

Weekly Crop Water Use (ET) Reports to Assist Farm Water Management

The San Joaquin Regional Office of the Department of Water Resources and UC Cooperative Extension have teamed up to provide “**Weekly Crop ET Reports**” for almond, pistachio, citrus, grapes, alfalfa and cotton. We will provide this update every Monday or Tuesday. (ET estimates for trees and vines are for mature fields (>70% cover).

What’s in each Weekly Crop ET report

Each report gives crop-specific evapotranspiration (ET_c, total crop water use including soil evaporation) estimates for the previous and coming week. Estimates integrate the crop coefficient (K_c) for the current growth stage and real-time weather measurements from CIMIS stations near Shafter, Arvin and Beldridge (Westside Kern). These reports can help you decide when to start irrigating and how much to apply when you irrigate, based on the idea of replacing the water that has been lost from the soil by evapotranspiration.

Using these Reports to Help Decide When to Begin the Irrigation Season

The water holding capacity of your soil and on-site rainfall is key to help decide when to *start* irrigating. When applying information from these reports, assess the soil moisture storage at your site beginning in mid-February. Looking at the first table, find your nearest station and your crop and compare the “*Accumulated Seasonal Water Use*” to “*Accumulated seasonal precipitation*” at the bottom of the table (or from your own on-farm measurements). When the water use exceeds accumulated rainfall, it’s time to start replacing the lost soil moisture.

Example: You know the profile in your almonds was completely filled by rain and irrigation during December and January. Now let’s say we get an additional 1.5 inches from Feb. 25 to Mar. 31. Estimated almond ET over this period is 2.8 inches. So a deficit of about 1.3 inches was taken out of soil moisture storage. If your system puts out 1.3 to 1.5 inches per day then you would start irrigating the end of March.

Using these Reports to Help with In-Season Irrigation – How long should I run my set?

These reports can be used to help adjust irrigation for changing growth phases and weather conditions. To use these reports, you must know two things about the block you are irrigating: the system design application rate in inches/hour (or day), and the effective wetted volume of the root zone as a % of the orchard floor. Comparing the system application rate with the soil moisture lost the previous week, from the column labelled “*Past Week of Water Use*” in the first table, you’ll know how long to run your system to replace the moisture that was lost. **In reality**, if the effective wetted root zone volume (including subsurface lateral subbing, not just surface wetting) is 50% of the whole orchard floor and crop ET for the week is given as 1.5”, then the moisture extraction from the wetted area = $1.5''/0.5 = 3.0''$. Likewise, if your irrigation design lists the application rate as 1.5”/day this is actually a 3”/day application in the wetted area. For most Kern County fine sandy loam soils this is not an issue as they have enough available water holding capacity to supply the 3 to 4 inches needed from that 50% wetted volume without causing stress. But coarse sandy soils (like Cajon, some Delano and Poso series) may only provide 0.5 to 0.8 inches/foot available water and may only have a 30% wetted volume and may require more frequent irrigations with shorter duration to avoid stress.

Example: Almonds, Cajon loamy sand, double-line drip, application rate 1 inch/day, 35% wetted volume, non-stress available water 0.5”/ft, 5 foot root zone. This coming week’s water use is estimated at 1.8” (0.26”/day). Extracted depth of water from wetted volume = $1.8/0.35 = 5.14''$. Ouch! This is twice the estimated non-stress available water in the root zone ($AW = 0.5 * 5 = 2.5''$). The system applies 1”/day over the whole field, Net application to wetted area = $1 / 0.35 = 2.86''$... about a third of an inch more than the non-stress AW. So maybe I stress a bit and then lose a little water out the bottom and stick to a 24 hour set to make life easy irrigating every 4 days (1.04” ET). But if these are 4th leaf trees I want to push for more canopy and a 2,500 lb crop in 2016, consider irrigating every 3 days:

$$\text{Required application time} = (0.26''/\text{day ET}_c * 3 \text{ days}) / 1''/\text{day irrigation} * 24 \text{ hr/day} = 17.5 \text{ hours}$$

Using the “Adjusted for Efficiency” Table

Additional water is needed to make up for non-uniform application of water. Field evaluations by the Kern County Mobile Irrigation Lab showed most orchards operate between 80-90% efficiency. If the mature almond orchard in the example was 90% efficient, you’d find the 90% column in the second table of the Weekly ET Report, and put in the almond value at 90% (2.0 inches) into the equation above, instead of 1.80 acre-inches. Contact your farm advisor if you need help estimating your system’s efficiency.

Have Questions or Looking for More Assistance?

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