



April 2014 Task List for Pistachios
By Bob Beede, UC Farm Advisor, Emeritus

Leaf Out Observations: I will be the first to admit that I do not fully understand the pattern of pistachio leaf out this spring. The short version of the story is that we are 7-10 days ahead of our “normal” leafing and bloom pattern, in a year in which rest satisfaction is very questionable. I could try and offer lots of seemingly scientific words in a vain attempt to demonstrate that I comprehend deciduous tree dormancy and rest better than others, but suffice to say, our understanding of rest is the equivalent of sticking one’s head in a dark box, and then attempting to elaborate on what degree of black it is! Yes, we know that the winter weather in the Central Valley has changed dramatically from the “old days”, when one dared to drive in Tule fog that persisted for days on end. Yes, we know that there has been an abundance of hours below 45⁰F this winter in most areas on the Valley floor. Yes, we know that there has also been an abundance of exceedingly warm days, which have driven the flower bud temperatures of both Kerman and Peters well above 45⁰F. And, yes, we have a Dynamic Chill Model which attempts to mitigate those high temperatures suspected of negating the colder ones. However, we ultimately are still making a scientific stab at explaining an event we do not understand on a physiological basis. To my knowledge, we have no data to even know if the temperature thresholds used for chilling and non-chilling are accurate, or whether they differ between Kerman and Peters, or Golden Hills and Randy. In summary, when the winter weather pattern was relatively simple (cold and foggy), our simple chill accumulation system worked pretty well. When we experience such extreme weather patterns as this past winter, we discover that our traditional tools, and to some degree, those attempting to be more sophisticated, still do not explain deciduous plant behavior.

So, what does this all mean to the pistachio grower trying to figure out this year’s leaf out pattern? If you did not oil, and your trees appear to be leafing out normally with good synchrony between the male and the female, then accept the fact that you are one of the fortunate ones whose orchard received adequate chilling. We estimate this to be about 750 hours below 45⁰F for Kerman, and possibly as much as 850 hours for Peters. If you find Peters lagging behind Kerman, then it is reasonable to conclude that the rest satisfaction of Peters was not fully satisfied. If your temperature recorder (you all have those in your orchards at this point, correct? Ha!!) suggests that you received 1000 hours or more below 45⁰F, then assess the number of hours between 61-70⁰F during the critical chill accumulation months of December and January. According to the Dynamic Chill Model, these play a significant role in negating the recognized chilling temperatures. Also run the Dynamic Chill Model for your nearest CIMIS weather station to see how close to 58-60 chill portions you came (http://fruitsandnuts.ucdavis.edu/Weather_Services/chilling_accumulation_models/Chill_Calculators/?type=portion). Research by Dr. Katherine Pope, recent Doctoral student at UC Davis, suggests this amount should meet the rest requirement of Kerman pistachio. The chill portions for Peters could be as high as 67. Dr. Pope suggests that roughly 13 hours below 45⁰F equal one chill portion.

Should we expect properly applied dormant oil to overcome insufficient chilling? Well, in all the years I worked with oil, it appeared to work well in this regard. HOWEVER, I never tested oil in a year as goofy
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as this one! My observations, and those of others in Madera and Kern Counties, suggest that Kerman responded much more to the oil treatment than did Peters. Why? Well, it would suggest to me that the rest requirement of Peters was much less satisfied than that of Kerman, perhaps by experiencing greater bud temperatures due to the larger Peters bud being a bigger solar target. The bark of Peters is also darker and thus more heat absorbent, thus possibly making the warm daytime temperatures more effective in negating those below 45⁰F. Preposterous? No one has ever measured bud temperatures during the winter, so who is to say yay or nay? I think we have to be careful not to overthink the reason for the delayed leaf out and bloom in Peters. For some reason within the dark box of rest physiology, Peters has not received enough chilling to be in sync with Kerman, and a properly applied oil treatment did not overcome it this season. Dormancy research also shows that warm spring temperatures help overcome inadequate winter chilling. Chris Wylie, Agri-World Ranch Manager, alerted me to the fact that the past 46 days have all been above their historic average in temperature. Thus, the more rapid leafing of Kerman could be a combination of almost complete rest satisfaction AND higher spring temperatures. The fact that Peters is not responding equally to the warmer spring suggests that its chilling requirement was far less satisfied. Carl Fanucchi, one of the living legends of Kern County pistachio culture, tells me that the new male cultivar, Randy, is overlapping beautifully with Kerman this year. This is something to consider in future plantings if our present winter climate persists.

What will be the fate of fruit set without sufficient overlap between the male and female trees? Time will tell. I certainly do not consider myself wise enough to make some blanket statement, and cause nights of restlessness and worry. My good friend and Extension Viticulture Specialist, Peter Christensen, always reminded me that 99% of the time, the worst never happened. Let's hope this is the case with the orchards with asynchronous leaf out and bloom!

One final shot on rest assessment; in a research report I wrote back in 2005 covering a rather elaborate attempt to refine our understanding of the chilling requirement of pistachio, AND the accuracy of three different methods of temperature accumulation, I mentioned that the industry would be WELL SERVED by establishing MONITORING STATIONS in various areas of the state where temperatures were annually recorded, AND spring tree development was regularly monitored, at LEAST up until fruit set. NOTHING ever became of that, and now you are freaking out about not having a bumper pistachio crop! What part of the old Boy Scout motto, "BE PREPARED" don't you understand?

Spring Diseases: If wet weather occurs during bloom, it may be necessary to apply a fungicide to control *Botrytis* and *Botryosphaeria*. The potential for these diseases depends upon past infection levels and repeated rain events. **Dr. Themis Michailides has determined 0.2 inches of rain and temperatures at or above 55⁰ F constitutes a *Botryosphaeria* infection event.** Your inoculum pressure can still be assessed by examining the base of old cluster rachises for blackened tissue **which extends into the one-year-old wood, and looks like verticillium streaking from where the cluster attached to the branch.** Infected old clusters also tend not to break cleanly from the shoot. Instead, they leave a stub when one attempts to knock them off. Also examine older wood for sunken areas, which, when cut into, also have blackened tissue running lengthwise in the limb. These represent old infections, which can possess active pycnidia for up to **six years**. *Botrytis* attacks the male bloom more than the female, because the tufts of pollen are high in sugar and proteins, both good substrates for the growth of this fungus. Male cultivars 02-16 and 02-18 (old selections originally released with Peters to assist in its overlap of Kerman) are more susceptible than Peters due to their denser bloom character. Kerman female trees show *Botrytis* infection in young, tender shoots. Diseased shoots wilt, and their tips curl like a shepherd's hook. **They turn dark, dull green, not black!** The base of the shoot also develops a cluster of buff-colored spores. ***Botryosphaeria* shoot infections do not occur until later in the summer** when it gets hot. See pages 37-40 of your BOT manual to contrast *Botrytis* to BOT. Several fungicides are now registered and effective against these diseases. Consider the likelihood of treating for *Alternaria* later in the season, and save the fungicide most effective against *Alternaria* for use in June or July. You can compare fungicide efficacy (we still are

waiting on the 2014 edition of this publication) at the UC website: <http://www.ipm.ucdavis.edu/PDF/PMG/fungicideefficacytiming.pdf>. Management of *Alternaria* resistance has now become a major concern for PCA's and growers.

Water: Obviously, water is a major issue for many this year. Growers with limited supply should save as much as you can for Stage III (July through August) in order to promote as much kernel filling and splitting as possible. Start off the season with at least 75% (estimated) field capacity to four feet, and then try to hold out until May to irrigate, if water availability is limited or very expensive. Irrigating at 50% of Etc from bud break to shell hardening was not harmful to pistachios in our regulated deficit irrigation trials. It did result in smaller nuts, and early splits were slightly higher. However, deficit irrigating from early July to harvest has serious negative effects on kernel filling, crop weight, and split nut percentages. Refer to last month's task list for more information on allocation of limited water throughout the season.

Nitrogen: You have all heard of the UC Davis study (the Harter Report) about agriculture being the source of ground water contamination. Grandpa may be responsible, but he is not around to take the blame. We have to step up to the plate and be the BEST stewards of our nitrogen usage as possible. Hence, avoid nitrogen applications before fruit set. **Remember that early shoot growth and fruit development is all from STORED NITROGEN! A good nitrogen management program includes soil, plant, and irrigation water N assessment. This means you should have samples taken of each, so you can make a better assessment as to how much synthetic N needs to be applied to the soil to meet the plant/crop requirement. I suggest you begin this management process NOW, because it will most likely be EXPECTED of you by some agency in the near future!** Shortly after bloom, I would assess my crop load, check past analyses and then begin N fertilization at 30 to 50 pounds depending upon irrigation method and estimated crop load. Apply the higher rate under flood irrigation. Recent research by Dr. Patrick Brown, UC Davis, indicates that pistachios remove 28 pounds actual N per 1000 pounds of ACP weight from the orchard system. **This value does NOT account for application inefficiency!** Fertigation applications may be 80% efficient. Furrow/broadcast applications may be as low as 50% efficient. It is for this reason that pistachio growers have largely gone to drip irrigation for improved water and nutrient management. Back off on the N applied this season if you find soil nitrate nitrogen levels above 25 ppm per foot in the root zone. Nitrate nitrogen levels in the irrigation water must also be considered in your budget. A 10 ppm nitrate N level supplies 27 pounds of actual N per acre foot of water applied!

Adding high levels of N to the soil early in the season will NOT result in greater plant uptake unless the tree is deficient. Available data indicates pistachio growth and yield is not improved with July tissue levels above 2.5 percent. A validated model for predicting July nitrogen and potassium levels from tissue samples taken earlier in the season can be found at: http://www.plantsciences.ucdavis.edu/plantsciences_faculty/brown/Models/PPMtest.html. Created by Dr. M.I. Siddiqui during his doctorate studies with Dr. Patrick Brown, UCD Pomology Professor, this model allows growers to assess the future nitrogen status of their orchards from late April and May tissue samples. For example, a 3% nitrogen tissue analysis 40 days after full bloom would predict that you would have 2.68% in July, a level sufficient to begin kernel filling. I recommend you begin using this model, since laboratory testing last season showed it was an accurate prediction tool.

Micronutrient Sprays: Research shows good zinc uptake at 50% leaf expansion (late April). Use only 2 pounds of zinc sulfate 36%. Research by Patrick Brown and Qinglong Zhang indicates it is safe to add one-half pound of Copper EDTA or one pound of Solubor to the foliar zinc sulfate rate. Buffering this mixture to a pH of about 5 also improves zinc uptake by increasing the amount in solution. Acidification should be done with citric acid (powder) rather than phosphoric buffer to prevent zinc phosphate precipitation. Many growers prefer to avoid the "Betty Crocker" mix and apply liquid materials formulated for pistachios. Check with your supplier for suggestions, but be sure they have adequate amounts of copper, boron, and zinc. **This is especially true of two and three year-old trees.** Deficiencies severely limit canopy development and reduce

early bearing potential. They are also very common, suggesting growers are not taking young pistachio plant nutrition sufficiently seriously, and suffer loss in orchard development because of it. My experiences suggest second leaf orchards are especially susceptible to micronutrient deficiency, partly because of all the tipping performed to create branching. Three sprays are often needed to prevent loss of canopy development during this critical training year.

Shriveling flower clusters do not necessarily indicate fungal infection. Clusters that remain green and shatter off the tree could be associated with low boron levels. Boron deficient leaves have crinkled edges but remain uniformly green and normal in size. Tissue levels less than 60 ppm in May suggests the need for boron fertilization. Boron is taken up by the leaves throughout the season, so application can be made at any time during the spring. Correcting severe deficiencies may require 2 ounces of Solubor **PER TREE** (16 lb/ac) soil applied! Yes, you read it right. It's not a typo! Pistachios are boron pigs!

Pest Management: Beating tray monitoring and sweep net sampling of true bugs should be initiated. The native vegetation surrounding pistachios is still somewhat green for now, so the migratory plant bugs have no reason to move...yet! That will quickly change as we move into April and early May! Navel orangeworm (NOW) traps should be in place. The Suterra NOW adult lure, looks to be very effective in catching adults from trapping data collected last season. Running both egg and adult traps for a couple seasons would certainly assist crop consultants interpret the wing-trap data. Research suggests pistachios compensate for nuts lost to *Phytocoris* and *Lygus* feeding, so early chemical treatment specifically for these pests may not be needed unless you have significant BOT, and *Calacoris* is your predominant plant bug present prior to shell hardening. Most growers routinely add a pyrethroid to their mid-April nutrition spray to cover this issue. Donnie Thomas, private pest consultant, also likes to assess the presence of Gill's pistachio mealybug at green tip using his beating tray. He beats ten trees per area with his tray beneath the shoot tips, and then surveys the tray for grey, immature mealybug stages that have crawled up the trunk during the warm February weather. Donnie says this has really helped him determine if he is going to have a problem in June. I would appreciate feedback from others who experiment with this.

Weeds: Weed control is critical this time of year, especially London rocket and spotted spurge which are preferred hosts for false chinch bug. When these weeds dry, the chinch bugs can roar out onto your young budded trees and kill them with the toxin associated with their mass feeding. Clovers, Russian thistle and birdsfoot trefoil are just a few of the weeds serving as hosts for lygus (grasses are not hosts for lygus) and stinkbugs. If you did not get the importance of removing London rocket and spotted spurge, read this paragraph over again, or suffer the consequences of dead trees from false chinch bug!

Happy farming!

Bob Beede is a University of California Cooperative Extension farm advisor, Emeritus, in Hanford.