



January 2018 Task List for Pistachios
By Bob Beede, UCCE Farm Advisor, Emeritus

Chilling and Cold Weather Update: High temperatures prevailed until the first week in December, when we finally got frost on the 5th. The first frost normally occurs about the second week in November. We had Thanksgiving outside at our neighbor’s house in shirt sleeves; I cannot remember the last time I did that. Maybe never! It was 77^oF November 23, and 82^oF on Black Friday! I am therefore surprised that the Chill Portion accumulations for selected CIMIS stations are not too far behind last year! Can this be true? Gee, I know a way farmers could determine that! It’s called YOUR OWN WEATHER STATION IN THE ORCHARD, something I have been whining about for years! I think you guys don’t respond to my pleas, just to watch me froth at the mouth, like an English bulldog!

Table 1 provides the chill portions for various sites throughout the Valley between September 1 and December 10 for the past five winters, as well as 2010 in which over 70 chill portions were accumulated by February 15. This exceeds the 58-60 chill portions estimated to satisfy the rest requirement of the Kerman cultivar. The Peters male may have a chill portion requirement as great as 65. The values in parentheses are the **total chill portions** accumulated by station and year. As you can see, 2013 and 2014 were significantly warmer than 2010, in which dormancy was well satisfied throughout all areas of the state. The 2015 winter data shows good chill accumulation throughout the Central Valley in mid-December, and continued cold temperatures through January contributed to the record 2016 crop. In contrast, 2014 was already showing deficient chill accumulation at several locations by mid December. The Arvin/Edison and Coalinga stations might be considered the “canary in the coal mine” for early assessment of future low chill winters. HOWEVER, now that all of you have your OWN weather stations, you can obtain much more valuable data than a poorly maintained CIMIS station being used as a scratching pole by a white faced steer! The importance of orchard-accurate chill data is realized by the 2017-18 CIMIS data I have summarized for your consideration. As you can plainly see, chill portion accumulation is marginal thus far, and we need a shift towards colder days to meet the pistachio chilling requirement.

Table 1. Chill portion accumulation for various CIMIS stations statewide from 9/1-12/10 for selected years. Numbers in parentheses are the total chill portions accumulated at each station by year from 9/1- 2/15.

Year	2017-18	2016-17	2015-16	2014-15	2013-14	2010-11
Durham	21	23(64)	25 (66)	22 (55)	20 (54)	28 (70)
Patterson	19	16(54)	20 (59)	23 (63)	22 (63)	26 (73)
Madera II	20	22(68)	25 (66)	25 (52)	15 (57)	23 (NA)
Parlier	16	14(56)	26 (67)	27 (64)	22 (53)	27 (74)
Five Points	15	15(56)	24 (65)	15 (52)	20 (55)	24 (69)
Coalinga	14	16(60)	25 (62)	13 (48)	20 (53)	28 (70)
Shafter	17	12(49)	24 (59)	25 (61)	24 (63)	23 (70)
Delano	Missing	15(56)	25 (65)	16 (58)	22 (56)	24 (73)
Blackwell’s	16	18(60)	24 (67)	15 (52)	21 (50)	27 (75)
Arvin/Edison	13	15(54)	23 (61)	10 (44)	21 (55)	22 (66)
Porterville	16	14(49)	30 (76)	20 (63)	22 (59)	27 (63)

I have gone back and reviewed the chilling observations of Dr. Julian Crane, as well as the research Dr. Louise Ferguson and I performed individually and collectively. It all clearly states that Kerman and Peters do not grow normally when winter rest is inadequate. Our research efforts suggest Kerman requires 750 hours below 45⁰ F, and Peters 850 hours in order to leaf out and bloom promptly in the spring. One experiment suggested that Peters continued to benefit from cold temperatures up to 1200 hours below 45⁰F. It was also reported in these studies that a minimum of 500 hours below 45⁰ F was needed to initiate much bud break from Peters. University of California Circular 179, “Deciduous Orchards in California Winters”, by W.H. Chandler and D.S. Brown (1936), states that December and January are the two most critical months in California to satisfy the rest requirement. During the 2013 and 2014 winters, the unusually warm temperatures in January did not provide its complement of chill hours.

The effect of high winter temperatures is **thought** to be two-fold; they negate the effect of chill hours already accumulated by altering the complex physiological processes occurring during dormancy, and they elevate the bud respiration rate which consumes the limited amount of carbohydrates critical for spring growth. UC Davis Plant Sciences Associate Professor Maciej Zwieniecki (Dr. Z) has joined our pistachio industry research team to study this important aspect of tree biology. Dr. Z suggests there may be a critical amount of carbohydrates and other growth substances needed to produce normal growth in the spring. This may explain why oiled trees performed so poorly in 2015. Oil is thought to enhance rest breaking by causing a slight stress to the tree which is not phytotoxic. In the process of metabolizing the oil, the tree **may** increase its respiration rate, which renders it more responsive to favorable spring temperatures for growth. Thus, high January temperatures and oil treatment possibly have a compound effect on carbohydrate depletion from elevated respiration. When the time comes for bud break, the deficiencies in both chilling and available sugars create the perfect storm for poor leaf out and fruit set. There could also be detrimental effects to male and female flower development and receptivity. Because of the current uncertainty of this winter’s weather pattern, oil application is NOT being suggested at this time due to the negative impact it had on the 2015 season.

To check on your local chilling, go to the “Weather-Related Models and Services” section of the UC Fruits and Nuts Center. Select “chilling accumulation models” from the menu, and then “Cumulative Chilling Portions”. This site allows you to see the chill portion accumulation for every CIMIS station in the state. You can also click on a given station to get historical data. I find this helpful in estimating where we are relative to other years. You can also compare chill portions to chill hours at this webpage. Keep in mind that these stations were designed to accurately estimate water use, NOT chill accumulation. The data is collected in an open grass-covered area which may influence the temperatures compared to those within the orchard environment. The absence of fog also causes temperature differences up to 20⁰F between ambient (air) and the buds. Obviously, we are concerned with the bud temperatures, so it would be helpful to make note of those warm, fog-less winter days.

Clays and Calcium for Dormancy Improvement? Tests of winter applied kaolin clay or calcium carbonate-based materials intended to either reflect solar radiation or diffuse it continue. Results from David Doll, UCCE Farm Advisor, Merced County, and Valley Orchard Management, showed a 200 to 250 pound increase in APC yield over untreated trees when Surround (kaolin-clay) was applied prior to the 2015 season. In 2016, trees treated with dormant oil yielded more than either the untreated or Surround treated trees. In 2017, the untreated, Surround, and Surround plus oil treatments yielded more than the oil alone treatment, but not the Surround plus oil treatment. Thus, the Surround plus oil treatment has yielded the most over two years. However, there is insufficient data to recommend any of the treatments. David believes the test results are partly associated with differences in rest satisfaction, since Surround application provided approximately 10 percent greater chill portion accumulation from lower flower bud temperatures. The 2014 winter was well below the chill portions required for adequate pistachio rest; hence the kaolin treatment was more valuable. High chilling during the 2015 winter rendered the kaolin treatment less valuable in 2016, and the reduced yield in 2017 from the winter oil treatment could simply be an alternate bearing effect. David hopes to continue this experiment to determine if one treatment clearly separates

itself from the others. Our lack of understanding the physiological effects of oil, reflective, and diffusion materials makes this research very difficult.

Calcium carbonate-based diffusion materials work differently than kaolin-based clay materials. Kaolin clays reflect light to reduce the absorption of solar radiation by plant tissue such as flower buds. It is also marketed as a finely ground powder, which growers report to be more difficult to apply than liquids. In contrast, calcium carbonate crystals modify the incoming light through a process called double refraction. This essentially divides the light rays as they intercept the crystals, and thus reduces their energy. Incoming light can also hit the crystals whose size matches the incoming wavelength, resulting in a so-called “sparkler effect” in which light is dispersed in multiple directions. Both light division and the sparkler effect reduce energy absorption by the plant, resulting in lower temperature. My intent in describing the methodology of calcium carbonate is NOT to suggest it is better than kaolin-clay. It is simply to inform the reader that kaolin-clay and calcium carbonate are distinctively different in their mode of action.

We cannot tell you if kaolin-clay or calcium carbonate provides statistical improvement in chill accumulation and subsequent yield benefit, because this research is slow to progress, due to the complexity of its performance. The weather also cannot be controlled to secure the needed temperature differences.

Field reports indicate some growers have begun treatment of these products in early December as a precaution. The use rates of the various kaolin-clay products vary from 25 to 40 pounds per acre. The liquid calcium carbonate is typically applied at four gallons per acre. Re-application is recommended after significant rainfall. Applications are not presently advised in February, unless one desires to delay bud break and bloom due to the risk of spring frost in your growing area. The cost per application is estimated at \$80-90 per acre.

Rain? Bring It ON! Growers wishing to periodically check on reservoir and snowpack status can do so my website: http://ceking.ucanr.edu/Agriculture/Grapes_Tree_Fruits_Nut_Crops/. Select “Management” in the main menu, then “Water and Weather”. Select “Snowpack Status” from the menu, which will link you to the state water resources webpage. This page converts snowpack into water content and plots it for three major sections of the state. It also compares this year to wet and dry seasons and the 30-year average. These plots really provide a visual picture of where we stand in water availability. Statewide reservoir conditions can be accessed by selecting “Reservoirs Status” from my webpage menu. This takes you to a DWR web site that lets you click on the reservoir of interest. It then brings up information about current and historic water status, and allows you to select what years you would like to compare in graphic form. It is pretty neat, and gives you lots of sound data to spread around at the coffee shop! Keep rain in your prayers!

Navel Orangeworm Management: SANITATION PAYS in pistachios! So unless you know something I do not, clean up your orchard, or lose big money in premiums and lost markets. I need not tell you how important the overseas markets are these days! They want nice clean, stain-free product, just like the California Pistachio ads show! I visited the local Chevy dealer the other day to buy a **new C7 Corvette**. The dealer almost fainted when I asked him to order me one with **drum brakes**. “Drum brakes?? Why on earth would you want those?”, he asked. “ Well, I’m used to them, know how they behave, and they were good enough for the early Corvettes, so why not use them now?”, I responded. As he gathered himself off the floor, the salesperson responded, “First of all, this C7 Corvette is light years greater in performance than the C2 Stingray you are familiar with. There is no way of stopping this powerful new Corvette with drum brakes. It’s an accident waiting to happen. The Stingray is old-school cool, but if you want to survive in this car, you have to modernize your thinking and realize disc brakes are a must!” Moral of the story; those of you with NOW problems not using MATING DISRUPTION are driving a fast car on DRUM BRAKES! With the thousands of new acres of almonds and pistachios, combined with abandoned pomegranates, poor sanitation, and improperly timed or poorly executed insecticide sprays, IT’S AN ACCIDENT WAITING TO HAPPEN!

Happy New Year, Farming, and see you at Pistachio Day, Wednesday, January 17, 2018, at the Visalia Convention Center!