COOPERATIVE EXTENSION UNIVERSITY OF CALIFORNIA

TREE AND VINE NOTES

May 2008

Hard Times Ahead?

Maxwell Norton, UC Cooperative Extension, Merced County

The newspapers have given much press to the high commodity prices farmers are receiving this year – in some cases, record prices. These high prices are less impressive when you consider that diesel is on its way to $4, labor costs are climbing fast, electricity costs for pumping are climbing, and fertilizer prices are skyrocketing. Reports are common of shortages of fertilizers and some key pesticides.

Those of us who have been involved with agriculture more than 30 years have seen the fortunes of Ag fluctuate considerably. We all know that high commodity prices do not last forever. The weak US dollar has boosted exports but it will eventually become stronger again which can suppress exports. The sobering reality is that after commodity prices fall, the costs for fuel, fertilizer, electricity and labor will not fall with them. This will leave farmers struggling to survive.

Old timers agree that now is the time to retire short-term debt and pay down as much long-term debt as you can. This will leave you in a stronger position when hard times re-visit. Once short-term debt is reduced, investing in cost-saving technologies and more energy-efficient equipment is logical.

In agriculture we all need to have a long-term business plan that accounts for the cyclical nature of farming. Spring is a time for looking forward. I look forward to a prosperous future for all of you.

Frost Damage

Maxwell Norton, UC Cooperative Extension

There are reports of significant damage to some peach blocks in the north part of Merced County, Stanislaus County and in the Sacramento Valley. There is likely damage in other locales that I have not heard of yet. Depending on the exact development stage of the fruit, the damaged fruit may continue developing for a while before dropping off. Sometimes damaged fruit will persist on the tree several weeks. Within a week or so the damaged should become evident: they will have a different color, they will not grow as fast, and sometimes they develop a wrinkled “cat scratched” look. The way to verify is to cut the fruit length-wise with a sharp knife and look at the embryo; a healthy embryo should be creamy white in color and not shriveling. You should also be able to follow an intact vascular strand that connects the embryo to the rest of the tissue.

It is logical to thin blocks that have no damage and higher sets first to allow damaged fruit to drop or at least become more evident. We are expecting this to be a better sizing year compared to last year (see article by Dan Rivers).

Powdery Mildew

Maxwell Norton, UC Cooperative Extension

The weather has been good for powdery mildew (PM) – on grapes, peaches and apricots. PM management programs need to be timely and use the correct materials to prevent crop damage. PM that becomes established on young shoots can spread rapidly to developing fruit. When utilizing synthetic fungicides always follow a resistance management program and alternate among classes of materials. Discuss this issue with your pest control advisor. Current pest management guidelines can be downloaded for free from: www.ipm.ucdavis.edu or we can print you out a copy at your local Cooperative Extension office for a small fee.

Disease Notes: Non-Infectious Bud Failure

David Doll, University of California Cooperative Extension, Merced County

During this past spring, my drives throughout the county have yielded one thing: Our county has a lot of almond bud failure. New cases of non-infectious bud failure have been seen at a high rate this year, with the varieties of Carmel and Nonpareil showing the most incidences. As the name implies, bud failure is characterized by the buds failing to grow, resulting in branches that are completely devoid of foliage. In some cases, the terminal bud may fail resulting in the lateral bud pushing to from another shoot. The repeating of this leads to the erratic branching patterns that we term "crazy top."

Bud failure is a genetic disorder, caused by a triggering of an unknown genetic pathway when the tree undergoes some level of stress. This predisposition is not well understood. What we do know is that there is a varietal difference in the occurrence of bud failure, and that the odds of a tree forming bud failure increases as we move further away from the original parental bud wood source for that variety. Carmel, Nonpareil, Merced, and Yosemite are cultivars that have demonstrated BF susceptibility.

Research by UC scientists, which include Dr. Tom Gradziel and Dr. Bruce Lampinin, has indicated that high temperatures and tree stress during the previous spring and summer is correlated with the subsequent occurrence of bud failure in susceptible varieties. In 2007, we experienced a cooler than average summer, but also a lower than average rainfall year. Many growers fell behind on their irrigation, and this tree stress may have triggered the high rates of bud failure that we are seeing this year.

We can not control the weather, but there are things we can do to control the occurrence of bud failure. When we are purchasing trees for the new block, choose to avoid varieties that are susceptible to bud failure. If choosing to plant Nonpareil or Carmel, make sure the nursery is using bud wood that is as close as possible to the genetic parent. After planting, keep trees adequately watered to reduce stress. If possible, grow a cover crop, which lowers the temperature within the orchard by shading the ground and reduces the reflection of heat off of the orchard floor onto the young trees.

Upon first seeing bud failure in your new orchard block, contact the nursery so they can eliminate the source tree from their harvested bud wood blocks. Pruning out affected wood will not reduce the occurrence of bud failed wood; the affected trees may look better, but the new growth will still show the symptoms of bud failure. Bud failure occurrence on young trees, less than 6-7 years of age, typically warrants tree removal or top-working of the old tree with a different variety. After that 6-7 year period, tree productivity may be high enough to consider keeping the trees. This, of course, is a management decision and is based upon your tolerance of seeing trees with non-infectious bud failure.

As with most orchard problems, prevention is far more valued than the cure. Communicate and work with your nurseries to help start off with the best available trees. As more almond trees are planted throughout the valley, nurseries are being pushed to meet very high demands. Maintaining the healthy relationship between nurseries and growers will only help increase the success of the industry.

Cling Peach Harvest Prediction

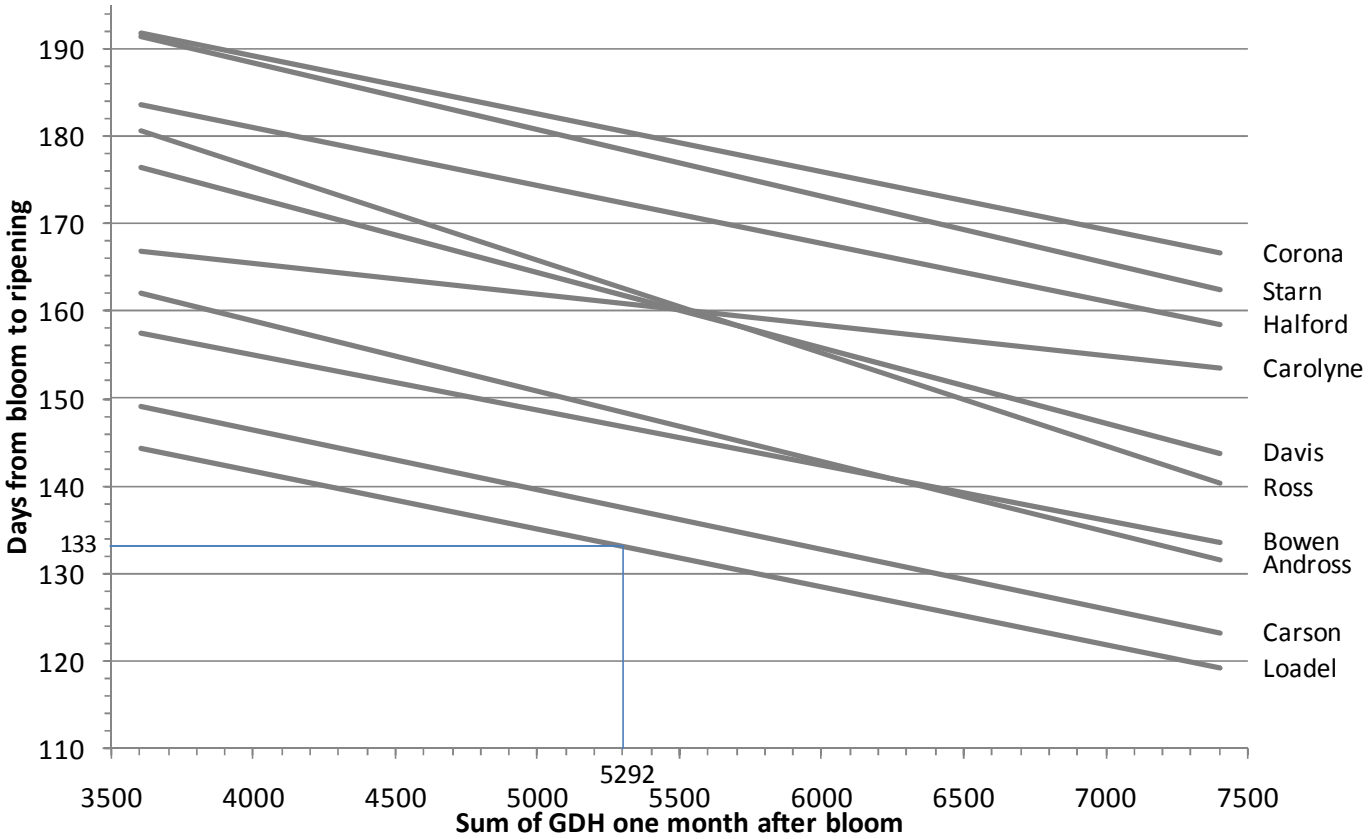
Dan Rivers, Staff Research Associate, UC Cooperative Extension, Merced

One of the many useful online tools developed by UC Davis researchers is the *Harvest Prediction Module* found at http://fruitsandnuts.ucdavis.edu on the Weather Services page. This module can help with making fruit thinning decisions and harvest plans. To use the module, select an appropriate CIMIS weather station and enter a bloom date for the season. (Bloom dates for the previous seasons can be entered for comparison.) The *Harvest Prediction Module* sums the growing degree hours (GDH) accumulated during the first 30 days after full bloom. Growing degree hours are counted as the number of degrees the hourly-average air temperature is above a lower fruit development threshold. At an optimum temperature, the GDH contribution is greatest. Above this, the contribution decreases to 0 as the air temperature increases to a critical fruit development threshold. More on GDH can be found at the website.

With the 30-day sum (GDH_{30}) from the module, you can predict your harvest date by using the chart found in the paper Using Spring Weather Data to Predict Harvest Date and Sizing Potential for Peaches, Nectarines, and Plums - Ted DeJong, Carolyn DeBuse, Gerardo Lopez; Plant Sciences, UC Davis. This paper can be downloaded by using the link above (if you're reading the electronic version of this newsletter) or by selecting the link *How to interpret the data in the table* after you run the module. You will also find this chart reprinted below. To use the chart:

1. Find the GDH_{30} value on the horizontal axis.
2. Read up to the line representing an appropriate cultivar.
3. Read over to the vertical axis marker.
4. Add this number to the bloom date to get the predicted harvest date (+/- 3 days).

An example of this is found on the chart below for Loadel which had a full-bloom date of March 14 and GDH_{30} of 5292 (CIMIS #168 – Denair). The module predicts a July 25 harvest date (March 14 + 133 days).



Also of note, temperatures in the month after bloom in 2008 were relatively low (GDH_{30}<6000) which means that the fruit sizing potential is high, the period from bloom to ripening is longer, and early and heavy thinning is less critical. Compare this to last year when GDH_{30} was over 7000, fruit-thinning costs were way up and the growers who got in early to thin had the most success with sizing fruit at harvest.

Fertilization of Young Almond Trees

Brent Holtz, University of California Pomology Farm Advisor, Madera County

Nitrogen is the most important element we can apply to our tree fruit crops. Almond growth and productivity depend on the availability and uptake of nitrogen. Most fertilizer recommendations are based on making nitrogen available to our trees so that a nitrogen shortage does not limit tree growth or productivity.

Young almond trees don't require as much nitrogen as older trees. I like Wilbur Reil's rule of "one ounce of actual nitrogen per year of age of tree". That rate can be applied several times per season, but never more than that at any one application. Thus, a first leaf (first year in your orchard) almond tree should not receive more than one ounce of actual nitrogen per any application. A five year old almond tree should not receive more than 5 ounces of actual nitrogen per one single application. The University of California only recommends one ounce of actual nitrogen per one year old tree over the course of the season, but I have been told by many growers and PCAs that this rate is not enough for the growth they desire. So, if you want to put out five ounces of actual nitrogen per one year old tree, do so in five applications and not all at once.

I have seen many trees burned by nitrogen, especially if liquid fertilizers like UN-32 (urea ammonium nitrate 32 %) or CAN 17 (a clear solution of calcium nitrate and ammonium nitrate) are used in single applications. These liquid fertilizers are very effective and easy to use but it doesn't take much to burn young trees. I do not recommend using liquid fertilizers on first leaf trees–I prefer to see triple 15-15-15 (15% Nitrogen-15% Phosphorous-15% Potassium) or similar fertilizers used on first leaf trees. I recommend granular fertilizers are placed at least 18 inches from the trunk. With micro-sprinkler and drip irrigation systems liquid nitrogen fertilizers can be used very efficiently and easily by growers. But be careful, I know several farm managers that will not allow more than 10 gallons of UN-32 per acre per application on mature almond trees. UN-32 contains 3.54 pounds of actual nitrogen per gallon; if you put out 10 gallons of UN-32 per acre you added 35.4 lbs of nitrogen per acre. If you have 120 trees per acre and do the math you come up with 4.72 ounces of actual nitrogen per tree–almost 5 ounces! I recommend not applying higher rates than this per application. I have seen nitrogen burn occur more often during hot summer temperatures when trees have elevated transpiration rates and obviously faster nitrogen uptake rates than what would have occurred at a cooler time of the year.

If you plan on applying a total of 200 pounds of nitrogen per year per acre to your orchard, I would prefer to see you add 10 pounds of actual nitrogen in 20 irrigations over the course of the season, rather than applying it all at once or even in two split applications of 100 pounds each. I know many growers that "spoon feed" their trees with injections of liquid nitrogen and other liquid fertilizers into their irrigation systems and they seem quite pleased with their fertilizer efficiency. Mature trees need more nitrogen in early spring so you may want to emphasize applying more nitrogen earlier in the season than later. Nitrogen uptake has been shown to be correlated with leaf activity and photosynthesis. Thus, dormant winter applications of nitrogen should be avoided.

The Importance of Good Agricultural Practices and Manure Application in Orchards: Preventing the Pound of Cure.

David Doll, University of California Cooperative Extension, Merced County

The Almond Board of California "Action Plan" to combat food borne illness went into effect on September 1st, 2007 requiring mandatory pasteurization of California almonds. In response to the outbreaks of *Salmonella* that has occurred in the past 5 years, the industry leaders decided to take these aggressive measures to reduce potential contaminants of almonds. Furthermore, good agricultural practice guidelines (GAPs) were developed by the University of California and the Almond Board to help reduce the risk of contaminating almonds with microorganisms that may cause food borne illnesses.

Food safety is an issue that all growers need to take seriously, especially nut growers. Shaking the nuts onto the ground during harvest provides the perfect opportunity for bad bacteria, *Salmonella* and *Escherichia coli* (*E. coli*), to come in contact with our food. Poor practices can lead to an elevated bacterial count that may increase the odds of contamination. Pasteurization processes do not kill all bacteria, but simply reduces the load. Poor agricultural practices may contribute to elevated microbial loads which pasteurization processes are not

designed to handle. Therefore growers using GAPs are our first line of defense against food borne illness and ensure the effectiveness of pasteurization to reduce bacteria to safe levels.

Being in a county where dairy and poultry play an important role in the economy, many growers make use of the manure as fertilizers for their orchard. Knowing that this is a touchy subject, it is important for us to approach this topic with an open mind. Manure is a source of bacteria that can cause food borne illnesses. Due to the potential for contamination with pathogenic microorganisms, the Almond Board does not recommend the use of manure in almond orchards. If you do choose to use manure in your operation you must consider the following:

If applying manure to an orchard, avoid application during the growing season. Try to apply manure as soon as possible after harvest. Guidelines and certification bodies require a minimum of 120 days pre-harvest interval. Research has indicated that under some conditions, pathogens may survive up to 200 days in the soil.

Fully incorporate the manure into the orchard floor. Pathogen die-off may be accelerated by the native soil-borne microbial community. Therefore incorporation of manure into the soil through tillage may shift the pathogen population, reducing the chance of contamination.

Use only treated, composted manure and maintain detailed records. Maintain records of suppliers and hauler/spreaders of manure and compost and dates of delivery as well as dates of broadcast or, preferably, incorporation. If purchasing compost from a certified supplier, obtain and keep a Certificate of Analysis for documentation.

Store manure away from areas where almonds are grown and handled. This includes the construction of physical buffers that will prevent run-off from piles by water into orchard, equipment storage, and traffic areas. Make use of tarps to cover manure piles in order to minimize the wind-driven transfer of manure particles. Furthermore, avoid running through your manure pile with clean orchard equipment to avoid unknowingly transferring manure into the orchard.

If under your control, make sure the pile of stacked manure reaches a temperature of 131-140 °F for at least three days at a depth of 18-24 inches. This will help reduce the number of bacteria found within the pile, reducing potential contamination in the field. Also, do not add fresh manure to a pile of aged-stacked pile manure because recontamination may occur.

Thoroughly clean equipment that is used for manure handling after each use. This includes tractors, front end loaders, shovels, and any other equipment that has contact with manure.

The questions of "Why do we have to do all of this now, we have been using manure applications for years?" and "What about birds, coyotes, dear, and other vertebrate pests, how can we prevent them from using our orchard as their toilet?" has been asked many times. The answer is simple: implementing practices that reduce known contamination will have a carry-over effect on contamination sources that are beyond our control, such as wildlife. Therefore, the implementation of some of these practices even has value for growers who do not use manure.

One outbreak can cause problems for all growers of an entire commodity. A prime example is of the *E. coli* outbreak in spinach in 2006 which caused the death of 5 people and sickened 205 more. Costs to the industry were over 350 million dollars and the industry reported that sales were off 20% a year later. Knowing this, it is not hard to imagine how an outbreak would affect the price of almonds or walnuts. Let us work together to implement practices that will reduce the chance of contamination by food-borne illness causing bacteria. I am always available to visit with you about your operations.

More information on GAPs for growers can be found at http://www.almondboard.com in the food quality and safety section, and at http://ucfoodsafety.ucdavis.edu . Hard-copy form of these practices can be requested from:

The Almond Board of California
Good Agricultural Practices Manual
1150 Ninth Street Suite 1500
Modesto, CA 95354