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Fruit and Nut Notes

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NOVEMBER 2015

- Volume 12 -

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SACRAMENTO VALLEY REGIONAL
PRUNE NEWSLETTER

IN THIS ISSUE:

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

Rain and pruning don't mix!

Luke Milliron, UCCE Horticulture Intern, Colusa, Sutter, Yuba and San Joaquin Counties.
Franz Niederholzer, UC Farm Advisor, Colusa, Sutter and Yuba Counties

Rainfall and disease spread:

Farming is a tough enough business. Don't help disease damage your orchard. There are a number of fungal and bacterial diseases in the Sacramento Valley that can infest your orchard and reduce orchard productivity. When you prune before rain, you could help the pathogen(s) damage your orchard – especially young orchards. Although these diseases can have vastly different biology, there are some basic practices to keep in mind that will help keep them in check.

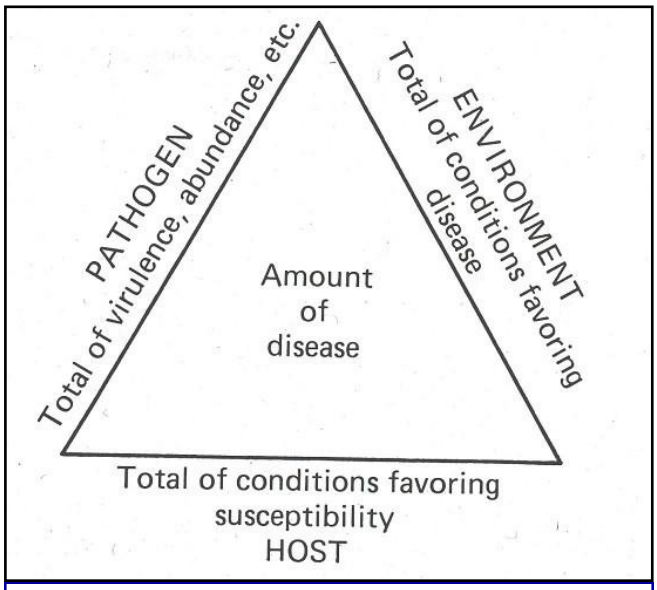

Figure 1. The disease triangle shows the three pre-requisites to disease.

If we look at the disease triangle below (Figure 1), we see that the "correct" environmental conditions, a susceptible host and an active pathogen are all needed before disease will occur. For our discussion of fungal and bacterial cankers in the Sacramento Valley we will conservatively assume that the pathogen is already present in the orchard (a pretty good bet) and will instead focus our efforts on the conditions favoring disease and host susceptibility. Each winter the perfect conditions for disease spread come together in some Sacramento Valley orchards. The host (i.e. tree) is susceptible following pruning.

Bark protects the interior of the tree from disease infection. Pruning exposes sensitive tissue. Pruning cuts require time to heal (reform a protective layer) and during this process pathogens can infect the wood and establish a canker. As the pruning wound ages, both the risk of infection and the canker size of any infection will be reduced. The susceptibility window between pruning and subsequent rainfall ranges widely depending on the pathogen and disease crop combination. UC researchers have susceptibility windows as short as two weeks (e.g. *Cytospora* canker in prune trees), and as great as twelve weeks or longer (various sweet cherry canker diseases).

The key environmental conditions that together with fresh pruning cuts can result in devastating disease spread are water splash and favorable temperatures. Water splash is a critical environmental condition for the spread of many fungal and bacterial pathogens, and can come from rain or irrigation splash of tree trunks. The favorable temperatures for fungal spore release are generally warmer temperatures. A 60-80 °F susceptibility temperature range has been demonstrated by UC researchers for fungal pathogens in sweet cherry. Unlike fungi, bacterial canker (*Pseudomonas syringae*) proliferates under cool conditions. In general, water splash, together with a fairly wide range of temperatures and fresh pruning cuts can result in devastating disease spread.

Figure 2. An almond orchard with rampant canker disease resulting from winter pruning and subsequent rainfall.

The best general practice across crops and diseases is to never prune trees before rain, or when rain is predicted in any long-term forecast. It is also critical to avoid any irrigation contact with tree trunks, whether from using splitters on micro sprinklers or avoiding irrigating with solid set sprinklers during the susceptibility window. UC researchers have found no yield advantage to pruning mature almond or walnut trees. Where pruning is

necessary – young trees, stone fruit, etc., prune during low risk rain periods in fall or spring. For existing canker disease in the orchard, good chemical controls are often not available and one of the only viable practices is to prune out diseased wood. In order to help reduce the existing inoculum in the orchard, it is recommended for many cankers to prune several inches to a foot below any canker and remove all of the diseased wood in late summer or early fall. In one young almond orchard visited recently, pruning cuts were made this past winter previous to a rain event, which resulted in many trees in the orchard having multiple cankers (Figure 2). Whatever you do, don't mix pruning and rain.

Special thanks to technical advice from Themis Michailides (UC Pathologist at Kearny Ag Center), as well as Brianna McGuire and Ara Avadisi Abramians (Gubler Lab at UC Davis).

Fall Prune Orchard Management Considerations

Luke Milliron, UCCE Horticulture Intern, Sutter, Yuba and San Joaquin Counties
Dani Lightle, UC Farm Advisor, Glenn, Butte and Tehama Counties

Pruning Cautions:

- It is critical to avoid timing pruning activities near rainfall events, whereby rain-splash can result in costly disease spread to freshly cut branches (*see article in this newsletter*).
- In addition to avoiding new infections, it is important to prune out existing *Cytospora* cankers by cutting several inches to a foot into the healthy wood below any symptoms. The pruned out wood should be removed from the orchard and burned (if permitted). Information on identifying *Cytospora* cankers can be found at: Pages 5-8 of cesutter.ucanr.edu/newsletters/Sacramento_Valley_Prune_News53275.pdf

Nutrition:

- Potassium is the most critical nutrient in prune production and a band application in late fall can be one way to correct any deficiency and replace the potassium removed by the previous year's crop.
- Deficiency symptoms, application rates and other information can be found at: Pages 4-5 of cesutter.ucanr.edu/newsletters/Sacramento_Valley_Prune_News53275.pdf
- Foliar zinc (36% zinc sulfate) can be applied at the beginning of leaf drop in late October or early November at about 20 lbs/acre in 100 gal water/acre. Zinc may drop leaves and disrupts aphid reproduction.
- Once leaves drop, trees don't absorb nitrogen until bud break in the spring. Any nitrogen applied in the fall won't be in the root zone come spring, especially if we have a wet winter. Put another way,do not apply nitrogen until after growth begins next spring.

Aphid and Scale Control:

- Aphids can be controlled with low rates of pyrethroid (Asana®, etc.) or organo-phosphate (diazinon, etc.) pesticides when applied in November (pyrethroids) or December through February (organo-phosphates.). The proactive November timing is chosen when orchard history indicates a chronic problem, whereas later sprays should be warranted by the presence of any aphid eggs in the dormant spur sampling.
- The dormant spur sampling conducted once between mid-November and mid-January, monitors for aphid eggs (only if not controlled in November), San Jose scale, European fruit lecanium and mites. Clip off 2-3 spurs from 35 to 50 randomly selected trees (for 100 total spurs) in each orchard and then carefully examine 20 random spurs with a hand lens or dissecting microscope, recording the number of spurs with any scales or aphid/mite eggs. Find videos on how to conduct a dormant spur sampling at: ipm.ucdavis.edu/PMG/r606900511.html (sampling form: ipm.ucdavis.edu/PMG/C606/prune-dormantspursample.pdf).

Weed management:

- Following your postharvest weed survey (ipm.ucdavis.edu/PMG/C606/prune-fallweeds.pdf), apply mid to late fall preemergence herbicide applications shortly before rainfall events that move the material into the soil. Include a postemergence herbicide if rains have already stimulated weed growth. *See article on weed management in prunes in this newsletter.*

Weed Management in Prunes

Franz Niederholzer, UCCE Farm Advisor, Colusa/Sutter/Yuba Counties
Brad Hanson, UCCE Weed Specialist, UC Davis Plant Sciences Department

Weeds in the prune orchard tree row compete for water and nutrients the trees need, plus interfere with sprinkler water patterns/spread and harvest operations (shaker trunk seal, shaker operator view of trunks, etc.). In addition, unmanaged weeds in the tree row provide excellent homes for rodents, particularly meadow voles, which can damage or kill prune trees by chewing on trunk bark at or near the soil surface. Controlling weeds is a key practice in successful prune growing. The need to control weeds hasn't changed over time, but the tools have.

Many growers have moved from disc and berm (flood) irrigation to drip or micro-sprinkler systems to reduce labor and equipment costs. Herbicides have replaced the disc as the key weed management tool(s) in many prune orchards. However, herbicide-based weed management in prunes has become challenging (and expensive) with the recent development of glyphosate resistance in fleabane, marestail, ryegrass, and junglerice. Weed management in a modern (no-till) prune orchard means matching effective herbicide(s) and application timings to the specific weeds present in an orchard.

Step one to managing weeds in your orchard is identifying the weeds present. See the UC IPM website for a free copy of a winter weed survey form (http://ipm.ucdavis.edu/PMG/C606/prune-fallweeds.pdf) and consider buying the handy shirt-pocket sized Weed ID cards produced by UC ANR researchers, which can be ordered at: (http://anrcatalog.ucdavis.edu/Details.aspx?itemNo=3541). A free online weed ID tool is available at http://weedid.wisc.edu/ca/

Step two to managing weeds in prune orchards is matching a registered, effective herbicide(s) with the weeds present. A fall preemergent program followed with postemergent materials in the spring and/or summer is an effective weed management strategy in many orchards. [A postemergent, only, program is often less effective (cost and control) in orchards where glyphosate-resistant weeds are present.]

Fall is an excellent timing for preemergent herbicide application, usually ahead of rainfall to incorporate the material. However, the traditional combination of Surflan or pendimethalin (Prowl, etc.) plus Goal™ has only been partially effective on fleabane. Certain newly registered herbicides can provide control of both glyphosate -resistant and glyphosate-sensitive weeds. Growers experiencing problems controlling fleabane with traditional preemergent herbicides (for example, Surflan + Goal) may want to consider discussing use of newer herbicides with their PCAs. See some preemergent herbicide research results (with almond) at: http://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=11625. [Alion® and Matrix® are registered in prune; however please note that Pindar GT is **NOT registered** for use in prune.] Preemergent herbicides should be applied to bare ground. Patchy weed control results can be expected where areas of dead weeds or leaves interfere with herbicide delivery to the soil. Where weeds are already present in the orchard, tank-mix effective postemergent materials with the preemergent herbicide.

Postemergent weed control with herbicides in prune orchards, especially glyphosate-resistant weeds such as fleabane, is difficult. There are few effective, registered materials and they must be applied to small (young) weeds for effective control. Gramoxone® or 2,4-D (Orchardmaster, etc.) have provided the best fleabane control in UC trials, while Shark® and Venue® have been less effective on fleabane. No products registered in prunes can deliver successful control on large fleabane weeds.

Glyphosate still effectively controls many weeds and should be considered as a tank-mix material in preemergent (if weeds are already present) and/or postemergent weed control. For best results with glyphosate, make sure the application is set up to deliver the best control possible. For details, see the article at: http://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=12006.

Finally, resistance management is as important a strategy in weed management as it is in other branches of pest management. Dr. Jim Adaskaveg's RULES for resistance management, developed for fungicide resistance management, apply to herbicide resistance management as well.

Here, we have adopted the Adaskaveg RULES to herbicide resistance management:

Rotate herbicide modes of action (see HRAC numbers on the label)

Use labeled rates. Where herbicide resistance (for example, glyphosate) is a concern use high label rates.

Limit the use of single herbicides in the tank to once, maybe twice a season. Tankmixing effective herbicides reduces the risk of resistance development.

Educate yourself about herbicides -- modes of action, weeds controlled, rates, etc. A good place to start is the UC Weed Science blog (http://ucanr.edu/blogs/UCDWeedScience/index.cfm) and the Weed Research and Information Center (http://wric.ucdavis.edu/) .

Start strong. Make your first application of the season a tankmix or other effective combination of materials. This reduces the number of weeds you will have to manage as the season progresses. If your orchard starts clean, it will be easier to keep clean through the season. When weed problems do get away and you have to spray a major weed outbreak, don't make a single material application to weeds that are larger than recommended for the product, you will likely be unhappy with the results and will also be selecting for resistance in a large population. That is one way that problems with herbicide-resistant weeds can get started.

Have any of your trees blown down? Give us a call!

Bob Johnson, UC Davis, Plant Pathology

If you grow prunes in the Sacramento Valley, you've lost some trees to windfall or suffered significant limb breakage from a large crop. The trees may have appeared healthy and shown no outward signs that they were going to break. However, if you were to examine the tree where it snapped, you would've been likely to find significant wood decay. The cause is wood decay fungi.

Wood decay fungi reduce the structural integrity of trees, leading to wind-driven collapses or "windfalls", causing Prunus tree loss and lost production in many parts of California. Wood decay is caused by a wide array of fungi that colonize and digest the heartwood, and sometimes sapwood, in living trees. This is thought to have a minimal impact on tree yields until the tree falls over; loss of multiple trees over several years leads to orchard decline and eventual removal. Through this process, these fungi are indirectly involved in killing thousands of acres of trees per year worldwide. But what can you do about it? Currently there is no good solution for managing heart rot. The etiology and biology of heart-rot diseases in orchard trees is overall poorly understood. Meaning that increased knowledge about the identity and biology of heat-rot pathogens in almond orchards is needed to improve management strategies that reduce the incidence of heart-rot and thus prevent tree loss.

This project funded by the California Dried Plum Board proposes to investigate the main fungal associates with these diseases as well as their dissemination pathways and infection patterns within the individual tree and the orchard. If you have any windfall trees or severe limb breakage we are interested in sampling them to determine which fungi are responsible. This initial survey will allow us to assess the fungal diversity associated with heart-rot diseases and will provide the baseline for completion of further objectives that may add years to the life of your orchard.

If interested, please contact: Bob Johnson, 530-302-6301, bobjohnson@ucdavis.edu

A good year for a fall spray in prunes?

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

This could be a tough year for dormant sprays. If the Sacramento Valley gets a big, wet El Nino winter, getting sprayers into orchards to apply dormant or delayed dormant sprays could be very sloppy – both for the sprayer and the spray job. Regulations to protect rivers and creeks will also limit when and what can be sprayed if the soil is saturated and more rain forecast within 48 hours of planned application. With early rice and walnut harvests, there should be time before the first big rains to put on a fall spray in prunes. If you have a history of aphid pressure, a fall spray is a proven practice for controlling the aphid population next year.

Plum aphids (leaf curl plum and mealy plum) move back into prune orchards in the fall to mate and lay eggs, which hatch around bloom. Many years of research has repeatedly shown that bottom of the label rate of certain pesticides applied from late October (pyrethroids like Asana®, Warrior®, Baythroid®, etc.) or December 1 (diazinon, etc.) through February give excellent control of aphid for the following year (no resprays). These effective control sprays require careful application with calibrated equipment, spraying every row. With a low rate of pyrethroid and a "Speed up, Ease off" spray job (see article in this newsletter), THE key pest for prunes can be controlled very cheaply. No oil is needed with these sprays, so the ability to mix zinc with pyrethroids can mean one spray delivers zinc and aphid control. On the other hand… if an orchard has no history of plum aphid damage, has no or few scale, and there is no interest in changing bloom timing; a grower might consider skipping the fall or dormant spray and only spraying IF aphids are found after bloom next year.

A fall spray, properly applied, should give excellent aphid control, but there are some parts of the dormant spray it can't replace.

- A fall spray will not control scale. Got scale? Take a dormant spur sample in early to mid-November. If the spur sample finds that you have a scale problem, a dormant (good) or delayed dormant (better) spray timing of pesticide +oil job is recommended. Be extra certain to check scale levels (do a dormant spur sample) if you have used a neonicotinoid pesticide (imidacloprid, Assail®, etc.) for in-season aphid control this past season, as neonicotinoids are hard on scale natural predators. Find videos, recording sheets and treatment recommendations on dormant spur monitoring for scale populations at: http://www.ipm.ucdavis.edu/PMG/r606900511.html.
- A fall spray won't change bloom date. If you want to change bloom timing, apply a high rate of 440 or dormant oil (for example, 4 gallons of oil per acre in 100-200 gallons of water) between late December and late January. There is no guarantee how much change in bloom timing you will get. I have seen as much as a week or as little as 2-3 days. Do not spray trees with high rates of oil if the soil and/or trees are dry. [Note: Four gallons of oil per acre, alone, gives good to decent control of low to moderate scale populations.] If you want to hedge your bets on all fronts ahead of winter, consider a fall spray for aphid control, and then, once winter arrives, an oil spray to move bloom and keep the lid on scale. If it's too wet get into the orchards in winter without a lot of hassle and mess, at least you have aphid under control.
- A fall spray won't control peach twig borer (PTB). This pest can be controlled with certain scale materials (diazinon, etc.) but not with the insect growth regulators like Sieze™ or Centaur®. Even a high rate of Asana®, Warrior®, etc. in the fall won't give good PTB control. Bloom sprays with B.t. (Dipel®, etc.) give good PTB control, as do "May" sprays with a range of materials.

There are many options for aphid control in prunes. Talk about them with your PCA to see what has the best fit for your operation. While you're at it, keep an eye on the long range weather forecast.

Gear Up, Throttle Down™ = pest control and cost/time savings

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

Fall, dormant or delayed dormant pesticide sprays in prune orchards are, when warranted, crucial to sustainable prune production and successful aphid, peach twig borer and/or San Jose scale control. These sprays can also be expensive, time consuming, and hard to keep in the orchard due to the increased risk of spray drift before bud break. Wouldn't it be great if there was a research-tested spray strategy that reduced spraying cost per acre, controlled pests AND reduced drift? There is! It goes by several names – Gear Up, Throttle Down™, Shift Up, Ease Off, etc. – but the basic principle is the same.

Here's how the strategy works. Between November and March 1st, shift to a higher gear and back off the engine throttle compared to regular in-season sprays. This means faster ground speed and less sprayer fan air production, which means faster work rate and less diesel use per acre. Larger nozzle sizes are needed to deliver the same spray volume (for example, 100 gallons/acre) if you use the same number of nozzles at a higher ground speed. Larger nozzles = bigger spray droplets that, pushed by less air from the sprayer fan, reduces spray drift.

Sounds like a lot of work? Not really. Flip-over nozzles allow you to easily switch between this preseason (fall/dormant) spray program and in-season sprays when slower drive speed and more sprayer fan air is needed for good coverage after the canopy fills in. Just adjust tractor gearing and engine RPMs (tractor or sprayer) and flip over the nozzles to shift from one system to the other. Two separate calibrations are needed to match nozzle size/flow rate with ground speed, but once they are done and documented, the switch is easy. You may need to increase sprayer pressure to maintain droplet patterns once the engine RPMs are reduced in the Gear Up, Throttle Down™ system. This adjustment is easy with diaphragm pump sprayers and/or sprayers with dual-pulley option on centrifugal pumps (for example, Rears sprayers).

What can you expect? In two years of work with fall sprays, spray time in the orchard was reduced 40% and diesel use reduced 50% when ground speed was increased from 2.5 to 4.0 MPH and tractor RPMs reduced 20% to a 420 RPM PTO speed. Spray pressure was maintained at 150 PSI using a diaphragm pump. Aphid control was excellent in two years of field trials in high aphid pressure areas. Spray drift was reduced by two thirds at 25-50' from the outside tree row with Gear Up, Throttle Down™ versus standard practices.

Here are some suggestions for anyone considering using Gear Up, Throttle Down™ spraying:

Test it yourself. Try a single tank or field the first year. Check for differences between this approach and current standard (2 MPH, 540 PTO speed). Keep your ground speeds below 4 MPH and PTO speeds at 80% or more of 540 RPM (full power).

Spray every row.

If you stretch the idea into bloom, be careful. All the research has been done during leaf fall (November). Bloom is a crucial time for good coverage. Try a tank or a row and see how your brown rot and scab control looks during the season. If it works, Gear Up, Throttle Down™ at bloom could help get fungicides on faster with rain in the forecast.

If you have any questions on the Gear Up, Throttle Down™ practice, please give me a call (530) 218-2359 or e-mail at fjniederholzer@ucanr.edu.

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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