COOPERATIVE EXTENSION UNIVERSITY OF CALIFORNIA

TREE AND VINE NOTES

March 2008

"March is good grafting, the skillful do know,
As long as the wind in the East does not blow"
-Thomas Tusser 1524-1580, English poet and farmer

Welcome David Doll

We welcome our new nut crops Farm Advisor David Doll. David comes to us from UC Davis where he has been doing plant pathology research with Dr. Greg Browne. He has a B.S. in Plant Biology from Purdue University, and a M.S. in Plant Pathology from UC Davis.

David hails from Southeastern Indiana where he was raised on a small apple and peach orchard. He has spent the last 4 years researching replant problems of Almonds and determining alternatives to methyl bromide fumigation. He plans to continue these research interests by pursuing non-fumigant strategies for controlling replant problems. Other research interests include means of reducing VOC's and other emissions into the environment, and ways to maintain water quality throughout the county. David will be doing research and extension work with all nut crops in Merced County.

Currently he is looking to establish a replant trial that involves peaches or almonds with sandy soil that contains high counts of ring nematode.

He can be reached at the Merced County Cooperative Extension Office at (209) 385-7403.

March 2008 Task List for Pistachios

Robert Beede, UC Cooperative Extension, Kings County

Water Status: Rainfall is 110% of average as of March 1, and the reservoirs are 85% of their average content, but only 48% of their total capacity. Snow water content is now over twice what it was at this time last year. However, because of the extremely dry conditions last year, statewide hydrologic conditions are still listed as dry. Climatologists predict more rain and snow is possible, which would be welcome to fill our reservoirs.
For more information see: http://cdec.water.ca.gov/cgi-progs/reports/EXECSUM.

Chilling Hours: Suffice to say, it has been a cold winter. Most stations have slightly more than a 1000 hours below 450 F. Even Arvin, which typically has 500-600 hours, is at 911 as of February 15. To check on your local chilling, reference my website, http://cekings.ucdavis.edu. Providing we have a warm spring, expect to see a sharp bud push and bloom, with the Peters male ahead of the Kerman females. My experience suggests Peters, a high chill male, blooms earlier than Kerman after a cold winter.

This season offers growers another opportunity to make observations on pistachio growth and development in areas with different chill. For those interested, go to my website and print off the instructions for how to do it as well as a data sheet for recording your observations.

Nutrition: It may not be too late for a delayed dormant **zinc** application. Zinc sulfate 36% at the rate of 40lbs. product per acre or 10-20 gallons of 12% liquid zinc per acre can be safely applied up to the early green tip stage (1/4 inch terminal growth). **Do not apply if flower buds are expanding**. Zinc is so immobile that early season sprays may prevent deficiency in young shoots for only a month. Leaf expansion sprays are very effective and require much less zinc than delayed dormant treatment. However, treatment at 50% leaf expansion will not supplement zinc during bloom when deficiency reduces fruit set. The suggested rate for leaf expansion sprays is 2 lbs. zinc sulfate 36% product per acre.

If boron (B) was low in August (less than 120 ppm), application of a soluble B (e.g. 5 pounds of Solubor®, 20.5% B) in 100 gallons of spray solution per acre in early March (bud swell) is effective in supplying B to developing flowers and pollen for improved fruit set. Boron can also be applied postbloom at 50% leaf expansion. Apply 3 pounds of Solubor in 100 gallons of water per acre. Solubor creates a strongly buffered solution of pH 8.2. If mixed with zinc and copper fertilizers, the tank mixture should be acidified to pH 4.5 to 5.5 with citric acid powder (**not** phosphoric acid, which precipitates zinc as phosphate) to maintain the uptake of zinc and copper by the pistachio leaf. The best long-term correction can be expected from a combination of soil and foliar treatments applied as yearly maintenance. There are a number of B fertilizer materials containing different amounts of actual B. Spring B applications during shoot extension are more effective in correcting current season deficiency than treatments in June or July. Boron is not readily translocated by the tree's vascular system. Similar to other micronutrients, B is most available in lighter, acidic soil. Soils lighter in texture and low in buffering capacity require the addition of less boron for correction. Applications through drip systems may be reduced by 25-30% due to higher efficiency from concentrated treatment.

RESISTANCE MANAGEMENT IS ESSENTIAL TO LONG TERM DISEASE CONTROL

J.E. Adaskaveg, H. Főrster, and D. Thompson, Department of Plant Pathology, UC Riverside and UC Davis

Currently, in addition to the inorganic copper and sulfur materials, ten classes of fungicides are registered for preharvest use on peaches and nectarines in California: the pthalimides (e.g., captan), dithiocarbamates (e.g., ziram), dicarboximides (e.g. iprodione), isophthalonitriles (e.g., chlorothalonil), benzimidazoles (e.g., thiophanate-methyl), sterol biosynthesis inhibitors (SBIs; e.g., fenbuconazole, myclobutanil, propiconazole, tebuconazole), strobilurins (QoIs; e.g., azoxystrobin, trifloxystrobin, pyraclostrobin), hydroxyanilides (e.g., fenhexamid), anilinopyrimidines (e.g., cyprodinil, pyrimethanil), and carboxamides (e.g., boscalid, a component of the pre-mixture Pristine®). The first four classes each have a multi-site mode of action, whereas the latter six classes all have a single-site mode of action and thus, target a single site in a

specific biochemical pathway of a target organism. Fungicide classes, also referred to fungicide groups, are assigned by the Fungicide Resistance Action Committee (FRAC) according to different modes of actions (see http://www.frac.info/). New fungicides introduced in 2008 include two pre-mixtures: tebuconazole-trifloxystrobin (i.e., Adament®) and pyrimethanil- trifloxystrobin (i.e., Distinguish®). With an increasing arsenal of fungicides available, using the proper material for good disease control while also keeping the risk of fungicide resistance to a minimum is becoming more difficult and requires an increasing amount of knowledge on the modes of action (fungicide classes), spectrum of activity, efficacy, and best usage strategies.

Resistance develops much more likely against single-site mode of action than against multi-site mode of action materials. In addition to the benzimidazoles, resistance has developed in pathogens of stone fruit crops in California against several of the newer fungicide classes. Thus, in populations of *Alternaria* spp. and *Cladosporium carpophilum*, causing Alternaria leaf spot and scab of almond, respectively, resistance is now widespread against the strobilurin fungicides. In 2007, resistance in *Alternaria* spp. was also common against the carboxamides. In addition, in 2007 we also found for the first time isolates of the brown rot pathogen of stone fruits, *Monilinia fructicola*, that were resistant to the anilinopyrimidines. In other stone fruit growing areas of the country, this latter pathogen has already acquired extensive resistance against the SBI fungicides, a very important class for the management of several stone fruit diseases.

Except for the benzimidazoles, to date resistance is not widespread in fungal pathogens of peach and nectarine in California. Thus, this is a critical time to remember the principles of anti-resistance management that are aimed towards preventing the development and spread of resistance. Resistance development in the field is mainly a selection process where a low fraction of the pathogen population that is naturally resistant multiplies in the presence of the selecting agent, i.e., the fungicide. Because members of a particular fungicide class have the same mode of action, cross-resistance patterns generally follow modes of action making all members of a class ineffective once resistance has developed against this class. Resistance development is a complex process that depends on characteristics of the pathogen, the fungicide class, and also the host. As a general rule, the risk of resistance development is highest when the following conditions are met:

- A large amount of pathogen propagules is present (e.g., when fungicides are applied when disease is already present - improper timing, especially during conducive environments)
- A low rate of fungicides is applied (e.g., alternate-row applications, air applications that are done at full canopy, or applications at low off-label rates)
- The pathogen is repeatedly exposed to the same chemical class (e.g., when no rotations are being done).

Based on these principles, several anti-resistance strategies have been developed that should be part of an integrated disease management program. The most effective way to combat fungicide resistance is to mix or alternate fungicides with different modes of action (classes of fungicides). If possible, at least one rotational mix partner should be a multi-site material. Because several highly effective classes of fungicides are available for peach, each class should be limited to one (or two) applications per season. The use of fungicide pre-mixtures can be a step in the right direction, but both mixture components should have activity against a particular pathogen, otherwise they will act like single-fungicides in the selection process.

Fungicides are most effective in reducing disease and the amount of pathogen survivors when the environment is less favorable for pathogen infection and when disease pressure is lower. Consequently, planting, cultural, and orchard sanitation practices can be important components in an anti-resistance program. Disease pressure can also be lowered if a management program is started with multi-site mode of action fungicides. This practice will reduce the pathogen population size that is exposed to subsequent treatments with single-site mode of action compounds and the probability of selecting for resistance is reduced. A single-site mode of action fungicide should never be applied by itself when disease incidence in the orchard is already high.

The following "Rules" are a guideline for following fungicide stewardship:

- **R**otate or mix fungicides of different mode of actions. Suggested disease management programs with fungicide groups can be found at www.ipm.ucdavis.edu.
- **U**se labeled rates – for strobilurins, use upper label rates.
- **L**imit the total number of applications of any single-site mode of action fungicide class to one or two per orchard per season

- **E**ducate yourself about fungicide activity, mode of action, and class – as well as resistance management practices. Visit the UC IPM website (www.ipm.ucdavis.edu) to obtain this information.
- **S**tart a fungicide program with multi-site mode of action materials (e.g., Captan, Bravo/Echo, Ziram, Rovral, Sulfur).

Lastly, because fungicide resistance management has to be a large-scale effort due to the generally free movement of pathogen propagules among orchards, it should be taken seriously by everyone.

WHAT TO DO IF IT'S HOT AT BLOOM – 2008

Franz Niederholzer, UC Farm Advisor, Sutter/Yuba Counties

Summary:
- High Temperatures (above 75°F) at bloom slow down or kill flower activity.
- To try to increase set if temperatures are above 75°F this year, growers might consider:
  - Cooling their orchard with irrigation water. Soil should be kept moist (not saturated) when high temperatures occur.
  - Get bees in the orchard.
  - Leaving grass long in the block if hot weather is predicted.

High temperatures at bloom present a huge economic challenge to California prune growers. Heat at bloom (>80°F) in 2004 resulted in the smallest California prune crop in almost a century. Temperatures over 80°F at full bloom in 2005, and 2007 produced prune crop failures in Sutter and Yuba Counties. Full bloom timing differences of only 24-48 hours in 2005 or 2007 resulted in crop load differences of 200-300%. If bloom temperatures head for 80°F in 2008, the crop may again be at risk.

What exactly is the relationship between heat at bloom and low crop set? Recent research by Dr. Vito Polito (Plant Sciences Department, UC Davis) showed that pollen germination and pollen tube growth decline rapidly above 75°F. At temperatures above 80°F, Dr. Polito believes that flower parts are severely or killed. Researchers have not yet determined exactly what temperatures for how long will affect fruit set. However, experience shows that it doesn't take much heat at or above 80°F to damage flowers. The 2005 Sutter/Yuba prune crop was essentially destroyed when temperatures at full bloom were at or above 80°F for total of 11 hours over a three day period (March 10-12).

What can growers do if the temperatures of 75+°F are predicted for bloom? While research has not yet developed rock solid recommendations for growers to follow, here's what has been learned over the past few years:

■ Cool the orchard with irrigation water

Evaporative cooling may reduce temperatures enough to help set a crop. Impact sprinklers or microjet irrigation systems have been an advantage over flood irrigation systems for orchard cooling. There are reports of good crops in 2005 after running water, while other growers ran water with no benefit. Soil should be moist (not saturated) when warm weather hits. If you can only irrigate part of the orchard per set, run water long enough to wet the soil and then shift flow to another part of the orchard. "Flash" water across irrigation checks and move on to others. If the soil surface dries and isn't rewet, the potential for evaporative cooling decreases significantly. Concentrate irrigation/cooling efforts where warm air is entering the orchard and let the wind move the cooled air down through the orchard. If water is applied to the trees for any length of time through overhead sprinklers, etc., a good systematic fungicide is advisable for control brown rot control.

■ Get bees in the orchard

This means renting bees, as native bee populations have weakened due to bee mites and poor food availability. Experience suggests better fruit set in 2005 and 2007 on trees close to hives, and poor fruit set away from the hives. It may be beneficial to spread hives throughout the orchard. In almond orchards beehives are distributed at 1/10 to ¼ mile intervals for optimum pollination.

■ Leave grass long in the orchard if heat at bloom is predicted. Tall, well irrigated grass should be 1-2°F cooler compared to short mowing. If frost is a threat at bloom, keep the orchard ground cover as short as possible so that a better forecast of bloom weather is available and can be included in the final decision.

■ Spray oil at first flower to delay bloom: this is a long shot, but 4 gallons of narrow range oil/acre oil (in 100 gallons/acre) at first flower may delay bloom a few days. This can be good or bad for fruit set, depending on when hot weather comes. If it does delay bloom in a particular block, it would only help if hot weather passed quickly.

UCCE shows costs of growing grapes, olives, berries and fruit

UC Cooperative Extension has released 14 new cost-of-production studies for growing olives, table grapes, winegrapes, blueberries & apples. The cost studies are available online at http://coststudies.ucdavis.edu for free, and at county Cooperative Extension offices for a fee.

The following new ANR publications are now available at your local Cooperative Extension office:

Integrated Pest Management for Avocados
This new manual for avocado growers and pest control professionals is the latest in UC's highly regarded series of Integrated Pest Management Manuals. Calling upon the expertise of UC faculty, UC Cooperative Extension specialists, farm advisors, and pest control advisors, you'll find the latest research and advice on Pest Management for avocados in this beautifully illustrated guide. Illustrated with 386 color photographs and 64 line drawings and charts that will help you identify and manage over 100 important pests and disorders.
3503 $35.00

Songbird, Bat, and Owl Boxes - Vineyard Management with an Eye toward Wildlife
This handy new guide explores the benefits of the biodiversity and aesthetics of songbirds, bats, and owls and suggests "win-win" situations for the environment and for grape growers. You'll learn about ideas and methods for integrating next boxes with vineyard management, biology and habitat requirements, details on construction and maintenance, literature sources, and online resources where you can get more information. While written with grape growers and vineyard managers in mind, anyone interested in learning about next boxes will find this guide useful -- from vineyards to the backyard.
21636 $15.00

The Home Orchard: Growing Your Own Deciduous Fruit and Nut Trees
Developed especially for use by California backyard orchardists, rare fruit growers, and small-scale growers, *The Home Orchard* offers a comprehensive look at "standard" growing methods, as well as some innovative practices that enthusiasts have developed in recent years, some of which are uniquely suited to the small-scale grower. Included are hundreds of photographs and diagrams that clearly show how to produce the best crops. Photos of several practices, such as key budding and grafting methods, are depicted in step-by-step photos.
3485 $25.00 202 pages Available at your local Cooperative Extension office.

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