COOPERATIVE EXTENSION UNIVERSITY OF CALIFORNIA

TREE AND VINE NOTES

May 2009

Central San Joaquin Valley Summer Almond Meeting
WEDNESDAY, JUNE 17TH, 2009

Merced UCCE Classroom
2145 Wardrobe Avenue, Merced, CA 95341; 209-385-7403
8:00 AM-12:00 PM

8:00 a.m. **Introduction, PCA and continuing education credits sign-up**
David Doll, Farm Advisor, UCCE Merced County

8:30 a.m. **Summer insect pest management in almond orchards**
Walter Bentley, Area wide UCIPM advisor, *Kearney Ag Center*

9:00 a.m. **Identifying and preventing hull rot of almond.**
Brent Holtz, PhD, Farm Advisor, UCCE Madera County

9:30 a.m. **Managing summer water stress in a drought year.**
Ken Shackel, PhD, Extension Specialist, UC Davis

10:00 a.m. **Break**

10:30 p.m. **Using leaf nutrient values to determine the following year's nitrogen budget.**
Patrick Brown, Professor, Department of Plant Sciences, UC Davis

11:00 p.m. **Orchard replanting: Should I fumigate?**
David Doll, Farm Advisor, UCCE Merced County

11:30 p.m. **Design and development of a successful orchard.**
Roger Duncan, Farm Advisor, UCCE Stanislaus County

12:00 p.m. **Conclusion and Thank You.**

3.0 hours of PCA, CCA and Private Applicators Credit have been requested.

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Cytospora Management

Franz Niederholzer, UC Cooperative Extension, Sutter/Yuba Counties

Branch and scaffold dieback is common in many dried plum blocks. Lab analysis by UC Davis plant pathologists found *Cytospora* fungus in all samples delivered to them. While all the dieback and tree death may not have been caused by *Cytospora*, in light of the lab results, a brief review of this damaging disease is in order.

- *Cytospora* canker is a disease caused by the fungus *Cytospora leucostoma*. It is a weak pathogen that shows maximum growth in hot temperatures around 90^{o}F, and is particularly active when prune tree activity is least (late summer/early fall). [Fall, 2006 was warm and dry, and trees were particularly stressed following a large crop. This may explain the large amount of dieback seen this spring.] *Cytospora* spores are spread from diseased wood by rain and wind to bark damaged by sunburn, old bacterial cankers, boring insects, etc.
- Symptoms: Look for a dark, sunken canker (Figure 1) on the bark of limbs showing dieback and/or sudden wilting. Pychnidia, black or white pimple-like structures on the damaged wood, (Figure 2) distinguish *Cytospora* canker from bacterial canker or other diseases. Some dark gumming can occur at the edges of the canker. When pychnidia can't be found, distinct zonate canker margins, looking a lot like bath-tub rings, help distinguish *Cytospora* canker from bacterial canker, which has non-distinct canker edges.
- *Cytospora* cankers spread and grow in the bark of weak trees, but do not spread in healthy trees. Water stress, potassium deficiency, and/or high ring nematode pressure increases tree susceptibility to the spread of infection (canker development). Trees planted on shallow and/or heavy textured (clay) soils are generally more likely to suffer economic damage from *Cytospora*.
- There is no known chemical control for *Cytospora*. Manage infection and/or spread of the disease by 1) avoiding tree stress and 2) removing and destroying cankered wood from the orchard. Avoid stress factors that specifically predispose prune trees to the spread of the disease such as potassium deficiency, sunburn, high ring nematode (*Criconemella xenoplax)* populations, trunk borers, and water stress. Prune to minimize sunburn potential, and paint exposed trunks and scaffold crotches with white interior latex paint to further protect them from sunburn. Maintain adequate orchard water status, especially after harvest. Avoid defoliation (sunburn potential) from spider mite or prune rust infections. Pruning cuts and leaf scars are not important infection sites.
- When infection does occur, remove (cut out) cankers and destroy dead or damaged wood. To ensure that all the disease is removed, cut into healthy wood several inches to one foot below any canker symptoms. Check the cut surface of damaged limbs to ensure that all the disease has been removed. In stressed orchards, where infected wood (cankers) are allowed to remain on the tree (Figure 3), canker growth continues and scaffold death can occur. Incomplete canker removal wastes time and money and doesn't control the disease. Remove from the orchard and destroy any dead wood containing *Cytospora* canker. Trees or limbs killed by *Cytospora* canker and left in the orchard or adjacent to living trees provide spores for further infection.

Summary:

- *Cytospora* canker can severely damage orchards, killing branches, scaffolds and, sometimes, trees. This bark disease infects trees weakened by sunburn, water stress, ring nematodes, and/or bacterial canker. This disease is most active in the warm summer months.
- There is no chemical control. To avoid tree damage, keep trees free of the stresses listed above. When found in the orchard, cut out and burn *Cytospora* damaged wood. Make sure cuts are made below all cankered wood. Cankers left in the tree will continue to grow, and may kill scaffolds or the entire tree.

Figure 1. **Cytospora cankers are dark and depressed areas on the branch where the bark has been killed. In the first photo, arrow shows edge of canker revealed by knife cut in the second photo.**

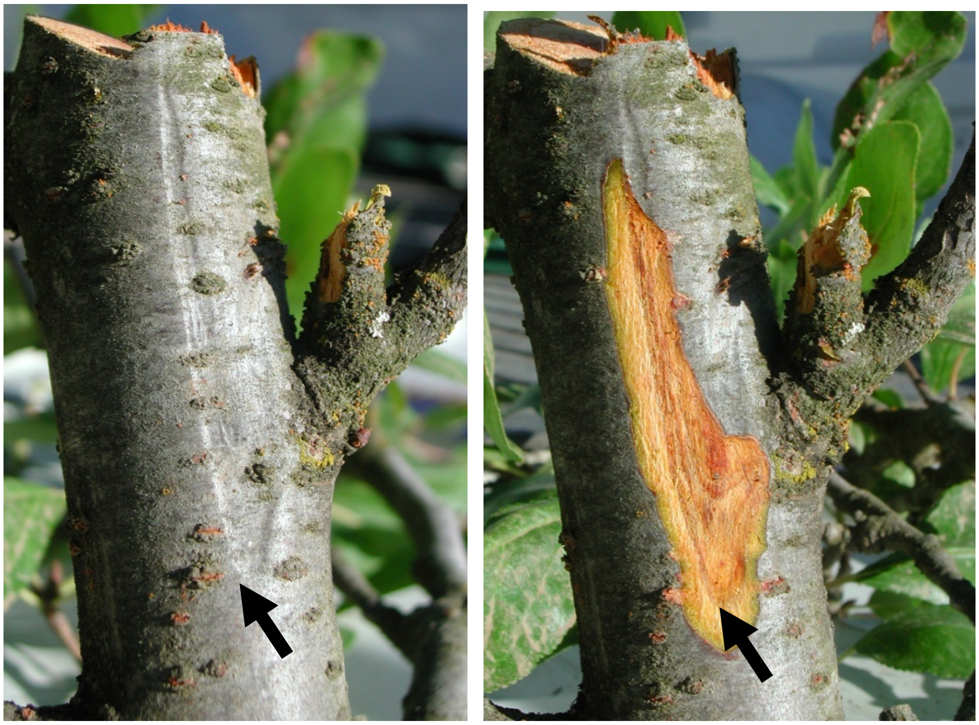
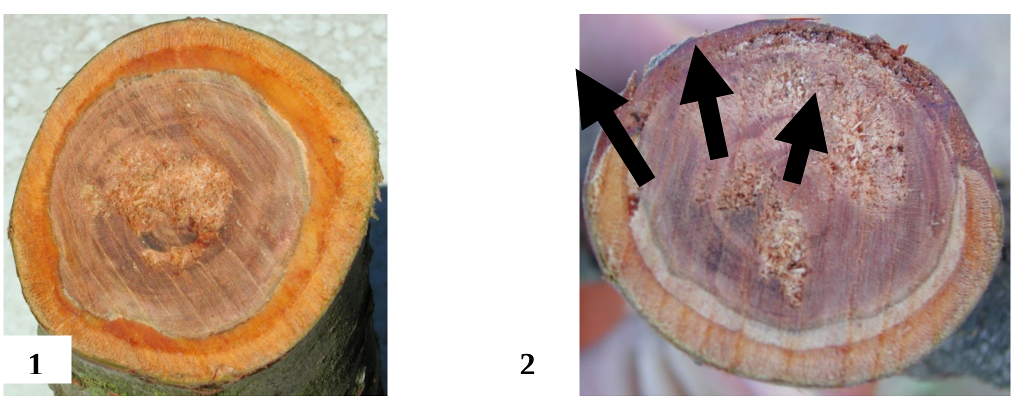


Figure 2. **Pychnidia are initially black, but turn white.**

Figure 3. Good cut (1) showing only clean bark. Bad cut (2), showing diseased bark (shown by arrows) left on the tree.



Precise and Accurate Herbicide Applications - Maximizing Weed Control and Minimizing Crop Injury

Brad Hanson, USDA-ARS, Parlier, CA

If you've ever taken target practice, you probably know that accuracy and precision are not necessarily the same things – a rifle that always shoots low and to the left of the bull's-eye is precise but is not accurate. The same idea holds true for herbicide applications. Because the spring and summer weed control season is upon us, it's time to think about ensuring that spray rigs and operators are set up to make precise and accurate applications. We want to make sure that we are applying pesticides on target and at the right rate (accuracy) and that our application in every pass or field is the same as the last (precision) in order to get good weed control and minimize off-target movement.

The most common causes of poor herbicide performance usually come down to 1) wrong herbicide(s) for the weed spectrum in the field, 2) wrong application timing with respect to growth stage or climactic conditions, and 3) poor application techniques. Proper field scouting and sound pest control advising are the first steps in taking care of the first two issues. Accuracy and precision are most directly affected by the spray rig and the operator.

Herbicide application equipment should be calibrated on a regular basis; ideally once per year or more depending on the number of acres treated. All nozzles on the spray boom should be checked to make sure that they are putting out the same volume in a given time period – any high or low output nozzles can result in poor weed control, wasted herbicide, or crop injury. All nozzles should then be checked to make sure they have a uniform spray pattern because any streams or dead spots in the pattern will also contribute to areas of under- or over-application. Check the sprayer pressure and ground speed of the rig in order to verify that the correct application volume (gal/A) is used when calculating how much herbicide to add to the spray tank. Remember that increasing the spray pressure can contribute to smaller spray droplet size and increase chances for off-target drift. If higher spray volumes are needed, it may be better to adjust ground speed or nozzle size instead of increasing pressure above recommendations. Nozzle arrangement and boom height should also be considered to make sure that each nozzle is applying herbicide to the correct amount of area – nozzles too far apart or low boom height can result in skips between nozzles whereas too high can decrease the effective herbicide rate by treating a larger area than intended.

Once the spray rig is optimized for accurate and precise application, it's time to address operator training. Only the sprayer operator or field supervisor can know the conditions in a field at the exact time the application occurs and it is up to them to recognize when conditions may not be right for accurate and precise applications. For example, high winds or gusty breezes could result in drift into the crop canopy or onto neighboring crops or areas of poor weed control. Conversely, some times of the year may be "too still" and an inversion layer may contribute to inaccurate applications, especially of the smallest spray droplets. The operator should routinely monitor spray patterns during the application to make sure that nozzles have not become plugged or out of alignment. If the spray rig ground speed is too fast for soil conditions (ie rough ground), it may be necessary for the operator to reduce speed to minimize bouncing of the nozzles which can lead to poor coverage and excessive drift -- but this will require an adjustment in the sprayer calibration.

Read and follow the directions on the herbicide label – the directions in this legal document are intended to provide weed control efficacy, crop safety, worker and bystander safety, and minimize effects on the environment. Pay attention to weed growth stage and stress condition – weed that are too large or under drought stress will be much more difficult to control that small, actively growing weeds. Think about pre-harvest intervals because applications too close to harvest could potentially result in illegal pesticide residues which may make the commodity non-saleable.

Finally, a take a little time at the beginning of the season to make sure that your equipment is set up and the operators are properly trained to make accurate and precise herbicide applications. The end result will be better weed control, reduced crop injury, and less wasted herbicides; all of which result in more bang for your weed control dollar!

Non-Infectious Bud Failure Effects and Management

Joe Connell, UC Farm Advisor, Butte County

This year is shaping up to be a bad one for the expression of Non-infectious bud failure (BF) symptoms. Anyone who has followed BF for awhile recognizes that some years are much worse than others.

It's well known that non-infectious bud failure is a genetic disorder that occurs in many almond varieties in California. Nonpareil or any variety with Nonpareil parentage in its genetic background can be affected by the disorder. The problem is usually more severe in warmer areas of the state and in a spring following a hot June the previous year.

BF does not affect the flower buds. Flowers form and bloom normally although the bloom time is usually delayed by four to seven days. It is the vegetative shoot buds that actually fail.

Yield losses occur because fruit wood development is reduced and possibly because more limited leaf surface reduces carbohydrate production. On individual shoots affected by BF the basal or terminal buds are more likely to survive since they grow during cooler times of the season. Pruning won't eliminate the problem. Re-growth that occurs following pruning has at least the same potential to develop BF that the tree had prior to pruning.

Various sources of a variety have differences in BF potential. The key element of control is the selection of single-tree sources whose low BF potential is determined by growing progeny trees under orchard conditions in a high temperature area. If BF is initially expressed in trees early in their training stage (up to 4 years), expression is severe because a large part of the tree is affected. If symptoms are initiated later, lesser expression results and affected parts are confined to smaller areas in the top or periphery of the tree. This is the basis of recommending BF trees be removed if symptoms develop during the early orchard development period.

Options. There are three options for dealing with a BF problem in your orchard. First, you can simply continue to maintain the BF trees (this is usually the best option in older trees). Second, it's possible to top work the affected trees by budding or grafting using wood with a lower BF potential. This takes considerable attention to detail but may be a good choice if the trees are noticed in the second to fifth leaf. Finally, replacing the tree by replanting is another option. This is reasonable between the second and fifth leaf (the sooner the better). Once trees are mature, replacing the tree should be done only if there is sufficient time left in the orchard's life to recoup the cost of the new tree and the yield lost from the BF tree while the replacement tree is coming into bearing.

In a study done in the early 1970's by Gerdts,et.al., Nonpareil yields from normal trees were compared to yields of both mildly affected BF trees and severely affected trees. Mild BF was defined as BF found only in several secondary branches. After three years of data collection, the average Nonpareil yield on mildly affected BF trees was 91% of normal. Such trees actually out produced normal trees in one orchard in some years due to later bloom and better pollination weather. Severe BF trees displayed BF in at least one major scaffold with other symptoms showing throughout tree. In these trees, the three-year average Nonpareil yield was 64% of normal. The researchers found decreases in kernel weight and in kernel numbers and they also observed a trend toward more double kernels.

In a companion study by Browne, et al., a UC agricultural economist calculated the break-even point for replacing BF trees by replanting or top working assuming hypothetical yield curves representing 90, 60, and 40 percent of a normal 1500 pound per acre orchard yield. Break even occurs when the increased returns of grafted or replanted trees finally offset the increased cost and loss of income from having the BF tree out of production.

At the 90% yield level, replacing a BF tree didn't result in breaking even until after more than 50 years had passed! At the 60% yield level, the break-even point occurred at 14 years (this level of yield reduction is typical for severely affected BF trees). If BF reduced the yield to 40% of normal it still took 9 years to break even by replanting. At all yield levels, top working a BF tree provided a one-year advantage compared to replanting assuming that top working was successful.

Overall, the severity of BF is the major factor in determining when the break-even point occurs. Orchard yield and price per pound are minor factors since different yield levels require a similar time to reach the break-even point. Generally, the orchard must have more than 10 years of life remaining to justify replacing a BF tree.

Shackel, et al. studied BF effects on yield of young Carmel almonds in a Kern County orchard planted in 1991. Yields for three years, 1994 through 1996 (4th-6th leaf) were collected from normal trees, from very mildly affected BF trees, from trees with moderate BF, from trees with severe BF, and from trees with very severe BF. Three year average yields from the very mildly affected trees were scarcely different from the normal trees and in some cases were actually greater. Moderately affected BF trees produced a 3-year average yield that was about 89% of normal. Trees severely affected by BF yielded 62% on average of what was produced by normal healthy trees. These results are similar to the findings on Nonpareil that were discussed earlier. Carmel yields from very severely affected trees were reduced even further to 50% of normal.

Early BF diagnosis is critical in reducing the time to a break-even yield. The first opportunity to observe BF in a new orchard is the spring of the second leaf. Observations must be made in March or April when symptoms are clearly visible since new growth from the surviving buds can mask BF later in the season. Replanting or top working any tree showing even mild symptoms at that time should have beneficial yield effects in four to five years. Mild BF symptom expression after the fourth leaf may not warrant tree replacement. Severe BF may continue to warrant replacement until about the eighth or ninth leaf.

What to do**.** BF has the greatest impact on future productivity when second through fourth leaf trees are affected. **Make a major effort to detect BF in the second to fourth leaf** and replant as soon as possible or top work affected trees using bud wood with low BF potential.

For trees five to six years old, replace the trees only if BF is affecting the main framework of the tree. If you find trees like this it means you probably overlooked them when they first showed subtle signs of the disorder in their second or third leaf. Mild BF affecting only the upper canopy may not seriously affect yield.

When older trees become affected, do nothing. The cost of replacement and the yield loss following tree removal will not be offset by increased production before the orchard is removed. When BF is restricted to upper portions of the canopy there's less impact on productivity.

Avoid any stress in the orchard that can raise canopy temperatures. Anything that can cause defoliation such as water stress, mites, scab, or leaf rust could contribute to higher canopy temperatures and possibly aggravate BF.

Sources:

Browne, L.T., M. Gerdts, E.A. Yeary, Replacing Bud Failure Trees, California Agriculture, March, 1975, pg.15.

Gerdts, M., W.C. Micke, D. Rough, K.W. Hench, L.T. Browne, G.S. Sibbett, Almond Yield Reduction, California Agriculture, March, 1975, pg.14.

Shackel, Ken, Tom Gradziel, Dale Kester, Mario Viveros, Warren Micke, Mike Cunningham. Non-infectious bud-failure, 1996 Annual Report to the Almond Board, Project No. 96-K23, Spring 1997, 7 pgs.

Pacific Spider Mite Control at Hull Split in Almonds

David Haviland, Entomology Farm Advisor, UC Cooperative Extension, Kern Co.

Hull split is one of the most critical decision-making periods of the year for PCAs that that manage spider mites in almonds. At this time, hot weather, dusty conditions, tree stress due to crop load, and reduced irrigation can all cause significant outbreaks of spider mites. Hull split is also often the last opportunity to utilize miticides in a spray program due to PHIs, as well as an opportunity to get a free ride through the field with a navel orangeworm spray.

However, not all fields require hull split miticide sprays. In many cases, beneficials are sufficient to keep spider mite populations in check. Some of the most common predators include six-spotted thrips, mite destroyer beetles, minute pirate bugs and lacewings. Predatory mites can also be very effective, though there have been many observations that their numbers have been declining over the past few years, especially in the lower San Joaquin Valley.

Deciding if a treatment is needed

Monitoring and treatment guidelines can be found within the University of California Pest Management Guidelines for Almonds (www.ipm.ucdavis.edu). Treatment decisions are made based on the percentage of leaves with mites present on them. If no predators are present, treatments should be made if about 25% of the leaves have mites on them. If predators are present, treatments can be held off until about 50% of the leaves are infested. As with any monitoring program the sampling accuracy increases as the number of trees sampled and number of areas in the field sampled increase. The UC guidelines that can be found online take this into account.
PCAs should also take into account additional information such as drought stress to the trees and mite history within the block. At hull split it is also wise to adapt the thresholds a little to consider that hull split may be the last opportunity to get into the field and spray before harvest begins.

Choosing a miticide

There are several miticides to choose from at hull split. The most commonly used include Acramite, Envidor, Fujimite, Kanemite, Oil, Omite and Zeal. Each of these products can do well at hull split, depending on what you want to accomplish.

For general use at hull split, Fujimite and Envidor provided the best overall control in University of California trials over the past three years in Kern County (Table 1). Plots treated with these products either did not, or rarely had mite populations return to pretreatment levels for the duration of the trial. Decisions between using these two products generally relate to pest population and price. Fujimite is more expensive, but can knock down mites quickly if they are getting out of control. It is the closest replacement that exists for the niche previously held by Omite. Compared to Fujimite, Envidor is less expensive and provided similar residual control in trials, but is slower acting and should be used at a normal treatment threshold and not as a product to try to put out fires.

The next best miticides in our trials were Acramite and Zeal, which provided excellent knockdown of mites for two to three weeks. Compared to Fujimite and Envidor, mite populations were similar for the first two to three week period, but were then quicker to return to pretreatment levels in about three to four weeks. In the case of Zeal, this is likely due to a reduced ability of the product to enter into the leaf at hull split compared to early in the year when the leaves are softer. Another consideration with these products is that out of the top four products in our trials, Acramite is considered to be the safest to predatory mites. All four of the top products are relatively safe to predatory insects.

The other products evaluated were Kanemite and 2% 415 oil. Both treatments provided good knock-down of mites, but little residual control. The best fit for Kanemite in almonds is where very quick knockdown of mites is needed from a product with a very short PHI. The best fit for Oil is to assist in mite suppression when it is used as a surfactant at about 1% v/v, or as a stand-alone treatment at 2% v/v where mite suppression is needed during the season or near to or between harvests.

Table 1. Affects of hull-split sprays on residual control of spider mites in large scale field trials in Kern County, 2006-8.

Treatment[1]	Days after treatment to return to an average of 1 mite per leaf			Days after treatment to return to an average of 2 mites per leaf		
	2006	2007	2008	2006	2007	2008
Fujimite	28	30+	58+	34+	30+	58+
Envidor	29	30+	58	32	30+	58+
Acramite	15	30+	35	19	30+	45
Zeal	22	21	36	25	30	42
Kanemite	10	NT[2]	22	17	NT[2]	35
2% Oil	NT[2]	11	38	NT[2]	17	45

[1]Most treatments were made with the addition of 1% 415 oil at a water volume of 200 GPA.
[2]Not evaluated in that year.

ON-LINE BOOK: RESOLVING CONFLICTS

The second edition of *Party-Directed Mediation: Helping Others Resolve Differences* is now on-line. This book explains two mediation models in depth. The first model is used to deal with conflicts among peers; the second, disputes between superiors and subordinates.

Party Directed Mediation: Helping Others Resolve Differences is an effort to present practical, sound, research-based ideas hopefully leading to the improved management of deep-seated interpersonal conflict. While many of the concepts were originally developed through research in agriculture and agri-business firms, the methods (Party-Directed Mediation and Negotiated Performance Appraisal) have since drawn the interest of a wide range of people throughout the world. The methods used require more time than traditional mediation, but are particularly well suited to volunteer mediators, intercultural conflicts when issues of saving face are important, and other conflicts in which emotional factors are high.

This approach is especially geared to help parties who will continue to live or work together after the mediator goes home, and need to learn interpersonal negotiation skills for handling future differences.

The full URL is http://www.cnr.berkeley.edu/ucce50/ag-labor/7conflict/ or alternatively, try http://tinyurl.com/3kzu5

The hard copy is $12.50 per book. Orders may be placed at https://ucce.ucdavis.edu/survey/survey.cfm?surveynumber=443&back=none or try http://tinyurl.com/yt6t

For more information on conflict management contact the book's author, Gregorio Billikopf, at gebillikopf@ucdavis.edu or (209) 525-6800.

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