



July-August, 2015 Orchard Task List for Pistachios
By Bob Beede, U.C. Farm Advisor, Emeritus

Crop Update: Depending upon your location, harvest should be about as early as last year, which was about 10 days ahead of average. Some growers report the beginning of kernel filling as early as June 15 this year, which is another strong index for early maturity. However, many growers that I interviewed indicated that they had not yet seen any growth of the embryo, even in oiled blocks. At this early stage in kernel growth, I do not know if this is an indication of slightly delayed development, or a high percentage of blanking associated with insufficient chilling. Based upon considerable hours spent monitoring several orchards this spring with Carl Fanucchi near Buttonwillow, Tejon, and Laval Road, I am of the opinion that Kern County suffered a serious deficit in chill accumulation. However, most of these orchards have NO TEMPERATURE MONITORING EQUIPMENT, so we can only guess how much chilling they actually received. I do not plan on having any future discussions of poor tree performance with growers who do not have temperature data. It is simply a waste of time, and the older I get, the more precious time becomes.

Many growers have also expressed disappointment in the response to oil application this winter for the purpose of overcoming insufficient rest. Although I share your pain and frustration with oil not performing miracles, I have mentioned in previous task lists that we have been navigating uncharted waters the past two seasons with historically dry and warm winter weather. Stating that pistachios are not designed to grow without proper rest satisfaction is as obvious as claiming that a Volkswagen cannot pull a ripper shank. However, growers find the latter far easier to accept than pistachios being cranky from no rest. The past two winters clearly reveal that we need more accurate methods for assessing rest satisfaction, and greater knowledge on how to best apply oil or some other magic dust to overcome inadequate rest to the best of our horticultural ability. I hope to perform tests on rates, timing, and oil weight this next winter, with the hope that declaration produces the coldest, foggiest winter in Central Valley history.

Now that we have the whining out of the way, let's address what we should be doing now to make the best of this season. By the 20th of June, we will have finished Stage 2 of pistachio development, in which shell hardening is almost complete, but kernel filling has not yet begun. Growers will soon need to monitor for kernel development, a task I believe to be of particular importance this season. Observing kernel filling will tell you a great deal about the effects of erratic leafout and bloom on fruit set and crop development. I would expect to find a very wide range of kernel sizes early in the development period, which will reflect how strung out the bloom period was. It will also tell you if the blank nut percentages are unusually high, which is a product of lack of pollination. Assessment of kernel filling should be performed as follows; randomly collect 10 ENTIRE clusters from a selected area of the orchard in a five gallon bucket, making sure that they represent fruit borne from each of the four tree quadrants (north, south, east, and west). Find a comfortable, shady area to work, because you are going to be there for 45 minutes. Strip the nuts off the rachises, and place the nuts in a container you can easily access. With a pair of hand shears, cut EVERY nut in half. Those preferring to cut them horizontally should hold the base of the nut while they remove the upper, more tapered tip. I prefer to cut the nuts lengthwise, because it makes viewing the developing green embryo at the tip of the funiculus easier. However, cutting lengthwise must be done with greater care to avoid catching the flesh of your index finger in the shears. Rate the cut nuts for kernel fill, and place them

under one of five categories labeled 0 to 5 (0=no fill, 5=completely filled) written on a piece of cardboard, or large coffee cups. When you are finished cutting all the nuts, count the number in each category, and do the basic math to determine the percentages of each. **WRITE DOWN** the results! Performing this task at least every two weeks will tell you a great deal about what to expect at harvest relative to maturity and crop load. By the way, **REAL** pistachio growers do this!

Kernel filling requires **lots** of water, nitrogen, potassium, and boron. Average water use in July is 9.8 inches (55 gal/tree/day, 150 trees/ac). August water use is 8.2 inches (50 gal/tree/day). Keep an eye on the temperatures and adjust your schedule accordingly. If you do not have any soil moisture monitoring equipment in the orchard, be sure to auger occasionally to check for moisture below two feet. The surface can look mossy and wet, but the lower depths can be dry as chalk. Believe me, deficit irrigation sneaks up on you, and before you know it, your trees are stressed and limited in kernel filling rate! The amount of water applied must be greater than the tree's water requirement because of application inefficiency (70-80% efficient in basin or furrow systems, 85-90% in low volume). **Deficit irrigation, zinc or boron deficiency, and cool weather during kernel filling will dramatically reduce split nut percentages.** Orchards with a history of *Alternaria* should be on their second spray by mid-July. Waiting until symptoms to appear in August is too late for disease control. Continue to watch for leaffooted plant bug and stink bugs, which are difficult to detect after shell hardening. This is because the hull and shell **do not** develop the brown lesion characteristic of bug damage earlier in the season when the shells are soft. However, they will often show a tiny, clear bead of sap on the hull from where the stylet penetrated. It is not too late to apply nitrogen and potassium for kernel filling.

Dr. Joel Siegel's trapping data in Madera indicates that the overwintering flight of Navel orangeworm (NOW) ended the week of June 12, and the second flight will begin around June 25. This timing coincides with his 1700 DD prediction using January 1 rather than a true biofix based upon egg trap data. As of mid-June, growers were not reporting any early split nuts, which Joel has confirmed as being an important link to accelerated development of in-season NOW. The need for treating at 1700 DD is based upon many factors **specific to each orchard**. This includes past NOW damage, degree of winter sanitation, surrounding host crops for NOW and their degree of cleanliness, and what plans you have for treating later in the season.

Dr. Siegel's research suggests that 1700, 2200, and 2700 Degree Days from January 1 are key times for **evaluation** of your NOW population, since they mark rises in NOW activity. Dr. Siegel's research confirms that NOW cycles **MUCH** faster on new pistachios, so much so that they can complete a generation in 500-600 D⁰! Dr. Martin Barnes also reported this back in the 1970's. Hence, Dr. Siegel suggests orchards under **HIGH** NOW pressure may require re-treatment at 2200 **and** 2700 D⁰ from January 1. The need to do this in **YOUR** orchard is a decision between you and your crop consultant, but I **CAN** tell you that this conversation needs to occur sooner than later to prevent you from having serious worm damage this season. Brad Higbee, Paramount Farming Entomologist, is testing the 1700 DD timing this year under large replicated conditions.

Between the difficulty in thoroughly winter sanitizing pistachios, and the thousands of acres of nut crops now present in the southern San Joaquin Valley with varying degrees of NOW management, it is no surprise to me that attempts to apply IPM principles prove very difficult. This is especially true with our excessive reliance on fourth and fifth generation pyrethroid insecticides, which are very hard on the predator and parasitic insects. There are no praying mantises in the orchards these days!

Watch out for citrus flat mite, a common pest in July that turns the rachis and hull tissue brown from feeding. Newly planted orchards should be prepared and scheduled for budding in early August. Follow the budder's instructions for irrigation and post-budding plant management. Tissue sampling should also be done in mid-August.

Soil and Water Management: Spread gypsum at one to two ton per acre if infiltration is becoming a problem. Standing water increases your foliar disease risk due to greater humidity. Irrigate every other middle rather than stretching irrigations out to reduce standing water and tree stress. This is especially critical if you are on shallow soil with limited root mass. **Remember: no water = no splits = no money!** In the WORST cases, rip down the middle of the row with a single 24" shank to get water into the root zone. The stress caused from in-season root pruning is small compared to dry trees. Irrigate IMMEDIATELY after you rip! A professional soils and water adviser can assist you in assessing the need for such drastic action.

Pest Management: Hull discoloration (epicarp lesion) typical of plant bug feeding **prior** to shell hardening does not occur **after** hardening. Hence, nuts observed now with external lesion symptoms are old damage. Do not forget to look for new damage **at the base of the nut** where it attaches to the stem. This is the "Achilles' heel" of pistachio since it remains softer and the insects somehow know this! Feeding at this site can cause loss of the developing kernel. Big bug feeding elsewhere on developing kernels causes distortion, sunken areas and black lesions in the meat (kernel necrosis). Carry a pair of hand shears during orchard monitoring. Select nuts randomly and cut them open to examine evidence of recent kernel damage. *Stigmatomycosis*, a fungal yeast infection resulting in wet, slimy kernels is also transmitted by the big bug mouthparts penetrating the kernel. Keep your UC/Pistachio industry insect guide handy for reference in the field.

The 2015 NOW population is reportedly a bit lower thus far than 2014. NOW researchers, Dr. Joel Siegel (USDA), and Brad Higbee (Paramount Farming) both continue to expand our understanding of this difficult insect. Growers have responded to the industry plea for "No NOW" with multiple treatments of environmentally safe but long-residual materials. Although this presently appears to be a successful insurance program against insect and aflatoxin damage, it is one which we hope to soon wean ourselves from. Growers having implemented mating disruption (puffers) report less NOW activity in their egg traps. It would be exciting news if orchards with puffers report less damage at harvest! The Suterra Biolure is also proving to be a valuable tool for monitoring adult male moths in non-disrupted orchards. Last year, crop consultants observed that the winged BioLure traps caught male moths ahead of when the egg traps started up. This pattern of advanced warning has apparently not been consistent this season. The Biolure may be very helpful in timing your August treatment, since you MIGHT be able to project 500-600 degree days (DD) out from heavy moth catches in July to possibly predict when the next wave will occur in August. This has NOT yet been confirmed from research. Please let me know if you find this suggestion helpful to your NOW program.

August-only treatments may not provide sufficient NOW control in orchards with high populations. By August, NOW development is strung out and generations are overlapping. Hence, a single treatment is unlikely to provide sufficient residual to reduce damage by much more than 50%. NOW eggs are also often imbedded in early maturing hull tissue in August and thus they avoid insecticide exposure unless they hatch and wander over it prior to boring into the hull tissue. Deciding on the necessity for treatment depends largely on damage history, the abundance of old "mummy" nuts and early splits, the projected harvest date, and the presence and condition of surrounding orchards, especially almonds. Don't forget to check the crotches of your trees for old nuts, which are often infested. When first laid, NOW eggs are white. Within a day, they turn a salmon-color, which becomes a reddish-orange just prior to hatch. Mean egg hatch is 100 degree-days from the time they are laid (about three to four days in the summer). In addition to egg color, note the size of any NOW larvae you find. This helps determine how strung out the NOW flight is in the orchard. Harvest after September 15 greatly increases your risk of NOW and often requires use of an insecticide to reduce damage. Insecticide choice will depend on your projected harvest date, and the pesticide preharvest and reentry interval. Monitor shriveled and split nuts weekly to obtain some feel for how much NOW is present. Depending upon the population and when you find it relative to your planned harvest date, use of the longer residual pyrethroids will provide better control, but they have a

longer pre-harvest interval (one week versus one day). Insecticides chosen for adult activity are most effective when applied at night, when the moths are active. Also take note of any sources of beet armyworm (cotton, alfalfa, pigweed), which can also attack maturing pistachios. Gary Weinberger has seen as much as 0.5% damage due to this pest.

We have several excellent materials now registered for navel orangeworm control. Your selection and preparation for treatment should be made in conjunction with an experienced pest consultant. You should also **CHECK WITH YOUR PROCESSOR**, to insure that your plans do not conflict with maximum residue levels set by other counties. It is also **CRITICAL** that you keep excellent records of what you have done. This is a major component of the good agricultural practices program established by the industry.

Pacific mite infestations occasionally occur in pistachios. Unlike citrus flat mite, pacific mite can cause damage at low populations (3-5 per leaflet). Defoliation during kernel filling can greatly reduce crop quality. Research suggests pacific mites do not thrive on pistachio. Six-spotted thrips are very effective predators. My research on various miticides in 2000 indicated oils of all types were as effective as synthetic compounds. Observations also indicate the addition of spreader-stickers to oils is not advised due to possible russetting of the hull tissue which could increase the potential for *Alternaria* infection later. Slight phytotoxicity may occur with oil applications made close to wettable sulfur.

Botryosphaeria may appear in August in some orchards. Orchards with past BOT infections benefit from two sprays; one in mid-June, and another close to mid-July. The strobilurins remain very effective against BOT, because the sexual stage of this disease is not present in pistachios, and its genetics remain very stable. This is NOT the case for *Alternaria*, whose genetic makeup is constantly changing, and thus it develops resistance to new fungicides within a couple of years, depending on the frequency of application. Treatment timing for *Alternaria* is the same as that for BOT. Do not wait to treat for *Alternaria* in August when symptoms appear, because it is then too late. High humidity and dense canopies both favor buildup of *Alternaria* inoculum. Look for patches of brown necrotic tissue on the leaves with black sooty material that rubs off on your fingers.

Fertilization: U.C. Davis research shows kernel filling is a period of high nitrogen demand. On-year trees took up 35 percent more nitrogen during kernel filling than off-year trees. The nuts accounted for more than 90 percent of the accumulated nitrogen for the entire season. The total nitrogen requirement for on-year trees was calculated at about 150 pounds. Research by Dr. Siddiqui and Dr. Patrick Brown indicate 28 pounds of N is required per 1000 pounds of ACP weight pistachios. Add 25 pounds of N during the on-year for tree maintenance. These guidelines do not include inefficiencies in application, which can run as high as 50% when applied by the water-run method. Off-year trees accumulate most of their nitrogen in the canopy branches. Yellowing of leaves adjacent to nut clusters is common in heavy bearing trees. This occurs even when tissue levels are considered adequate (2.5%). Some growers report less yellowing with higher nitrogen applications. This has not yet been researched. .

Potassium (K) uptake is also very high during kernel filling. Research by Drs. David Zeng and Patrick Brown indicate potassium applications up to 200 pounds actual K per acre applied in equal amounts over the months of May through August significantly increased yield, split nut percentages, nut weight and reduced blank and stained nuts. Reductions in staining were associated with less *Alternaria* leaf infections at harvest. Siddiqui and Brown indicate 25 pounds of K are required per 1000 ACP pounds of pistachios. The greatest response to K fertilization was on soil whose potassium availability was limited by either low soil K or high fixation within the soil. Young alluvial soils such as those on the west side of the San Joaquin Valley are very high in exchangeable K, and thus less likely to respond to potassium fertilization, unless confounded by salinity or extremely light texture. Zeng and Brown suggest the August tissue level for K should be about 1.7% for optimum plant performance. No elevation in chloride was observed in the leaf tissue from chloride-containing potassium sources after three continuous years of application.

However, consideration of orchard health, soil permeability and stratification should be given prior to performing large-scale KCL applications.

New Trees: Lack of chilling has also affected the growth of young trees in many southern and westside locations. Bud break has been very slow, causing unbalanced trees and extra training costs. Be cautious about tipping secondaries too late in hopes that sufficient tertiary growth will occur to gain additional canopy development. My experience is that it only works on highly vigorous trees. Carl Fanucchi has shown me second-year trees with strong tertiary growth from secondaries tipped as late as early August in Buttonwillow. However, I have also seen insufficient growth from the same practice on the eastside in Pixley. Properly assess your orchard's vigor with your tree trainer before attempting this. There is always next year! Tying vigorous limbs into the desired upward position prevents flat scaffolds in the winter. Above all, be careful about too much water. Also, be on the lookout for zinc, boron or copper deficiency, all common in young trees. They will stop new growth!

Happy farming!