



TREE AND VINE NOTES



September 2005

September/October 2005 Pistachio Task List

Robert Beede, UC Cooperative Extension, Kings County

Summary: Keep a close eye on navel orangeworm (NOW) as harvest progresses to avoid damage on blocks harvested in mid-September. Weekly monitoring of split and mature nuts during harvest is a must. This could be a bad worm year! The research data on pistachio shows worm damage can increase by one percent per week!

There appears to be lots of early splits and hull cracking this season, which greatly increases the potential for NOW damage. I have also seen orchards "on fire" with *Alternaria* which creates defoliation and trash problems during harvest and decreases nut value from dark staining. A post harvest *Botryosphaeria* strike-cutting program is also a must in many orchards to reduce the amount of inoculum available for next season. A little post harvest water (25-50% of ETc) is advisable for relieving shaker stress and improving nutrient uptake in the fall. Growers with one to two year old trees or trees with marginal zinc levels should foliar apply this nutrient towards the end of October for the purposes of hardening-off young trees and providing zinc for flower development. Trucking could be difficult and expensive this harvest with diesel prices at \$3.00 or more per gallon.

Cultural: Crop loads vary from very light to very good this year. Although the esthetics of this year's crop have been marred by rain russeting of the hull, nut size appears excellent. I am sure growers will be considering crop load and hull maturity carefully this season to insure timely harvest and minimal staining. I will be surprised to hear many complaints about low split percentages this season. Check your stage 3 (kernel filling) irrigation schedules, zinc and boron levels if yours are lower than average.

In addition to inadequate nutrition (zinc and boron), it is my professional opinion that many factors affect split percentages. Keep in mind; the following are opinions and NOT researched facts. First, I believe time of bloom and pollination affect percent splits. In high chill years, pistachio trees have the potential of pushing and blooming early, PROVIDING the weather is favorable. When spring temperatures are warm, bloom occurs early and sharply. This, in my opinion, allows for more uniform nut development and size since a higher percentage of flowers are fertilized in a shorter period. When spring temperatures are cool and erratic, the opposite occurs. Consequently, the nuts that pollinate late experience different developmental weather than those setting earlier. These subtle differences affect the AMOUNT of cell division and the RATE of cell expansion during shell development. The result is that some nuts have thinner or smaller shells, which are more prone to both premature and normal splitting.

Diseases and Insects: Be on the lookout for *Alternaria* and *Botryosphaeria* during harvest. As leaf tissue ages, its susceptibility to *Alternaria* infection increases due to decreasing sugar content. Look for yellowing leaves, which have black necrotic lesions and spores in the center. Also examine the leaf stem (petiole) and main vein. Rub the area with your fingers to see if some of the black comes off. If so, this is *Alternaria*. This fungal disease also causes small black lesions on the hull tissue. Severe *Alternaria* can cause substantial defoliation, a symptom that might be confused with water stress. Remember that *Alternaria* DOES NOT kill nut clusters and shoots. *Botryosphaeria* does that. BOT also does not rub off on your fingers when you handle the infected tissue. Leaves uniformly brown low in the canopy can be easily mistaken as *Alternaria* infections when in fact they are simply dying from lack of light or water stress. How do you tell? Look for the black spores that rub off on your fingers! If there are no spores and the leaves are UNIFORMLY brown rather than having angular sections of brown with black spores in the center, they are shoots that have simply shaded out. Following harvest, determine if pruning, irrigation and soil management practices might be modified to reduce the problem. Dense canopies and slow water infiltration are common causes. Consider applying gypsum in June rather than in the winter to improve the surface soil

structure. Minimize Alternaria infection through good cultural practices because the materials we presently have registered for this disease develop resistance from their frequent use.

Do not confuse citrus flat mite or rain damage for Alternaria. Several calls typically occur at harvest concerning dried clusters on the tree, which cannot be removed by the shaker. Citrus flat mite causes patches of chocolate brown discoloration on the hull and rachis tissue rather than the distinct, round lesions about 1 mm in diameter associated with Alternaria. Flat mite discoloration is also only on the surface, so scratch the tissue to see if it is green underneath. Citrus flat mite also does not attack leaf tissue and cause black necrotic margins. This tiny, orange colored mite can turn entire clusters brown and render them unharvestable. Citrus flat mite damage can be confused with BOT, BUT flat mite does NOT cause oozing and blackening of the cluster like BOT. Wettable sulfur in June or July is the cure for flat mite. If you are near a dairy, do not confuse flyspeck for flat mite!

BOT infected tissue must be pruned out and removed from the orchard to prevent the build-up of inoculum. DO NOT let strike removal go! Cutting shortly before or after harvest in the presence of leaves makes it easier to see the strikes.

Do not confuse leaf scorch common on the male "Peters" variety for Alternaria or Botryosphaeria. Male scorch is thought to be caused by heat and it may predispose the males to Alternaria, but this disease did not cause the initial leaf browning.

Lower Limb Death in Almonds

By Roger Duncan, UC Cooperative Extension, Stanislaus County

We are noticing more dieback of lower limbs in many almond orchards this year. This "disease" has become quite significant, killing a large percentage of the lower wood in some orchards. Padre appears to be the most seriously affected variety, although Butte can be very bad also. Nonpareil, Carmel, Aldrich and a few other varieties are affected to a lesser degree. The problem appears to occur primarily in orchards older than ten years.

Symptoms. The problem is associated with weaker, small diameter wood in the lower canopy, although shoot death sometimes extends ten feet or more from the ground. Beginning in late April, leaves on affected limbs first turn yellow, then brown as the limb collapses. Limbs may die right up to the point of attachment but the large wood of the scaffolds appear to remain unaffected. If the bark on yellowing limbs is scraped away with a knife, you can often see brown spots underneath. These spots seem to grow together to form large dead areas which then causes the whole limb to collapse. Shoots continue to collapse throughout the summer. Sometimes darkened cankers can be seen extending deep into the middle of the branch if you cut the branch in cross section. Sometimes the cankers are wedge-shaped, sometimes they are not.

The Cause. With help from UC plant pathologist, Themis Michailides, we surveyed several orchards in Stanislaus and Merced Counties to determine if the limb death is a disease or if it is caused by some other problem. Clearly the limb death is not caused by excessive shading, anthracnose, Alternaria, or bread mold. In all surveyed orchards, two different species of fungi were consistently found growing on affected limbs. The fungus most consistently isolated from "diseased" limbs was an unidentified species of Phomopsis. There are many species of Phomopsis that cause canker diseases in grapes, figs and other plants. Phomopsis amygdale causes limb dieback of almond in some Mediterranean countries, Australia and in South America. This fungus was also shown to be the cause of a fruit rot and associated limb dieback in a Butte County almond orchard in 1998 after an unusually wet spring.

The second fungus commonly isolated from affected shoots was Botryosphaeria dothidea. This is the fungus that causes band canker, a fairly rare disease affecting the trunks and scaffolds of young almond trees. It is also the cause of panicle and shoot blight of pistachio, a serious disease for that industry. Recently, this fungus has been shown to cause shoot dieback in local walnut orchards. During our survey, we found this fungus sporulating on dead walnut shoots in orchards next to affected almond orchards. We also found spore-producing structures in nearby cedar and redwood trees. Botryosphaeria fruiting bodies were rarely found on the affected almond wood. It is unclear at this time if one or both of these fungi are responsible for this lower limb dieback. If these fungi are involved, it is unclear when infection is occurring.

This spring, we tried to reduce lower limb dieback in a badly affected Butte/Padre orchard by spraying Abound® fungicide from petal fall through June 1. Of course, we would never want to apply any fungicide that often back to back in the real world, but we were just trying to determine if the problem could be reduced with spring-time fungicide sprays. Unfortunately, even trees sprayed four times after petal fall had just as much lower limb dieback as the unsprayed trees. Abound® should have been very effective against both of these fungi. This information suggests that infection had already occurred prior to petal fall and that it may take several months for the dieback symptoms to show. In fact, the literature from other countries suggests that Phomopsis infections on almond shoots occur primarily in the fall. In the coming months, we will try some fall and/or dormant treatments to see if we can reduce this lower limb dieback problem. However, based on conversations with growers, typical dormant copper applications do not seem to make a difference.

As you can see, we are just in the first stages of figuring this problem out. At this point, I suggest pruning out affected and dead limbs before the fall rains arrive (and while trees still have leaves so you can identify which limbs to remove). Removing these limbs should reduce the inoculum in the orchard. It is also important to keep limbs strong by keeping scale populations low with an occasional dormant oil application. Guidelines to determine when a San Jose scale treatment is necessary can be found at <http://ipm.ucdavis.edu> or you can give me a call. We will continue to work on this problem and hopefully come up with some answers for next season.

Verticillium Wilt

By Roger Duncan, UC Cooperative Extension, Stanislaus County

This has been a particularly bad year for Verticillium wilt, especially on the west side in old row crop ground. Many second and third-leaf orchards have extensive limb death. Affected trees will have to be retrained or replaced. Even first-leaf trees are affected this year, which is pretty unusual. All Prunus species trees (almond, apricot, cherry, plum, peach, etc.) are susceptible.

The soil-borne fungus invades trees through the root and grows up into the water-conducting pipes (called xylem) in the trunk and limbs. The fungus eventually clogs the pipes and then shoots die from lack of water. Affected limbs collapse quickly and shoot tips often turn dark and curl into a characteristic “shepherd’s hook”. If you cut cross ways through an affected limb, you can often see a darkened ring. This is the area of clogged xylem vessels. Extended, cool spring weather like we had this year favors growth of the fungus which leads to more extensive problems. Once temperatures heat up in the summer, the fungus dies out in the upper part of the tree and no more shoots die. Although shoot dieback is rarely observed in almond and stonefruit trees older than five years, it is very likely that tree growth and yield will be affected even in the absence of disease symptoms. Pistachios on susceptible rootstock can have serious shoot dieback problems for the entire lifespan of the orchard.

This fungal pathogen is generally present at very low levels in most areas of the San Joaquin Valley. High populations of Verticillium build up in soils when susceptible crops such as tomatoes, cotton, cucurbits (melons) and strawberries are grown over and over. Verticillium can also build on weeds such as pigweed, groundsel, London rocket, nightshade and dandelion. Verticillium forms resistant spores called microsclerotia that can survive for 6-12 years in the soil.

There is no “cure” for an infected tree. The best strategy is prevention. If you plan to plant an orchard in ground previously planted to susceptible row crops, you should take soil samples to determine your risk of Verticillium wilt. Only sample the top twelve inches of soil because the microsclerotia are pretty shallow. Significant Verticillium wilt disease can occur in almond orchards when there are only three microsclerotia present per gram of soil. Only one microsclerotia per gram is necessary for significant problems in pistachio. Following a susceptible annual crop, there may be 60 or more microsclerotia per gram in the top foot of soil!

Solarization with clear plastic is very effective in killing Verticillium. Fumigating with chloropicrin or combinations of methyl bromide or Telone® that contain chloropicrin can also be effective in reducing Verticillium. All peach and peach/almond hybrid rootstocks are very susceptible. Marianna 2624 plum rootstock is somewhat resistant, but probably not worth the trouble.

Hull Rot

By Roger Duncan, UC Cooperative Extension, Stanislaus County

We are seeing a fair amount of hull rot (commonly called “bread mold”) again this year in Nonpareil and Sonora almonds. Last year I tried spraying Botran®, a very effective fungicide against Rhizopus (but not registered on almonds) at 5% hull split and again at about 60% hull split. Even at the highest label rate, we saw no significant reduction in hull rot compared to unsprayed trees. Brent Holtz, UCCE Farm Advisor in Madera County, tried a more extensive list of fungicides than I did, including sulfur. Unfortunately, Brent was no more successful than I was in reducing hull rot. It appears that fungicide sprays during hull split are not the answer for hull rot. We probably just cannot get the material inside the splitting hull, which is where the infection is occurring. However, we know that we can make matters significantly better (or worse) through our cultural operations. Hull rot is generally worse in well-watered and excessively fertilized orchards. Growers should avoid applying nitrogen fertilizer in June and July. Growers with drip and microsprinklers should reduce their irrigation by 50% during the first three weeks of hull split (assuming the trees are well watered to begin with).

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