



Pomology Notes



September Newsletter

ALMOND AND PRUNE ORCHARD PRACTICES TO CONSIDER IN SEPTEMBER

ALMONDS

- ❑ **HARVEST:** Rain at harvest? I hope not, but see info in this newsletter.
- ❑ **IRRIGATION:** Avoid water stress in almonds through mid-October (if no rain on the horizon and/or your harvest schedule and irrigation system allows). After harvest, trees use much less water than during the summer, so irrigation monitoring ([pressure bomb](#), [Watermark® sensors](#), [tensiometers](#), shovel, auger, etc.) is needed to know if there is a need to irrigate. Please call me (Franz) if you have any questions about irrigation monitoring. [Note: Reflowering may occur in trees that lost leaves from water stress or mites around harvest. Limiting irrigation after mid-October may reduce premature flowering.]
- ❑ **NUTRITION:** Plan fall fertilizer program. Use leaf and hull nutrient analysis results from this and previous years to help. See article in this newsletter.
- ❑ **DORMANT SPRAY OPTIONS:** Monitor your orchard in late fall or early winter to find out if you need a dormant/delayed dormant spray to control scale. Consider whether you need a dormant spray for [peach twig borer](#) (PTB) control. At best, this worm is only partially controlled by a dormant spray. (The best protection against PTB damage, when needed, is a well timed hull split spray.) Dormant sprays do not help control [navel orange worm](#) or [spider mites](#).
- ❑ **ORCHARD CLEAN-UP:**
 - Clean up “barked” trees damaged by shaker. Trunk/limb damage from harvester can result in *Ceratocystis* canker infection and possible tree death. Remove damaged bark with hammer and chisel, draw knife, or hatchet. Paint injury with dilute interior latex paint to reduce chance of sunburn. Spraying the trunk with Lorsban ® 4E or 75WG prior to painting can help control borers attracted to the wound, and reduce the potential for infection with *Ceratocystis* canker. (Borers can spread the disease.) The paint helps to preserve the insecticide and give protection over a longer period of time. If needed, contact Franz for details on cleaning up “barked” trees.
 - Prepare to replant where needed. Pull weak trees and prep for replanting. Mark dying or weak trees for removal. Backhoe out old trees, making sure to get as much of the roots out of the hole as possible.

- Fumigating replant orchards (almonds following almonds) has shown to benefit newly planted orchard growth (see article in this newsletter). Spot treatment of replant holes in established orchard may improve replant growth, although the specific research to demonstrate this has not been done.
- Calibrate your orchard sprayer for next year. Call Franz (822-7515 or 218-2359) or email at fjnieiderholzer@ucdavis.edu for free on-farm calibration demonstration.

PRUNES

- **IRRIGATION:** Prune trees need some water after harvest. Avoid extreme water stress between harvest and leaf drop. Trees not irrigated between preharvest cut off and winter rains can become very dry and *Cytospora* canker spreads faster in dry trees than trees getting some irrigation. In addition, very dry prune trees can produce small fruit buds.

Don't over irrigate. Prune trees use less water later in the season and will tolerate moderate water stress after harvest. **NOTE:** The light crop of 2004 left many prune orchards with almost a full canopy of leaves. This could lead to blow-over problems if orchard soil is wet and a sudden storm hits. The chances of a storm get greater, and the need for irrigation water gets smaller the farther into fall we get.

- **ORCHARD FLOOR MANAGEMENT:** If you use flood and berm irrigation, don't disc entire orchard after the last irrigation. Bare soil absorbs water less readily than grass/weedy/cover cropped ground. (The soil seals off faster without ground cover to slow the impact of rain drops and provide root channels for rain water infiltration.) This means more runoff – and more potential for pesticide runoff following dormant spray – from disced orchards than undisced ground. Many growers just knock down irrigation berms (no cross discing) after their last irrigation. This saves money (tractor, diesel, labor, etc.), plus it will allow weed growth to get an early start and so reduce runoff.
- **COVERCROP MANAGEMENT:** Plant cover crop now if this practice is part of your orchard management program. Cover crops in prune orchards will be discussed in the fall field meeting (see agenda later in this newsletter).
- **FERTILITY:** Plan fall fertilizer program. Use leaf and hull nutrient analysis results from this and previous years to help. See article in this newsletter.
- **PRUNING:** Pruning is one of the most important and expensive activities in prune orchard management. Eliminating pruning is a recipe for lots of small prunes, unless the orchard is carefully thinned. Alternate year pruning and/or pruning from the ground (no ladders) are two options to consider when maximizing the return from your pruning dollar. There will be a discussion of pruning alternatives at the Yuba/Sutter prune field day in September. Agenda included in this newsletter.
- **DORMANT SPRAY OPTIONS:** Monitor your orchard in late fall or early winter to find out if you need a dormant/delayed dormant spray. Call me (Franz at 822-7515) or look on the web at www.ipm.ucdavis.edu and click on "agriculture and floriculture" and then "prunes" to get to details of how to take a dormant spur sample. Plan on attending the fall field meeting on September 23 to here about new alternatives for prune aphid control.

□ CLEAN UP ORCHARDS:

- Cut out *Cytospora* cankers and get rid of infected wood (see article in this newsletter). Old wood piles are sources of disease that may infect healthy trees in the future.
- Clean up “barked” trees damaged by shaker. Trunk/limb damage from harvester can result in *Ceratocystis* canker infection and possible tree death. Remove damaged bark with hammer and chisel, draw knife, or hatchet. Paint injury with dilute interior latex paint to reduce chance of sunburn. No fungicides or insecticides are labeled for use on or around prune trunks. A 1969 publication from UC suggests using anhydrous lanolin or grafting wax melted to paint consistency to seal the wound.
- Mark dying or weak trees for removal. Backhoe out old trees, making sure to get as much of the roots out of the hole as possible. Replant with Marianna 2624 where prune brown line (see information below) and/or oak root fungus are dangers. Avoid Marianna, if possible, where bacterial canker is major concern.
- Fumigating replant orchards (almonds or prunes following almonds) can benefit newly planted orchard growth (see article in this newsletter). Spot treatment of replant holes in established orchard may improve replant growth, although the specific research to demonstrate this has not been done.
- Calibrate your orchard sprayer for next year. Call Franz (822-7515 or 218-235) for free on-farm calibration demonstration.

Upcoming meetings

Date	Meeting	Location
October 19	Sutter Buttes CAPCA Orchard crops meeting	Yuba City, CA
September 23	Sutter/Yuba Fall prune field meeting	Yuba City, CA
December 1-2	Almond Board of California annual conference	Modesto, CA
December 7	UCCE/Sutter County Ag Department grower meeting	Yuba City, CA
December 9	UCCE/Sutter County Ag Department grower meeting	Yuba City, CA

DISEASE PROBLEMS IN PRUNES

CYTOSPORA CANKER: *Cytospora* is a fungal infection that can infect, and potentially kill major branches of prune trees -- particularly trees weakened by potassium deficiency, water stress, ring nematodes, shot hole borers, and/or bacterial canker. Infection occurs through tissue damaged by sunburn (after defoliation due to potassium deficiency, mites, rust, etc.), insects, bacterial canker, or rodents. Damage often shows up in mid-to-late summer as darkened, depressed canker, with dark gumming often found at the canker edges. This disease

spreads from tree to tree and orchard to orchard in rain, wind, and possibly wood-boring insects. In stressed trees, *Cytospora* canker can remain active in the tree for several years, often killing more wood with each year. Trees planted on shallow soil and/or clay soils are particularly sensitive to *Cytospora*.

Managing *Cytospora* canker in prunes:

- ❑ Prune out old cankers in the fall, making sure to get all the canker. Pictures of “good” and “bad” cuts to remove *Cytospora* canker are available from Franz or on the web (see below).
- ❑ Avoid trees stress by maintaining adequate orchard irrigation, good potassium levels, and controlling nematodes.
- ❑ White wash trunks and exposed crotches in the spring.
- ❑ Remove/burn old dead trees. Piles of dead prune trees are sources of *Cytospora* spores that may infect healthy trees.
- ❑ **Fungicide sprays provide no *Cytospora* control.**

This newsletter is available with color pictures at <http://cesutter.ucdavis.edu>



Cytospora canker affected tree in a Yuba County prune orchard.

This newsletter is available with color pictures at <http://cesutter.ucdavis.edu>



The presence of pycnidia (white pimple-like structures on dead limb) confirms that the scaffold damage is due to *Cytospora* canker.

PRUNE BROWN LINE: This condition is caused by tomato ring spot virus and transmitted through soil by the dagger nematode (*Xiphinema americanum*). Prune brown line affects prune scions propagated on the virus susceptible rootstocks Myrobalan, Myro 29C and peach. The French prune scion (*Prunus domestica*) and plum rootstock, Marianna 2624, are resistant to the virus. On infected susceptible rootstocks, tree decline and death is caused by formation of necrotic phloem (bark) tissue at the scion and rootstock junction and cause a girdling effect.

Depending upon tree age, infected trees may collapse and die suddenly or decline slowly over several years. Initial foliar symptoms resemble mineral deficiencies consisting of leaves with interveinal chlorosis. For positive diagnosis for prune brown line disease, lift the bark at the scion-rootstock junction and look for a necrotic line of tissues outlining the graft union. Use a one to two-inch chisel and hammer to remove the bark patch. On affected trees, the bark is thicker than normal. (This article was edited by [Dr. Jerry Uyemoto](#), USDA virology researcher based at UC Davis.)

This newsletter is available with color pictures at <http://cesutter.ucdavis.edu>



Trees dying from prune brown line (foreground) and healthy appearing trees in a mature Sutter County prune orchard on M29C rootstock.

This newsletter is available with color pictures at <http://cesutter.ucdavis.edu>



Dark brown layer at the bud union characterizes prune brown line.

FALL FERTILIZER PROGRAMS IN ALMONDS AND PRUNES

*Leaf critical nutrient values for almonds and prunes are available in my June/July, 2004 newsletter at:
http://ucce.ucdavis.edu/counties/cesutter/newsletterfiles/Pomology_Notes5164.pdf*

POTASSIUM: Why is potassium a key nutrient in almond and prune orchards?

- More potassium is used by a crop than any other nutrient, including nitrogen.
- A good maintenance program is a key to good, consistent production in prunes and almonds. Don't fall behind with potassium levels in your orchard.

- In prunes, no other common, chronic condition can damage an orchard as much as potassium deficiency. Leaf loss from potassium deficiency can lead to sunburn and *Cytospora* infection that can kill branches and/or scaffolds. This means less fruiting wood – and less crop -- for several years to come.
- In almonds, also, don't fall behind in your potassium fertility. Fewer flowers are developed this year for next years crop in a potassium deficient almond tree compared to a tree with sufficient potassium. Once summer leaf analysis results show an orchard is potassium deficient, it is too late to avoid some production loss next year.

For growers with flood irrigation or solid set sprinklers, fall is the time to apply potassium fertilizer. Potassium deficient orchards (based on summer leaf analysis results) require up to 2000 pounds of potassium sulfate fertilizer/acre to recover sufficient potassium levels, while maintenance rates run up to 500 pounds/acre of potassium sulfate or 300-400 pounds/acre of potassium chloride. Wait until orchards are dormant before applying potassium chloride (muriate of potash), as the chloride can burn the tree if the material gets to the roots before the leaves drop. If potassium chloride is used as a fertilizer, always include chloride in the leaf analysis request to make sure that toxic levels are absorbed into the trees.

Injecting potassium into drip or microjet irrigation water during the summer puts potassium right in the active root zone and so is readily available to the tree. Research at the Nickels Soils Lab in Arbuckle by [Dr. Rollie Meyers](#) and [John Edstrom](#), UCCE Farm Advisor, Colusa County, measured similar nut yields with equal amounts of surface banded or irrigation injected potassium for either microjet, double hose-line, or single hose-line drip systems. However, when same rate of potassium (124# K₂O/acre) was banded on the soil surface in the fall, much higher leaf potassium levels were measured in the microjet or double hose-line systems than in the single hose-line irrigation systems the following year. Rollie and John feel that this difference is due to the fact that, during the summer, the active root zone is under the drip emitters right in the tree row, but the potassium was banded on either side of the tree about four feet out from the trunk. Some potassium was absorbed early in the spring when winter rains wet the entire profile, but in the summer the active root zone is under the drip emitters, far from the potassium fertilizer.

ZINC: If leaf analysis results show a need, fall sprays of zinc sulfate can correct deficiency symptoms. UC recommends dilute applications at the start of natural leaf drop of 10# zinc sulfate/100 gallons of water. Rapid leaf drop can be a side benefit of using zinc sulfate in the fall, although I have heard several growers complain that “zincing” leaves hasn't defoliated some orchards in the last couple of falls. High rates of zinc sulfate (20#/100 gallons of water or higher) are not compatible with boron materials in the spray tank – about 75% the boron comes out of solution. This probably doesn't affect the results of spraying the zinc, but it probably means that the boron application is wasted. Spring applications of neutral zinc or chelated zinc materials are also effective in treating zinc deficiency in almonds and prunes, and can, depending on the material, be tank-mixed with other applications (leaf feeds, fungicides, etc.).

BORON: Boron is an essential micronutrient (plants can't function without it) that can also be toxic to plants when too much is available. So, careful nutrient monitoring (tissue analysis) is essential if when considering boron fertilization.

ALMONDS: Hull samples are the best way to determine almond tree boron status. Research by [Dr. Patrick Brown](#), UC Davis Pomology Department, and several UC Farm Advisors ([Bill Krueger](#), Glenn County and [Mark Freeman](#), Fresno County), have measured increases in almond nut set in some years following a foliar boron spray (2# Solubor/100 gallons of water at 100 gpa) applied between harvest and pink bud. In work by Dr. Rollie Meyer (UCCE Specialist) and John Edstrom (UCCE Farm Advisor,

Colusa County), a fall boron spray produced the most consistent improvement in almond yields in a three year study in the late 1990's at the Nickels Soils Lab in Arbuckle.

PRUNES: Research to date has not shown benefit (i.e. improved fruit set) from boron fertilization of French prune trees in California, except when leaf boron levels drop below the deficiency threshold (25 ppm).

NITROGEN: Unless leaf analysis indicates nitrogen deficiency, fall nitrogen fertilization in prunes is not necessary. Here are some points to consider when contemplating adding nitrogen to orchards between harvest and bloom.

PRUNES: I know of no research that measures improved crop yield following fall nitrogen application in prunes. Prunes readily and efficiently absorb nitrogen from late March through harvest. However, some growers I know add a “shot” of nitrogen to their orchards following harvest. This “tops off the tank” and allows some time in the spring to evaluate the crop and decide how much, if any, more nitrogen is needed. This is an interesting strategy, especially in years like 2001 and 2004, where weather conditions in the spring virtually eliminated the crop – and any need for any more nitrogen. If you are considering apply fall nitrogen, please consider these research results:

- Trees, even nitrogen deficient trees, can't use much nitrogen in the fall. So, any fall nitrogen fertilizer should be used at a very low rate – probably an absolute maximum of 50 pounds N per acre in flood irrigated blocks and less in blocks where fertilizer is injected via drip or microjet irrigation.
- Nitrogen absorption decreases dramatically when trees defoliate. Nitrogen fertilizer applied between leaf fall and petal fall is a waste of money.
- Any excess nitrogen (fertilizer or soil nitrogen) in the soil at leaf fall will be leached out of the root zone as nitrate with winter rains. This nitrogen is no longer available to trees, and can contaminate ground water.

ALMONDS: There is very little (no?) evidence of any economic value to postharvest soil nitrogen fertilization in almonds. Late fall applications of nitrogen (October) do not result in any significant amount of fertilizer nitrogen in the buds at bloom – and that fertilizer investment is most probably lost out the bottom of the root zone with winter rains. On the other hand, nitrogen applied to almonds with the last irrigation prior to harvest “makes it” into the buds by bloom. Fall foliar urea sprays can increase almond leaf nitrogen levels, but I know of no data documenting increases in nut set from that practice.

PREPLANT FUMIGATION CAN IMPROVE ALMOND AND PRUNE TREE GROWTH

Replant disease (RD) is a condition that can limit growth of newly planted stone fruit or nut trees that follow the removal of a closely related crop. RD can dramatically reduce the performance of a new orchard, especially in the first year of growth. The specific cause(s) of RD are not known, but orchard damage from RD can occur without the presence of plant parasitic nematodes, oak root fungus, *Phytophthora*, or unfavorable chemical/physical soil characteristics.

Recent research by [Dr. Greg Browne](#), Research Plant Pathologist with USDA-ARS at UC Davis, and [Joe Connell](#), UC Farm Advisor in Butte County at several almond sites affected by severe RD, has shown marked improvement in first-leaf almond tree growth on Lovell, Nemagard, or Marianna 2624 rootstock following pre-plant fumigation. When ‘French’ prune on Marianna 2624 trees were planted at similar sites in an earlier part of the study, strong fumigation benefits were also measured. All of the trials were conducted in

commercial orchards previously devoted to old almond plantings on Lovell peach rootstock. The trials were located where more than 80% of the almond trees replanted by the grower had failed in the year before pre-plant fumigants were tested.

Browne and Connell's work showed that when used as tree-site treatments, several fumigants performed as well or better than methyl bromide (see Table 2). However, in a separate trial that involved only broadcast shank treatments (Telone II, MB, or chloropicrin; each approximately 350 lb per acre), only pre-plant chloropicrin treatment prevented RD (data not shown). The investigators concluded that concentrating the treatment at the tree site may improve efficacy of some fumigants for control of RD. For tree site treatments, the investigators used the following procedures: 1) previous trees were removed and hole sites were augered (2' diameter, 2' deep) and refilled in October, 2) fumigation was applied in October using one probe injection at about 20" deep in the soil, 'Carmel' almond trees were planted in February/March. Browne and Connell caution that there is risk of lethal phytotoxicity if fumigation treatments are not completed by October or if early winter plantings are anticipated. Check with your PCA and County Agricultural Commissioner for changes in fumigant labeling and allowable application conditions.

Table 2. Summary, effects of pre-plant tree-site fumigation treatments on first-year establishment of Carmel almond on Marianna 2624 rootstock at Butte Co. sites affected by *Prunus* replant disease

Fumigant ^a	Rate of fumigant per tree site (lb)	Percentage of acceptable trees (9/30/03) ^b	
		Orchard 1	Orchard 2
None	0	0	0
MB	1.0	83	67
IM	0.5	--	83
IM	1.0	--	92
IM:Pic (50:50)	0.5	92	100
IM:Pic (50:50)	1.0	92	100
Pic	0.5	100	100
Pic	1.0	100	92
Telone II	0.5	75	100
Telone II	1.0	92	100
Telone C35	0.5	58	100
Telone C35	1.0	92	92

^aMB:Pic=methyl bromide:chloropicrin mixture (75:25, w:w); Pic=chloropicrin; MB=98% methyl bromide; IM=iodomethane; IM:Pic=iodomethane:chloropicrin mixture (50:50).

^bPercentage of trees in disease rating categories 0 and 1 (see Figs. 1 and 3), which as of 30 September 2003 were approximately 5 ft or greater in height and produced healthy shoot growth. Orchard 1 and Orchard 2 trees were planted 28 February and 4 March 2003, respectively. "--" indicates treatments that were not imposed

The work by Dr. Browne and coworkers may be of value in planning individual tree or orchard replant work in your existing orchard in coordination with your PCA. Telone II, Telone C35, and Chloropicrin are DANGER label materials that must be used with extreme caution. **Always read and follow the label.**

PROTECTING THE ALMOND HARVEST FROM RAIN

Orchard conditions	Prescribed action when 5-day forecast predicts			
	Dry, windy, or normal weather	High Humidity	Showers	Rain
No rain has occurred, and almonds are				
On tree	Knock	Knock	Knock	Wait
Knocked	Harvest normally	Harvest normally	Open*	Open
Opened and raked	Harvest normally	Harvest normally	When dry, windrow	When dry, windrow
Windrowed	Stockpile or pick up	Stockpile or pick up	Stockpile or pick up	Stockpile or pick up
After 0-¼ in. rain, almonds are				
On tree	Knock	Knock	Wait	Wait
Knocked	Harvest normally	When dry, open	When dry, open	Wait
Opened and raked	Harvest normally	When dry, windrow	When dry, windrow	1.Wait or windrow or 2. Pick up and machine-dry
Windrowed	When dry, pick up	When dry, pick up	1. When dry, pick up or 2. Pick up and machine-dry	1. when dry, pick up or 2. Pick up and machine-dry
After ¼ - ½ in. rain, almonds are				
On tree	Knock	Wait	Wait	Wait
Knocked	Harvest normally	Harvest normally, windrow	Harvest normally	Open
Open and raked	Harvest normally	Harvest normally, windrow	Harvest normally	1. Wait or windrow or 2. Pick up and machine-dry
Windrowed	Drop-Chute [†]	1. Drop-chute or 2. Pick up and machine-dry	1. Drop-chute or 2. Pick up and machine-dry	1. Wait and drop-chute or 2. Pick up and machine-dry
After more than ½ in. rain, almonds are				
On tree	Knock	Wait	Wait	Wait
Knocked	Open	Harvest normally	Harvest normally	Open
Opened and raked	Harvest normally	1. Pick up and move nuts to dry area or 2. Machine-dry	1. Pick up and move nuts to dry area or 2. Machine-dry	1. Pick up and move nuts to dry area or 2. Machine-dry
Windrowed	Drop-chute	1. Pick up and move nuts to dry area or 2. Machine-dry	1. Pick up and move nuts to dry area or 2. Machine-dry	1. Pick up and move nuts to dry area or 2. Machine-dry

Source: This table was originally developed by Larry Reinhart, former manager, North State Hulling Cooperative. This table appears on pg. 263 of UC ANR publication #3364, Almond Production Manual.

*To open, in this context, is to sweep almonds off berms but not gather them into windrows.

[†] To drop-chute is to run nuts through the pickup machine and drop them from an open cart. This process removes leaves and promotes quick drying by laying out a wide swath of almonds.

UCCE SUTTER/YUBA FALL PRUNE FIELD MEETING

SEPTEMBER 23, 2004
WILBUR RANCH, LIVE OAK BLVD AND REDNALL ROAD, YUBA CITY.
8:30 - 11:30 A.M.

Agenda:



- 8:30 a.m. Coffee and sign-ins
- 9:00 a.m. Alternative prune aphid control options.
Franz Niederholzer, UCCE Sutter & Yuba Counties
- 9:30 a.m. Getting rid of trouble: Cutting out *Cytospora* cankers
Franz Niederholzer, UCCE Sutter & Yuba Counties
- 10:00 a.m. Ideas for efficient pruning
Steve Southwick, UCCE, Davis
- 10:30 a.m. Planting cover crops in prunes
Dan Bozzo, Grower
- 11:00 a.m. Getting ready for next year's crop
Group discussion

1 hour of CE credits approved for private applicators and PCA

Funding for this project has been provided by the CDFA's Buy California Initiative and the USDA.