in the spring and not just the fall.

To make sure that a fall, banded K application is delivering enough K to the trees the next year, take an April or May leaf sample and compare the K leaf levels from the lab analysis with the standards for July leaf samples*. Since leaf K levels generally decrease over time, the closer the spring leaf sample result are to the critical levels, the greater the risk of K deficiency in July. If spring leaf K levels are approaching July critical levels, the orchard should benefit from adding additional fertilizer K by foliar spray or fertigation.

Other considerations

Don't forget to monitor crop load after fruit set. If crop load is heavier than expected, additional K (foliar or fertigated) may need to be applied to avoid drawing down leaf levels to deficient. Use the prune fruit thinning calculator tool to help decide whether and how much to thin this season.

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*July prune leaf K standards:
Deficient: <1.0% K
Adequate: >1.3% K
Excessive: >2.0% K (not damaging, but not beneficial to the crop)

Managing aphids in prune orchards

Sudan Gyawaly, Northern Sacramento Valley IPM Advisor

'Leaf curl plum aphid' and 'mealy plum aphid' are the key pests of prune orchards in the northern Sacramento Valley. Both aphid species survive the winter in the orchard at egg stage near the base of buds. Once hatched, around bloom time, they vigorously feed on the young foliage and build up their population quickly. From May (leaf curl plum aphid) and June/July (mealy plum aphid), most aphids leave the prune trees and feed on alternate weed hosts outside the orchard.

Curling and stunting of leaves caused by mealy plum aphid infestations.

Both aphid species infest growing leaves and stems in spring and summer, which can cause curling and stunting of the leaves. Serious aphid infestation can reduce tree growth, vigor, and potentially reduce fruit sugar content. Accumulation of honeydew, which these aphids excrete while feeding, results in the development of sooty mold which can potentially lead to fruit cracking.

Determining the need to spray for aphids and optimum spray timing.

The decision to spray for aphids depends on the past and present orchard aphid pressure, which also helps determine the optimum spray timing. Also, the need to spray for other prune pests (such as scale or peach twig borer) can influence the selection of materials and application timings for aphids. Several pesticide options are available for aphid control for different application timings (see table, below). An effective aphid management program should always weigh the relative cost, efficacy, and impacts on natural enemies and surface water quality.

If aphids are a consistent problem in an orchard, a late fall/early dormancy (Nov-early Dec) spray with a low label rate of a pyrethroid insecticide provides good control of aphids. Low label rates of these insecticides applied at this time are effective, yet the risk of surface water runoff is reduced. Oil spray during this period can seriously impact parasites (natural enemies) and is not recommended, especially if leaves are still on trees.

Dormant sprays (late Dec-Jan) of pyrethroid or pyrethroid plus oil treatments are effective against aphids and other pests, such as scale and PTB. However, this application timing poses higher risks of surface water contamination.

If a fall/dormant spray is not applied, dormant spur sampling can help decide the need for aphid sprays at bloom. Dormant spur sampling for aphids involves sampling for aphid eggs, and the treatment threshold for aphids is just 1 egg out of 100 spurs. However, aphid eggs can be hard to find on dormant spurs, and not finding eggs on spurs doesn't mean none are present. Therefore, a spring/summer monitoring is necessary to complement the dormant spur sampling if no eggs were found on dormant spurs. Bloom time sprays of narrow-range oil are effective against aphids.

If aphids are only an occasional problem in the orchard and sprays were not applied at fall/dormant or bloom time, the need to spray for aphids is based on spring/summer monitoring. Spring/summer aphid monitoring involves weekly monitoring (from petal fall until a treatment is applied or July 15) of 40 trees/block for aphid infestation and determining if those trees have significant (aphid covering >10% of tree leaf surface) aphid infestations. Treatment is warranted if a threshold (12 out of 40 trees monitored in a block) have significant aphid infestation. Click this link for details on spring/summer monitoring.

The table below (adopted from Franz Niederholzer) provides a good summary of various prune aphid control materials, their application timings, efficacy against key prune pest and risks to water quality.

Label is the law. Always read the label of the product being used.

General timing, efficacy, and water quality risk for spray practices and material combinations that target key prune insect pests – plum aphid, peach twig borer (PTB) and scale. Efficacy rating assumes excellent spray coverage. "++" = excellent control, "+" = partial control, "--"no control or benefit, "?" = no data.

General Timing	Timing details, materials	Aphid (1)	PTB (2)	Scale (3)	Advance Bloom	Water Quality Risks (4)
Fall (Nov-early Dec)	Fall spray (pyrethroid only)	++	+	--	--	+
Dormant (late Dec-Jan) (5)	Lite dormant spray (pyrethroid only)	++	++	--	--	++
	Lite dormant spray (3-4 gpa oil + pyrethroid)	++	++	+	++	++
	Dormant spray (3-4 gpa oil + diazinon).	++	++	++	++	++
	Dormant scale spray (3-4 gpa oil + Centaur or Seize	--	--	++	++	+
Bloom	B.t. with bloom sprays (Dipel, Javelin, etc)	--	++	--	--	--
	2x 4% 440 oil at bloom (with fungicides) (6)	++	--	?	--	--
Post-Bloom	Aphid spray (late March-April)	++	--	--	--	--
	PTB "May" spray (timed by Deg Days after biofix) (7)	--	++	--	--	--
	Scale crawler spray (based on monitoring)	--	--	++	--	--

(1) Determine the need to spray for aphid based on: A regular history of some aphid pressure in an orchard may suggest a need for annual treatments; OR No history of aphid infestation suggests "wait and see" strategy could be effective.
(2) PTB feeding on fruit can damage fruit in-season and is an entry point for brown rot.
(3) Scale is not always a problem in prunes but can be a major problem if not controlled when populations build. Use dormant spur sampling to determine the scale population in your orchard and what treatment is needed.
(4) Indicates relative risk of runoff from orchards to surface water and harm to aquatic life (fish and their food chain). "++" = significant risk, "+" = relatively less risk, and "–"indicates relatively little to no risk.
(5) This spray mix is very effective on indicated pests in late dormant or delayed dormant (Feb. 1 to pre-bloom) but does not move bloom date and/or must be reported to Ag Commissioner's office to avoid bee kills after Jan 31.
(6) Cannot be tank-mixed with captan or chlorothalonil (Bravo®, etc.) fungicides.
(7) Check with your packer to make sure anything sprayed is on their "OK to spray" list.

Disclaimer: Products listed in this table do not constitute a recommendation, and many of the active ingredients presented in this article can be purchased under multiple trade names.

New Advisor Introduction: Domena Agyeman

I am excited to join the University of California Cooperative Extension as an Agriculture and Natural Resources Economics Advisor. I will be stationed at the UCCE office in Oroville, delivering services to Butte, Glenn, and Tehama Counties. I earned a B.S. in Agricultural Science from the University of Cape Coast in Ghana and an M.S. in Agricultural Economics from Mississippi State University. I obtained a Ph.D. in Agricultural Economics from the University of Kentucky. Prior to my current position, I worked as a Postdoctoral Associate at Virginia Seafood Agricultural Research and Extension Center at Virginia Tech University. My research interests encompass natural resources and environmental policy impact assessments, economic contributions and impacts analyses, producer decision-making assessments, and consumer preference assessments. In my advisor role, I aim to enhance economic viability in agricultural production, forestry, and other natural resources-based businesses, while also promoting broadband access and online resource utilization to support these sectors and contribute to regional economic development.

I am excited to leverage my expertise to highlight the economic contributions and impacts of the agriculture and natural resources industries in Butte, Glenn, and Tehama Counties and to provide producers and other stakeholders in the region with research-based information that will help them navigate their business challenges and opportunities.

I am eager to engage in collaborative learning with all of you and anticipate the opportunity to establish a research program tailored to address your specific needs. Kindly reach out to me with ideas, requests, or questions related to the economics of agriculture and natural resources. I can be reached at dagyeman@ucanr.edu or 530-552-5812.

2024 Sacramento Valley Orchard Meeting Save the Dates!		
Th Feb 29, 7:30 AM - Noon	Northern Sacramento Valley Walnut Day	Elk's Lodge Red Bluff, CA
Tue Mar 12, 8:00 AM - Noon	Sac-Solano-Yolo Walnut Day	Norton Hall in Woodland

Details for events at: sacvalleyorchards.com/events

Excerpt from Adaskaveg et al. “Fungicides, bactericides, biocontrols, and natural products for deciduous tree fruit and nut, citrus, strawberry, and vine crops in California – 2024” UC IPM, Agricultural Pests and Diseases.

PRUNE (DRIED PLUM): FUNGICIDE EFFICACY - CONVENTIONAL

Fungicide	Resistance risk (FRAC#)[1]	Brown rot		Russet scab	Rust
		blossom	fruit[2]		
Miravis Duo	medium (3/7)	5	5	ND	5
Bumper, Tilt[2]	high (3)	5	5	0	4
Cevya	high (3)	5	5	0	4
Tebucon, Teb, Tebuconazole, Toledo[2,7]	high (3)	5	5	0	4
Viathon	med. (3/33, P07)	5	5	0	4
Fontelis	high (7)	5	4	0	4
Kenja	high (7)	5	4	NL	NL
Sercadis, Tesaris	high (7)	5	4	NL	NL
Indar[2]	high (3)	5	5	0	4
Protocol[3]	med.-high (1/3)	5	5	0	5
Inspire Super	high (3/9)	5	5	0	4
Luna Experience	medium (3/7)	5	5	ND	5
Luna Sensation[2]	medium (7/11)	5	5	ND	ND
Merivon	medium (7/11)	5	5	ND	ND
Pristine[2]	medium (7/11)	5	5	ND	ND
Quash [2]	high (3)	5	5	0	4
Adament**	medium (3/11)	5	5	ND	5
Quadris Top, Acadia ESQ[2]	medium (3/11)	5	5	ND	5
Quilt Xcel, Avaris 2XS[2]	medium (3/11)	5	5	ND	5
Rovral/Iprodione/Nevado[5] mixed with oil[2]	low (2)	5	NR	0	NR
Scala[6]	high (9)[3,4]	5	4[6]	0	ND
Topsin-M, T-Methyl, Incognito, and Cercobin when mixed with oil[2,4]	high (1)[4]	5	5	0	0
Vangard[6]	high (9)[3,4]	5	4[6]	0	ND
Elevate[2,7]	high (17)[4]	4	4	ND	0
Rhyme	high (3)	4	4	0	4
Rovral/Iprodione /Nevado[5]	low (2)	4	NR	0	NR
Topsin-M, T-Methyl, Incognito [2,3]	high (1)[4]	4	1	0	0
Quadris (Abound), Acadia, Arius 250	high (11)[4]	3	2	0	4
Botran	medium (14)	3	3	ND	ND
Bravo, Chlorothalonil, Echo, Equus[8,9,10]	low (M5)	3	3	3	0[9]
Captan[7,8,10]	low (M4)	3	3	4	0
Flint Extra[7]	high (11)[4]	3	2	0	4
Ph-D, Oso	high (19)	3	3	0	ND
Rally[2]	high (3)	3	3	0	0
Sulfur[10]	low (M2)	1	1	0	3

Rating: 5 = excellent and consistent, 4 = good and reliable, 3 = moderate and variable, 2 = limited and/or erratic, 1 = minimal and often ineffective, 0 = ineffective, NL = not on label, and ND = no data. NR=not registered after bloom.

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

[1] Code 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 Code number are suitable to alternate in a resistance management program. In California, make no more than one application of fungicides with mode-of-actions (MOA) with high resistance risk before rotating to a fungicide with a different MOA (Code number);

for other fungicides, make no more than two consecutive applications before rotating to fungicide with a different MOA (Code number).

[2] Fruit brown rot treatments for fungicides in FRAC Codes 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 lose 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 per 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 - FUNGICIDE EFFICACY - BIOCONTROLS AND NATURAL PRODUCTS

		Brown rot			
Trade name[1]	**Biological or natural product (FRAC code)[2]**	**blossom**	**fruit rot**	**Russet scab**	**Rust**
Oso	polyoxin-D (FC 19)	3	3	NL	NL
Botector	*Aureobasidium pullulans* (BM 02)	3	2	NL	NL
ProBLAD Verde*	*Lupinus albus* (BM 01)	3	2	NL	NL
EcoSwing	*Swinglea glutinosa* (BM 01)	3	2	NL	NL
Dart	capric and caprylic acids (BM 01)	3	2	NL	3
Guarda[3], Thymguard	thyme oil (BM 01)	2	2	NL	1
Double Nickel 55	*Bacillus amyloliquefaciens* D747 (BM 02)	2	0	NL	NL
Serifel	*B. amyloliquefaciens* MBI600 (BM 02)	2	1	NL	NL
Taegro 2	*B. amyloliquefaciens* FZB (BM 02)	2	1	NL	NL
Sonata	*B. pumilis* QST2808 (BM 02)	2	1	NL	NL
Serenade	*B. subtilis* QST 713 (BM 02)	2	1	NL	NL
Aviv	*B. subtilis* IAB/BS03 (BM 02)	2	1	NL	NL
Oxidate, Perasan	peroxyacetic acid (oxidizer)	2	2	NL	1
Cinnerate	cinnamon oil (BM 01)	2	0	NL	2
Cinnacure, Seican	cinnamaldehyde (BM 01)	2	1	NL	NL
Trilogy, Terraneem	neem oil (BM 01)	1	1	2	2
Actinovate AG	*Streptomyces lydicus* (BM 02)	1	1	NL	NL
Sulfur	sulfur (M2)	1	1	0	3
Copper	copper (M1)	1	1	0	1

Rating: 5 = excellent and consistent, 4 = good and reliable, 3 = moderate and variable, 2 = limited and/or erratic, 1 = minimal and often ineffective, 0 = ineffective, NL = not on label, and ND = no data. NR=not registered after bloom.

*** Registration pending in California.**

[1] Organic treatments arranged by performance on brown rot.

[2] FRAC Codes are also provided as BM- or P-number codes. In general, sulfur compounds are fungicidal and may affect applications of fungal biocontrols (e.g., Botector); whereas copper may affect applications of bacterial biocontrols (e.g., Actinovate, Double Nickel 55, and Serenade). Rotations must consider these factors.

[3] Not organically approved.

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]	2	3	3	0	1	2
Russet scab[2]	0	0	3	0	0	0
Rust[3]	0	0	0	1	2	3

Rating: 3 = most effective, 2 = moderately effective, 1 = least effective, and 0 = 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.

Herbicide Registration on California Tree and Vine Crops - *(reviewed April 2023 - UC Weed Science)*

	Herbicide-Common Name *(example trade name)*	Site of Action Group[1]	Almond	Pecan	Pistachio	Walnut	Apple	Pear	Apricot	Cherry	Nectarine	Peach	Plum / Prune	Avocado	Citrus	Date	Fig	Grape	Kiwi	Olive	Pomegranate
			----- tree nut -------				- pome -		---------stone fruit ---------												
Preemergence	**dichlobenil** *(Casoron)*	L / 20	N	N	N	N	**R**	**R**	N	**R**	N	N	N	N	N	N	N	**R**	N	N	N
	diuron *(Karmex,Diurex)*	C2 / 7	N	**R**	N	**R**	**R**	**R**	N	N	N	**R**	N	N	**R**	N	N	**R**	N	**R**	N
	EPTC *(Eptam)*	N / 8	**R**	N	N	**R**	N	N	N	N	N	N	N	N	**R**	N	N	N	N	N	N
	flazasulfuron *(Mission)*	B / 2	**R**	N	**R**	**R**	N	N	N	N	N	N	N	N	**R**	N	N	**R**	N	N	N
	flumioxazin *(Chateau)*	E / 14	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	NB	NB	N	NB	**R**	N	**R**	**R**
	indaziflam *(Alion)*	L / 29	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	N	**R**	N	N	**R**	N	**R**	N
	isoxaben *(Trellis)*	L / 21	**R**	**R**	**R**	**R**	NB	NB	NB	NB	NB	NB	NB	NB	NB	N	NB	**R**	NB	NB	NB
	mesotrione *(Broadworks)*	F2/27	**R**	**R**	**R**	**R**	N	N	N	N	**R**	N	**R**	N	**R**	N	N	N	N	N	N
	napropamide *(Devrinol)*	K3 / 15	**R**	N	N	N	N	N	N	N	N	N	N	N	N	N	N	**R**	**R**	N	N
	norflurazon *(Solicam)*	F1 / 12	**R**	**R**	N	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	N	N	**R**	N	N	N
	orthosulfamuron *(Craze)*	B / 2	**R**	**R**	**R**	**R**	N	N	NB	NB	NB	NB	NB	N	N	N	N	**R**	N	N	N
	oryzalin *(Surflan)*	K1 / 3	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	N	**R**	**R**	**R**	**R**	**R**
	oxyfluorfen *(Goal, GoalTender)*	E / 14	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	NB	**R**	**R**	**R**	**R**	**R**	**R**
	pendimethalin *(Prowl H2O)*	K1 / 3	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	N	**R**	N	NB	**R**	**R**	**R**	**R**
	penoxsulam *(Pindar GT)*	B / 2, E/14	**R**	**R**	**R**	**R**	N	N	N	**R**	**R**	**R**	**R**	N	N	N	N	N	N	**R**	**R**
	pronamide *(Kerb)*	K1 / 3	N	N	N	N	**R**	**R**	**R**	**R**	**R**	**R**	**R**	N	N	N	N	**R**	N	N	N
	rimsulfuron *(Matrix)*	B / 2	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	N	**R**	N	N	**R**	N	N	N
	sulfentrazone *(Zeus)*	E / 14	N	N	**R**	**R**	N	N	N	N	N	N	N	N	**R**	N	N	**R**	N	N	N
	simazine *(Princep,Caliber 90)*	C1 / 5	**R**	**R**	N	**R**	**R**	**R**	N	**R**[2]	**R**	**R**	N	**R**	**R**	N	N	**R**	N	**R**	N
	trifluralin *(Treflan)*	K1 / 3	**R**	**R**	N	**R**	N	N	**R**	N	**R**	**R**	**R**	N	**R**	N	N	**R**	N	N	N
Postemergence	**carfentrazone** *(Shark EW)*	E / 14	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**
	clethodim *(SelectMax)*	A / 1	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	N	**R**	N	N	NB	N	NB	N
	2,4-D *(Embed Extra, Orchard Master)*	O / 4	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	N	N	N	N	**R**	N	N	N
	diquat *(Diquat)*	D / 22	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB
	fluazifop-p-butyl *(Fusilade)*	A / 1	NB	**R**	NB	NB	NB	NB	**R**	**R**	**R**	**R**	**R**	NB	**R**	NB	NB	**R**	N	NB	NB
	glyphosate *(Roundup)*	G / 9	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**
	glufosinate *(Rely 280)*	H / 10	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	N	**R**	N	N	**R**	N	**R**	N
	halosulfuron *(Sandea)*	B / 2	N	**R**	**R**	**R**	**R**	N	N	N	N	N	N	N	N	N	N	N	N	N	N
	paraquat *(Gramoxone)*	D / 22	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	N	**R**	**R**	**R**	**R**	**R**
	pelargonic acid *(Scythe)*	NC	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	N
	pyraflufen *(Venue)*	E / 14	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	N	NB	**R**	**R**	**R**	**R**	**R**	**R**
	saflufenacil *(Treevix)*	E / 14	**R**	N	**R**	**R**	**R**	**R**	N	N	N	N	N	N	**R**	N	**R**	N	N	**R**	**R**
	sethoxydim *(Poast)*	A / 1	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	NB	NB	**R**	NB	NB	**R**	N	NB	NB
Organic	**ammonium nanoate** *(Axxe)*	NC	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	N
	ammoniated fatty acids *(Final-San-O)*	NC	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**
	caprilic/Capric acid *(Suppress)*	NC	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	N	N	**R**	**R**	N	**R**
	d-limonene *(AvengerAG)*	NC	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	N	**R**	N	N	**R**	N	N	N
	eugenol *(Weed Slayer CA)*	NC	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**

Notes: R = Registered, N = Not registered, NB = nonbearing. This chart is intended as a general guide only. Always consult a current label before using any herbicide as labels change frequently and often contain special restrictions regarding use of a company's product.

[1] Herbicide site of action designations are according to the Herbicide Resistance Action Committee (letters) and the Weed Science Society of America (number) systems. NC = no accepted site of action classification; these contact herbicides are general membrane disruptors. [2]Simazine is registered on only tart cherry in CA. Weed susceptibility information and the most up to date version of this table can be found at the Weed Research and Information Center