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IN THIS ISSUE:

- Pruning and training young almond trees
- Butte-Glenn Walnut Day & Almond Institute -- February 1st
- Guidelines for planting almonds
- Almond Board Sustainability Workshops: February 2012
- Winter irrigation
- South Sacramento Valley Winter Almond Meeting – February 2nd
Almond Board Sustainability Workshops in February
- Focus on bees, colony strength and health
- Orchard Sanitation: a key winter practice in almond production

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Pruning and training young almond trees

By Joe Connell, UC Farm Advisor, Butte County

Farm Advisors from Bakersfield to Chico have completed many pruning trials over the past 30 years and the results have changed the way we train and prune almond trees. We now know that the more you prune a tree the lower the yield will be and the less you prune the heavier the yield. This does not mean that you shouldn't prune almond trees! The dormant pruning done to an almond tree after its first and second growing seasons is the most important it will ever receive.

I suggest identifying primary scaffolds with good angles of attachment for structural strength and selecting three main scaffolds spaced vertically and horizontally around the trunk. Avoid poorly attached branches with included bark (Fig.1). These three primary branches permanently establish the tree's basic framework. Leaving more than three limbs often results in poor crotches, weak branch attachment, and excess breakage when the first big crop is set, particularly when trees are grown on vigorous rootstocks.

From our trials we know that **short pruning** in the first dormant season where scaffolds are headed back hard to 12 inches and all side shoots are stripped off reduces yield the most in the first few harvests. Advantages are that this type of pruning is easily learned and taught, trees are uniformly controlled in size, usually no tying is required in the second growing season, and there are lots of secondary limbs and watersprouts to select from at the second dormant pruning. Drawbacks are that you guarantee the need for lots of thinning cuts at the second dormant pruning or you end up with way too many "virtual" primary branches and too much crowding, you may also need to loop tie the secondary branches in the second dormant season to prevent them from flopping over during the third growing season. Hard heading cuts on vigorous trees results in willowy pole-like branches the next year.

Long pruning where three primary scaffolds are selected in the first dormant season and left unheaded is the other extreme. Small lateral fruitwood is left on the tree and some thinning may be done to select secondary branches. Advantages are earlier production, far fewer thinning cuts needed in the second dormant season, and fewer watersprouts to remove. Disadvantages are that the method is harder to teach and more pruning skill is required, there may be a need to tie vigorous trees in the second growing season to keep the primaries from flopping over, trees are less uniform, and they may be more easily blown over during heavy storms. Similar light thinning is done in the second and third dormant seasons.

I don't believe that Farm Advisors have ever advocated **non-pruning** during the tree training years. Non-pruned trees may have heavier early yield in the third and fourth growing seasons but those years are the lowest yield years in the orchards life. Poor bloom weather in the third or fourth year may eliminate any yield advantage a non-pruner was hoping for. Eight or ten primary scaffolds will develop into a bushy dense tree that is more subject to disease and to blowing over in the establishment years and beyond. Such trees may also be more subject to limb breakage from poor branch attachments. In the northern part of the valley where heavy winter storms are common, the potential cost of tree loss or damage can far outweigh the hoped for yield gains. If thinning cuts are made on these crowded primaries as the trees age, the remaining limbs result in an even less desirable tree.

The best compromise is **intermediate pruning** where three primary scaffolds are selected in the first dormant season, small lateral twigs growing horizontally and non-vigorous lateral branch growth coming from the upper trunk or scaffold branches are left on the tree. The three primary scaffolds are tipped back lightly, usually to about 48-60 inches to where internodes are longer so that good secondary branching results. In the second dormant season, vigorous upright secondary branches are thinned out to no more than three on a primary while once again lateral fruitwood is kept. Disadvantages of this method are similar to long pruning in that this method is harder to teach and trees are more variable. Advantages include less pruning needed to thin watersprouts in the second dormant season, less need to tie trees, and there is less limb breakage and a fuller canopy compared to long pruned trees.

Early production in trial treatments using intermediate pruning is often very similar to production in the long-pruned check trees. In addition, keeping small lateral shoots and branches have several other benefits compared to short pruning where they are removed. Their leaves shade the trunk and lower limbs and prevent sunburn. Photosynthate produced by these leaves nourishes the lower limbs and trunk and increases their strength. Finally these lateral branches are the first to spur up and produce crop.

Little additional training is needed in the third and fourth dormant seasons. The very few thinning cuts made (if the trees have been trained well in the first and second dormant seasons) are confined to maintaining the dominance of the primary and secondary scaffold branches you've selected previously. The third dormant pruning should be your final shot at correcting any mistakes made in previous years.

Twenty years ago many young orchards were pruned way more severely than necessary or desirable. Today, I believe that too often, little to no training is practiced with the mistaken assumption that yield will be the best with no downside. That is not the case. Good intermediate pruning will minimize blow overs while still returning reasonable early production and longer term tree health.



Figure 1. A weak primary scaffold with included bark (left) that is likely to split out.

A primary scaffold with strong branch attachment (right).



Butte-Glenn Walnut Day & Almond Institute -- February 1st

By Joe Connell, UC Farm Advisor

The Butte/Glenn Counties Walnut Day and Almond Institute will be held on Wednesday, February 1st from 8:30 a.m. to 2:15 p.m. at the Chico Masonic Family Life Center (1110 W. East Ave.). This seminar delivered by University of California farm advisors, specialists, research scientists, the Butte County Ag Commissioner, and industry experts from the California Walnut Board will feature topics on:

- Agricultural Commissioner's update on laws
- State of the California Walnut Industry
- Pruning physiology and reasons for pruning almonds
- Experience with irrigation scheduling tools in walnuts and almonds
- Does increasing the Nonpareil percentage improve per acre returns?
- Strengthening honey bees – Bee Informed Partnership Tech Transfer Team
- Strategies for walnut blight management – Do we need Mancozeb?
- Managing summer diseases of almond – Rust, Scab, Alternaria, and Hull Rot
- Walnut husk fly outbreaks – a management update
- What's new in almond insect pest management



This seminar is open to the public and is presented free of charge. For more information about the program, call (530) 538-7201.



Guidelines for planting almonds

Bill Krueger, UC Farm Advisor, Glenn County

- ◆ Plant only into soil that is at field capacity or drier. Planting into wet soil can cause compaction, rutting, and glazed tree holes.
- ◆ Make the planting hole just deep and big enough to accommodate the root system using an auger or shovel and plant the tree no deeper than it was in the nursery. Trees can be planted on a mound or a berm to insure good water drainage away from the crown. This can be particularly useful on heavier or poorly drained soils.
- ◆ Never allow trees to dry out from the time they are picked up until they are planted. Store them in the shade and cover with a moist blanket.
- ◆ Prune broken roots or roots that won't fit in the hole without bending.
- ◆ To protect the trees from Crown Gall, treat the roots with a preventative spray of K-84 bacteria prior to planting.
- ◆ Spread roots and work the soil around roots, orient the strongest roots in the direction of prevailing winds, and to the extent possible, avoid orienting the bud crook (the flat side opposite where the scion bud emerged) toward the southwest.
- ◆ Keep fertilizer and organic material out of the planting hole.
- ◆ If the soil is moist and friable, it should not be necessary to water at planting. If the soil is dry, water with one to two gallons of water to establish good root to soil contact and eliminate air pockets. Potted trees will require watering at planting to establish good soil to root contact.
- ◆ Top the trees at 30 to 42 inches to insure vigorous growth while allowing adequate trunk length for easy shaker attachment. Remove all side branches.
- ◆ Protect trees from sunburn and Pacific Flathead Borer and herbicides by using a tree protector and/or painting with white interior latex paint. Tree wraps, protectors, or milk cartons protect the tree trunks continually, are easy to apply and settle with the soil. If trunk protecting boxes are used without painting trees, the boxes should be flattened (look like \diamond this from the top, not this \square) to avoid "box burn" If the trees are painted, use white interior latex paint, one part paint to one part water, and paint trees before they are planted or after the soil has settled. Painting + boxes gives the best possible protection.
- ◆ After settling the trees should be no deeper than they were in the nursery.

Almond Board Sustainability Workshops: February 2012

Attention almond growers: Free workshops in Stanislaus and Colusa counties in February 2012!

The California Almond Sustainability Program is designed by the Almond Board of California and SureHarvest to ensure value for you. Participating in an Almond Sustainability Workshop helps market your almonds. Also, after you submit the confidential assessment at the workshop, you will receive a FREE customized farm-management report comparing your practices to fellow growers.

For more information:

<http://www.almondboard.com/growers/sustainability/pages/default.aspx>

<http://caff.org/programs/bio-ag/almonds/>

For questions or to register, please contact Debye Hunter from the Almond Board of California (dhunter@almondboard.com, phone: 209.343.3230, fax: 209.549.8267).



Winter irrigation

By Joe Connell, UC Farm Advisor, Butte County

I'm writing this article so it will start raining before bloom and will hopefully solve our dry soil problem. If a weather change brings sufficient rain soon then concern about this topic will be unnecessary.

Orchard soils are dry, even after the heavier than normal rains during October. Ideally, the entire root zone should be well supplied with moisture when root growth and bud swell begin. Historical seasonal rainfall in the Chico area for the period from October 1st through January 20th is about 13.4 inches. In most of our orchard soils this is enough water to wet the soil profile down to at least 4 feet. This winter we've had about 2.5 inches of rain to date with all of that precipitation occurring in mid-November. Resident vegetation has transpired most if not all of that water so that rainfall did not contribute to current soil moisture storage. Obviously, we're running considerably behind. Many orchards have already been irrigated in preparation for the coming bloom period.

Early irrigation trials in Durham conducted by my predecessor Clem Meith decades ago indicated that early irrigated trees produced nuts that were longer, wider, and heavier than those from other trees. Yield was greater and more shoot growth resulted on the early irrigated trees.

It's crucial to start the growing season with the soil profile fully stocked with available water. In most of our almond orchards this means moisture down to a depth of about 4 feet. At this point, I feel it's a good idea to irrigate almonds if you don't have sufficient soil moisture in the root zone.

The last time I dug an auger hole in an almond orchard, the soil was moist down to about 12 inches. I was pouring dust dry soil out of my auger from two to four feet in depth. Unless we get enough rain to adequately wet the root zone's soil volume by the end of January, plan to irrigate. This is especially necessary for almonds where growth begins early and the highest possible percent set is desirable.

Once trees begin actively using water in late spring and summer it's often difficult to keep up with a tree's needs. If a soil reservoir of stored moisture isn't there, your trees may suffer when it comes to the long, dry harvest period. It's much easier to keep up and stay there than it is to catch up when you're behind.

South Sacramento Valley Winter Almond Meeting

Arbuckle Golf Course

Feb 2, 2011

PCA and CCA CE hours requested

Refreshments sponsored by Wilbur-Ellis Co.

8:30 Intro/welcome

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

8:40 Managing harvest timing with late varieties: what do we know?

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

9:10 Pruning timing options to avoid wood diseases in young almonds

Carolyn DeBuse, UC Farm Advisor, Solano/Yolo Counties

9:40 Almond disease management in a wet year

David Doll, UC Farm Advisor, Merced County

10:15 -- Break

10:30 Buried drip irrigation

Larry Schwankl, UC Irrigation Specialist, UC Kearney Ag Center

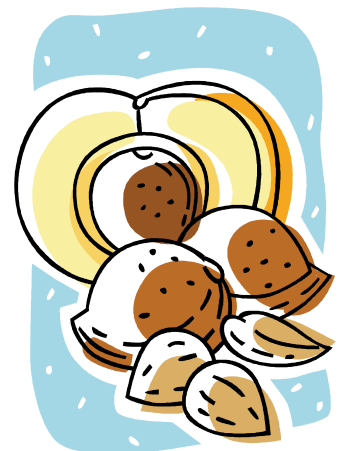
11:00 New Approaches to Almond Nutrient Management

Sebastian Saa Silva, UC Davis Plant Sciences Department

11:30 Spray coverage and miticide trials in the south Sacramento Valley

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

Noon -- Adjourn





Focus on Bees, Colony Strength and Health

By Katie Lee, Bee Team UCCE Butte County and Joe Connell, UC Farm Advisor, Butte County

In response to the serious health problems facing honey bees, a Tech-Transfer Team was initiated to work with beekeepers in Northern California. Three trained crop protection agents (the Bee Team) are now established in Butte County working as an extension program of the University of California Cooperative Extension. The Team is part of a nation-wide effort to help the honey bee: the Bee Informed Partnership (beeinformed.org). This project is a newly funded nationwide initiative supported by a grant from the U.S. Department of Agriculture's National Institute of Food and Agriculture. The project is designed to monitor and improve honeybee colony strength by supporting work to identify colonies that have stronger hygienic behaviors possibly helping to alleviate pest and disease problems and reduce colony deaths. Local Bee Team members are Rob Snyder, Michael Andree, and Katie Lee.

California bee breeding is centered in the counties of Butte, Glenn, Tehama, Shasta, Colusa, Yuba, Sutter, Yolo, and Solano. Honeybees overwinter well in California's favorable climate and beekeepers can build up hives in early spring when almonds bloom. The Team's focus is interaction with approximately 16 queen breeders that produce and ship queen bees, thus providing genetic material for beekeepers nationwide. The Sacramento Valley is responsible for approximately one-third to one-half of the nation's bee industry.

The Bee Informed Partnership (BIP) will use an epidemiological approach to identify common beekeeping management practices and develop best practices on a regional level. The goal according to the BIP project leader Dennis vanEngelsdorp is introduction of best management practices that will reduce national losses in honeybee populations. We hope to reduce honey bee mortality, increase beekeeper profitability and enhance adoption of sustainable management systems in beekeeping. By surveying beekeepers management practices as well as their colonies' overwintering success, we can use epidemiological methods to inform beekeepers about which practices work and which do not.

The Team assists the queen producers with pest monitoring and testing potential breeder colonies for resistance to disease and parasitic mites. Since its start about a year ago, the Team has taken over 4,000 samples to determine levels of the gut fungus *Nosema* and the *Varroa* parasitic mite, and has tested 600 colonies for the hygienic behavioral trait that correlates with disease resistance. Each sampled colony is assessed for characteristics associated with health and tagged to allow multiple samplings to provide colony history over time.

The team began to track pathogen loads in potential breeder stock in September 2011. Over 1,100 hives were examined and samples have been taken and analyzed. The queen breeders were provided with diagnostic reports for *Varroa* and *Nosema* loads within two weeks of sampling.

Further pathogen load sampling will be conducted in January/February 2012 to allow these beekeepers to make breeding decisions prior to beginning the 2012 season. Initial economic feedback is forthcoming as to whether certain products or protocols used in the health management of colonies provide a net benefit or loss per colony. These economic take home messages will be included in results released in early 2012.



Orchard sanitation: a key winter practice in almond production.

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

It's January, time to start the time consuming, relatively expensive and essential practice of mummy counting and, where necessary, sanitation in California almond orchards. We have had a very dry winter and the natural decomposition of mummy nuts may be reduced if the winter remains dry. While an article on almond orchard sanitation is probably review for most growers, the topic is so important that we, the UC Farm Advisors in the Sacramento Valley, thought a review article was worth writing.

What's the problem? Navel orangeworm (NOW) is a key pest in almond production. Kernel damage from NOW feeding directly reduces grower income. NOW moths can carry *afatoxin* spores onto almonds, and nuts damaged by NOW feeding are at high risk of *afatoxin* infection. Aflatoxin contamination is a major issue in the European Union (EU). A third of all California almonds are shipped to the EU.

What's the solution? A NOW management program in almond orchards in the Sacramento Valley should include 1) winter orchard sanitation, 2) early harvest, and 3) a hull split spray. Not all three steps are needed in every year.

Why sanitize? NOW population overwinters in almond orchards in mummy nuts. The larvae (worms) emerge and feed on mummies until hull split of the new crop in the summer. Removal and destruction of mummy nuts in the winter provides two important steps in NOW management:

Directly destroys NOW in mummy nuts.

Reduces or eliminates food (mummy nuts) for the first generation of NOW during the spring/early summer.

A carefully sanitized almond orchard starts the season with a low NOW population and few egg laying sites for any remaining NOW moths or for NOW flying in from nearby.

Why an integrated approach? Combining all three parts of an integrated NOW control program delivers the best pest control results. Sanitation reduces overwintering populations and NOW food source in the spring, but can't protect splitting nuts in the summer from the few remaining NOW or those flying in from outside the orchard. NOW populations that move in at hull split can build rapidly on high quality food (new crop nuts). Hull split spraying provides only partial NOW control (50% in many experiments) due to the difficulty of 1) controlling a pest with 1-2 sprays as the target changes (splits) over time and 2) getting good spray coverage -- especially in the tree tops. Early harvest requires longer drying time on the orchard floor, something some growers -- especially those with micro-irrigation -- have moved away from to get water back into the orchard as quickly as possible, but, it is a key component of a good NOW control program and it is much better than harvesting later and risking getting caught by rain.

How to sanitize? Here is a check list of practices that make up a complete sanitation program.

Count mummies in the dormant tree canopies before January 15, looking at 20 or more trees per block. If the average count is more than two mummies per tree, plan on poling or shaking the orchard to remove mummies from the trees before the end of January.

Get mummies out of the trees by February 1.

Blow or rake all mummies on the orchard floor into the middles and destroy them (mow or disc) by March 15.

What does the weird winter so far mean to NOW sanitation? This year might be important to check mummy numbers in the trees, even if you have not had much of a history of mummy survival and NOW pressure. November, December and much of January were dry and may have resulted in more mummies remaining in the trees. Dr. Frank Zalom, professor of entomology at UC Davis, suggests that this might be a good year to pay attention to tree mummy counts even if this has not been needed in the past. Dr. Zalom also told me he did not think the weather on January 16-17 was cold enough to kill NOW larvae in the mummies and allow growers to avoid sanitation.



Tehama County Fruit & Nut Notes & Sacramento Valley Regional

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