



March 2014 Tasklist for Pistachios
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Season Preview: OK, it is official now. Zero water allocation to the westside farmers via the Central Valley Project (CVP). On the Valley's east side, 15,000 farmers are facing their first summer without San Joaquin River water since Friant Dam was constructed and formed Millerton Lake more than 60 years ago. This historical dry winter leaves the Sierra snowpack at only 29% of its February 1 average, which is only 12% of the April average!. The CVP's carryover storage from the 2013 water year into this season is 5.1 million acre-feet, which is only 43 percent of capacity, and 75 percent of the 15-year average for six of the key CVP reservoirs. Below is a table comparing the CVP storage for 2014 to that of 2012:

| Central Valley Project Water Storage Comparison for 2014 and 2013, and the 15-year average as of January 22 for each year. Storages listed as Millions of Acre-feet. | | | | |
|--|-------|----------------------------|-------|----------------------------|
| CVP Reservoir Capacities | 2014 | Percent of 15-year Average | 2013 | Percent of 15-year Average |
| Shasta 4.552 | 1.659 | 56 | 3.424 | 112 |
| New Melones 2.420 | 1.047 | 67 | 1.624 | 100 |
| Trinity 2.448 | 1.168 | 71 | 1.913 | 113 |
| Folsom 0.977 | .166 | 39 | .557 | 124 |
| Millerton 0.520 | .206 | 70 | .303 | 98 |
| San Luis Reservoir 0.966 | .335 | 46 | .709 | 94 |
| Total 11.883 | 4.581 | 58 | 8.53 | 107 |

These numbers illustrate how dependent we have become on annual rainfall, and how rapidly our present storage capacity is depleted by a thirsty California when it does not rain!

So, enough of the towel wringing! The American Pistachio Growers just finished a fantastic conference at the Hotel Del Coronado, in San Diego, and I left with speaker Trent Dilfer's big message; **FIGURE-IT-OUTNESS!** Yes, folks, when your Achilles tendon has been torn twice, and you get relegated to scout team quarterback (you run the other team's offensive plays in practice, not your own), you can either give up, and

resign yourself to second string mediocrity, or figure out a way to turn the knowledge of the other guy's game into a Super Bowl ring! If there was ever a group of individuals known for their FIGURE-IT-OUTNESS, it is the American farmer! In preparation for years such as this, the California pistachio industry initiated water research 25 years ago. Led by Dr. David Goldhamer, UC Extension Specialist, we studied season-long irrigation at 0, 25, 50, 75, and 100% ETc, as well as temporary reductions from full ETc at the three main stages of pistachio development: bud break to shell hardening (Stage I), late May to late June, when neither shell or kernel growth is occurring (Stage II), and late June to harvest when kernel growth and shell splitting takes place (Stage III). We refer to these carefully managed reductions in water application as Regulated Deficit Irrigation (RDI).

From these trials, we learned that pistachio, unlike almond, will tolerate a season of little to no water. In fact, the trees which received only rainfall water were still alive and sparsely foliated after THREE years of dryland farming! The trees extracted about 3.5 inches of water per season measured in the top 20 feet of the profile. Almond trees would not survive these conditions nor extract water from such depths. Now, it would take a couple years to rebuild the fruiting structure on these trees, but at least they survived and you did not lose your principal! This experiment was done at Kettleman Pistachio Growers in cooperation with Donnie Rose. The soils are high quality there, so salinity was not a factor in this experiment.

Equally important to survival under extreme water deficits is the response of pistachio to RDI, by which as much as a foot of water can be conserved with little short-term implications to crop quantity or quality. Table 1 provides a brief summary of the impacts of water stress at the different stages of crop development.

Dr. Goldhamer's team research suggests that 7-10 inches of water can be saved with RDI with no impact on fruit yield or quality; either for this or subsequent seasons. This can be accomplished by irrigating at 50% of potential ETc from mid May through late June (Stage II). This is after the attainment of full shell size and before rapid growth of the kernel.

Growers needing to reduce water use by MORE than 7-10 inches must stress the trees more severely and during other times of the season. This will reduce yields of marketable product due to smaller nuts, less crop load, less splitting, and more split nuts left in the tree after shaking. These more severe RDI regimes are built on the principle that from early July through harvest, the trees are most sensitive to stress.

To reduce seasonal ETc by 16-20 inches, irrigate at 50% ETc through mid May, then 25% through early July, 100% through harvest, and 25% ETc postharvest. Additional RDI strategies to save even more water are shown in Table 2. As you can see from the table, as much water as possible is retained for Stage III, the most water sensitive stage of crop development. Reductions in shell splitting, increased blank nut production, and greater difficulty in crop removal will be proportional to the percentage of full ETc applied during this critical period. RDI is also highly DEPENDENT upon being able to refill the effective root zone to field capacity BEFORE the beginning of kernel expansion in late June (shown in Fig. 1).

Regulated Deficit Irrigation is not for everyone! Reduction in applied water greater than 7-10 inches does reduce shoot growth and nut size, and above average irrigation skill is required to properly execute this "controlled plant stress". However, if you do not have enough water, then ya gotta FIGURE IT OUT!

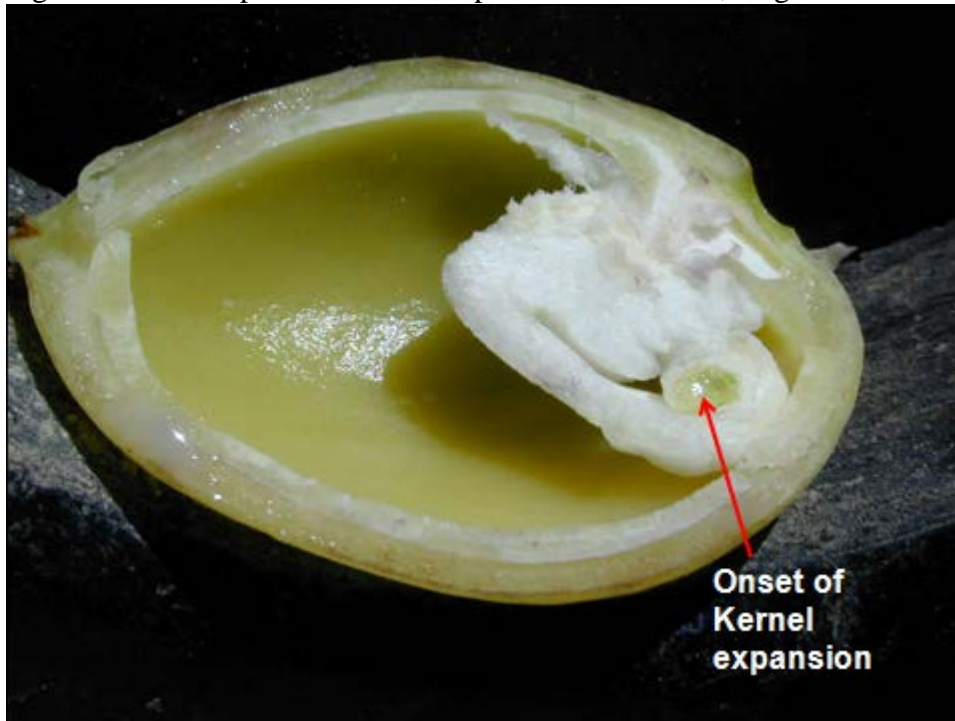
Table 1. Impacts of SEVERE water stress during the growth stages of pistachio.

| Impacts of Stress During Growth Stages | |
|--|--|
| Stage 1 | Smaller fruit; reduced vegetative growth |
| Stage 2 | Very little |
| Stage 3 | Early. Lighter fruit; more blanks; reduced harvestability > reduced splitting |
| | Late. Lighter fruit; more blanks; reduced splitting > reduced harvestability |
| Postharvest | Very little; possible smaller nut size following year |

Table 2. Regulated deficit irrigation schedules to minimize the effect of applied water in amounts less than full ETc.

| RDI Strategies to Minimize Drought Impacts | | | | | | | |
|--|--------------|-------------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| | Date | Normal ETc in Period (inches) | 36" Case RDI Factor (% ETc) | 30" Case RDI Factor (% ETc) | 24" Case RDI Factor (% ETc) | 18" Case RDI Factor (% ETc) | 12" Case RDI Factor (% ETc) |
| Stage 1 | Apr 16-30 | 1.28 | 100 | 50 | 50 | 25 | 10 |
| | May 1-15 | 2.33 | 100 | 50 | 50 | 25 | 10 |
| Stage 2 | May 16-31 | 3.58 | 50 | 25 | 25 | 10 | 10 |
| | Jun 1-15 | 4.81 | 50 | 25 | 25 | 10 | 10 |
| Stage 3 | Jun 16-30 | 5.38 | 50 | 25 | 25 | 10 | 10 |
| | Jul 1-15 | 5.04 | 100 | 100 | 75 | 75 | 50 |
| | Jul 16-31 | 4.86 | 100 | 100 | 75 | 75 | 50 |
| | Aug 1-15 | 4.90 | 100 | 100 | 75 | 75 | 50 |
| | Aug 16-31 | 3.94 | 100 | 100 | 75 | 75 | 50 |
| PH | Sept. 1-15 | 3.27 | 100 | 100 | 75 | 75 | 50 |
| | Sept. 16-30 | 2.21 | 100 | 25 | 25 | 25 | 10 |
| | Oct 1-15 | 1.39 | 100 | 25 | 25 | 25 | 10 |
| | Oct 16-31 | 0.74 | 100 | 25 | 25 | 25 | 10 |
| | Nov 1-15 | 0.39 | 100 | 25 | 25 | 25 | 10 |
| | Seasonal ETc | 44.1 | 37.2 | 28.4 | 22.9 | 17.2 | 11.2 |

Figure 1. Onset of pistachio kernel expansion in late June, Stage III



Chilling Update: I have written about this extensively in the last two newsletters, so refer to them to get caught up to this month's comments. Dr. Katherine Pope, UC Davis, suggests that 58-60 chill portions are needed to completely satisfy the Kerman pistachio rest requirement, using the dynamic model which considers negating warm daytime temperatures. Depending upon your location, the automated weather stations suggest that 52-57 chill portions have been received. Growing regions north of Merced generally appear to have greater chill portions than the southern region. However, Woodland, just east of Davis, reports only 54 chill portions. This anomaly reinforces the need for a simple weather station on every ranch. From the phone calls I received, my guess is that the number of growers who applied dormant oil to assist in rest satisfaction equals those who did not. I will be watching an orchard in Kern County closely this season, which typically gets about 600 hours below 45⁰F. Due to the unprecedented winter weather pattern, the manager did not apply his traditional oil treatment. Warm weather at bud break can partially overcome marginally insufficient chilling. Time will tell!

What should I be doing now? Most importantly, you have to finish pruning, and then get the brush shredded, so you can access the orchard and treat the weeds which escaped your pre-emergent treatment. I can tell you from experience that treating SMALL weeds is SO much faster and effective than letting it go until the jack rabbits are hopping around on Pogo sticks! The herbicide rig travels faster, the water volume used per acre is lower, and the kill percentage is so much more satisfying than dealing with 18-24 inch tall vegetation. Tall weeds also consume quite a bit of water, a precious commodity this season. You have to eventually spray them anyway, so why not kick yourself in the tush and do it now? One added motivation is that gophers feed on these weeds, and they do serious damage to young pistachios. By serious, I mean....kill pistachios, sometimes up to four or five trees in a row!

Now is also an excellent time to perform some bud monitoring for *Botryosphaeria*. As you walk through the orchard, collect at least one hundred female flower buds, and place them in a paper or plastic bag. During your collection, take a stick with you, and hit the persisting fruiting rachises on the tree to see if they knock off cleanly at their base, or if a stub is left. If the latter, you had better pull that fruit limb down, or cut it off, and cut into the wood around the base of the rachis to check for black streaks. Discovery of these symptoms

suggests that rachis was infected with BOT this past season. Cutting the collected buds in half with a razor blade will help you determine how much BOT is present in the orchard. Buds black inside are often BOT infected, so if you find several in your first sample, you might want to sample one or two more times to get a better average infection level. Yes, I know this is time consuming and boring, but BOT is nothing to mess around with. Infected wood emits inoculum for SIX YEARS, and if you do not get control of it in drier years, it will cause you MAJOR economic loss in wet years! You know what they say about an ounce of prevention? Practice it!! While you are out collecting buds, you will also most likely to encounter a bunch of other things needing attention, so feet in the field is good! Be on the lookout for cotton-like masses on the main trunks, which is OLD Gills mealybug activity. Show your workers what this looks like, so they can report how much of it they see during pruning and irrigation system maintenance. You should also keep an eye out for soft scale adults on the one and two-year-old wood. If you find a substantial number, you still have time to treat, but you need to move quickly! Go to the UCIPM Pistachio Web site and read up on your options.

The dry winter demands irrigation prior to bud push for early root growth and hydration of the tree. If salinity is an issue, you still have time to apply high quality water for leaching. If you have not done it already, get some water in the ground, even if it means delaying shredding of the brush.

Take your crop consultant to lunch, and discuss what went well last year, and what needs improvement. The biggest complaint I hear from consultants is that growers spray seven to 14 days after they write them a recommendation. How do you expect to have clean product if you are responding so slowly to your PCA's advice? Have you recalibrated your sprayers yet? Want better coverage? Add a second bank of nozzles, based on Dr. Joel Siegel's coverage research! Also practice the 2 mph Dibble Rule! Also, switch out your old extended range herbicide nozzles for the new, improved TuboJets. Kurt Hembree highly recommends them!

Nutrition: It may not be too late for a delayed dormant **zinc (Zn)** application. Zinc sulfate 36% at rates up to 40lbs. product per acre or 10 gallons of 12% liquid zinc per acre can be safely applied up to the early green tip stage (1/4 inch terminal growth). **Do not apply if flower buds are expanding.** Zinc is so immobile that early season sprays may prevent deficiency in young shoots for only a month. Research just completed by Dr. Carol Lovatt and I with Paramount Farms suggests improved uptake of Zinc Sulfate and Boron when six pounds of L.B. urea are added to the bud swell spray solution and then acidified with citric acid powder to pH 4.5-5.5. Leaf expansion sprays (2 lbs. zinc sulfate per acre, 100 gpa at 50% leaf expansion) about the third week in April are the most effective timing for uptake and therefore require much less zinc than delayed dormant treatments. However, treatment at 50% leaf expansion will not supplement zinc during bloom when deficiency reduces fruit set. By the way, there is a REASON why this spray is timed at 50% leaf expansion! During this period, the cuticular waxes of the leaves have not yet fully developed, so the zinc gets absorbed into the plant tissue, rather than being bound in the wax. You may not need a delayed dormant zinc treatment if you are not in a zinc deficient-prone soil (pH > 8 and/or your soil series is a terrace soil such as the San Joaquin series). Annual application of zinc during the 50% leaf expansion period may, in some orchards, be a sufficient maintenance program. Do not get low in zinc! This micronutrient is critical to shoot growth and flower bud differentiation. Once deficient, it can be difficult to get enough zinc taken up into the pistachio tree to resume normal growth. This is especially true of young orchards! **I typically find zinc deficiency in HALF the young orchards I visit in the spring!** You can lose a year of growth trying to recover from a bad zinc deficiency. That means crop in the seventh year, not sixth!

If **boron (B)** was low in August (less than 120 ppm), application of a soluble B (e.g. 5 pounds of Solubor[®], 20.5% B) in 100 gallons of spray solution per acre in early March (bud swell) is effective in supplying B to developing flowers and pollen for improved fruit set. Boron can also be applied post-bloom at 50% leaf expansion (LE). The LE rate is 3 pounds of Solubor in 100 gallons of water per acre. Solubor creates a strongly buffered solution of pH 8.2. If mixed with zinc and copper fertilizers, the tank mixture should be acidified to pH 4.5 to 5.5 with citric acid powder (**not** phosphoric acid, which precipitates zinc as phosphate)

to maintain the uptake of zinc and copper by the pistachio leaf. The best long-term boron correction can be achieved from a combination of soil and foliar treatments applied as a yearly maintenance program. There are a number of boron fertilizer materials containing different amounts of actual B. Consult with your nutrition adviser about which one is best suited to your cultural program. Spring B applications during shoot extension are more effective in correcting current season deficiency than treatments in June or July. Boron is not readily translocated by the tree's vascular system. Similar to other micronutrients, B is more available in lighter, slightly acidic (6.0-6.5) soil. Soils lighter in texture and low in buffering capacity require the addition of less boron for correction. Applications through drip systems may be reduced by 25-30% due to higher efficiency from concentrated treatment. I have had to apply two and sometimes three ounces of Solubor PER TREE to correct deficiency in young trees. That's 17-25 POUNDS of Solubor per acre! Boron and zinc are equally common deficiencies in young trees. If you let them get deficient, it can take a MONTH or more to get them growing again!

Did you know **Nitrogen** is becoming a dirty word? That is because the State believes agriculture is applying excessive amounts, and when they ask farmers to show them their method for budgeting nitrogen applications, they cannot comply. Not completing the good agricultural practices survey will come back to haunt you with added regulations on nitrogen management. Remember the "four R's"; apply the Right Rate (match demand with supply), apply at the Right Time (apply when the trees are active, and focus most of your N application on kernel filling, when N is in greatest demand), apply in the Right Place (ensure delivery to the active roots, and do what you can to manage variability across the orchard), and use the Right Source (understand the leaching and decomposition characteristics of the N you select). Secondly, remember how much actual nitrogen, potassium, and phosphorous are consumed per 1000 pounds of dry (CPC) weight; 28, 25, and 3, respectively. Hence, a 4000 pound pistachio crop is only consuming about 112 pounds of actual N per acre, plus another 25 pounds for tree growth. Occasional soil sampling to determine your nitrate nitrogen levels in the root zone will also help guide you in balancing your nitrogen applications. Present thought suggests 10-15ppm nitrate nitrogen is a reasonable number, and 25-30ppm is high. I strongly suggest you sample to see what levels you have both in your soil, and in your water source. A 10ppm nitrate nitrogen level in your water equals 27 pounds of actual N applied per acre-foot!

Crop Quality for 2014? If growers want to maintain the critical overseas markets, they must commit themselves to the **industry goal of producing a high quality, safe product**. Navel orangeworm, aflatoxin, and food safety should be ever-present on your minds. Where does quality begin? **AT THE FARM!** Commit yourself to this, and keep the pistachio demand high! Crop size for 2014 is anybody's guess, given the challenges we face. We can still produce lots of clean, yummy pistachios to sell the consumer. We cannot have ANY grower, investor, or absentee landlord disconnecting from our industry's commitment to quality. Please think of this when you consider ignoring your PCA's pest management recommendations. Chuck Nichols writes an excellent market newsletter. Check it out at: <http://nicholsfarms.com/newsletters.php>. Happy Farming!