Weekly Crop Evapotranspiration (Crop ET) Reports Are Available to Assist Farm Water Management

The Northern Region of the California Department of Water Resources and the University of California Cooperative Extension have teamed up to provide "Weekly ET Reports" to agricultural water users. This Weekly crop ET Report for the 2022 irrigation season includes water use information for a variety of crops. Background information about the reports and ways to use them in on-farm water management are outlined in this article. Instructional videos are also available at: sacvalleyorchards.com/et-reports/et-how-to-video-series.

Information in each Weekly ET Report

Estimates provided are for healthy crops where soil moisture is not limiting growth. Estimates for bearing orchards are in reference to fifth leaf or older trees. An instructional video is provided at sacvalleyorchards.com/blog/young-orchards to assist adjusting these estimates for young orchards that are not yet producing. The reported "past weeks of crop ET" and the "cumulative seasonal crop ET" are based upon real-time weather conditions measured at four different CIMIS weather stations across the Northern Sacramento Valley. "Next week's crop ET" is the historical average and not based upon short-term weather forecasts. Rainfall received during the growing season and stored soil moisture from the dormant season contributes to meeting these estimates and will reduce the irrigation water needed. Irrigation decisions based on this information should be confirmed with field monitoring. Irrigation systems that apply water with a high uniformity require less water to supply the crop needs.

Use in the Spring Season to Help Decide When to Begin the Irrigation Season

October through early January rainfall was record breaking this year with heavy precipitation providing much needed accumulations to assist with localized drought and increased snowpack. The resilient high-pressure ridge returned early to mid-January leading many orchard growers to irrigate. Irrigation took place because of periods of warmer than normal temperatures and increased northerly winds. As the beginning of February started, record high temperatures struck most of the region reducing soil moisture profiles to little amounts. Almonds have been fully leafed-out since February 25th, while we are considering prune leaf-out as March 25th. Leafout dates for walnut and other deciduous trees crops will be noted in these reports as the crops progress. Concerning the irrigation season, refer to the first table from the weekly ET report**,** select the crop in question and compare the *"Accumulated Seasonal Water Use"* since leaf-out to the *"Accumulated Precipitation"*. As the seasonal crop water use exceeds accumulated precipitation, compare the difference to the water holding capacity of the soil in the crop root zone. The choice is to rely on soil moisture storage to supply the difference or to begin to irrigate.

A Past Example: Accumulated seasonal water use for almonds from February 16 through March 22, 2019 was 3.22 inches while accumulated rainfall from the Gerber South weather station in Tehama County was 2.54 inches. Rainfall measurements taken from your own farm or ranch will improve the accuracy of this projection. In the case of almonds, which is the earliest leafing deciduous orchard crop to leaf out and begin developing a full canopy, a 0.68-inch soil moisture deficit had developed through March 22, 2019. When the deficit accrues to an amount greater than will be applied with a single irrigation event, it may be time to begin irrigating unless a grower has concerns about root diseases from irrigating too early and prefers to wait longer. Monitoring soil moisture levels or crop water status with a pressure chamber should be used together with these ET estimates to confirm decisions on when to begin irrigation. Learn more at: sacvalleyorchards.com/blog/almonds-blog/early-season-irrigation-do-we-know-when-to-start

Use throughout the Season to Aid Irrigation Operation

Crops go through phases of growth and the weather can be highly variable during the season. These weekly reports can be used to help adjust for changing growth phases and weather conditions. In order to apply this information, the water application rate from the irrigation system must be known. For orchards, this can be estimated with a count of micro sprinklers or drip emitters per acre along with a reliable estimate of the water emission rate per micro sprinkler or dripper. Another option if you farm in Tehama, Butte, Colusa, Glenn, Shasta, or Yolo counties is to contact the Tehama County Mobile Irrigation Lab and arrange an irrigation system evaluation. This service has been available at no cost. Contact: Kevin Greer, Tehama County Resource Conservation District Mobile Irrigation Lab, (530) 727 – 1297 or kevin@tehamacountyrcd.org.

Almond Orchard Example: One micro sprinkler is used per almond tree; each micro sprinkler emits nine gallons of water per hour; and the orchard design has 151 trees per acre. The **hourly** water application rate for this example is 1359 gallons per acre. This equates to a water application rate of 0.05 inches per acre per hour of operation. The math is as follows: 1) 151 micro sprinklers per acre multiplied by 9 gallons per hour emission rate equals 1359 gallons per acre per hour; and 2) 1359 gallons per acre per hour divided by 27,154 equals 0.05 inches per acre per hour of operation (there are 27,154 gallons of water per acre-inch). You can get help with these ET calculations at: sacvalleyorchards.com/et-reports/et-calculators.

Suppose an upcoming weekly report shows that almonds from May 6 to May 12, 2019 use 1.80 inches of water per acre and they are irrigated with the micro sprinkler system described above. At an hourly water application rate of 0.05 inches per acre per hour of operation, a maximum of 36 hours of operation or the equivalent of two 18-hour irrigation sets that suit PG&E off-peak rates. Choice of set length is a site-specific consideration depending on irrigation system and soil type; however, it is best to minimize ponding conditions that can starve roots of oxygen and provide favorable disease conditions.

The previous example provides context of how this deficit relates to the irrigation system capacity. It is left to the irrigation manager's judgement to continue to delay the beginning of irrigation to protect tree and root health, begin irrigation by partially refilling the soil moisture deficit (i.e. one 18 hour irrigation set), or begin irrigation and fully replace the soil moisture deficit. If this information were paired with the pressure chamber measurements and the stem water potential values were still within 1 bar drier than the fully irrigated baseline, the manager may have more peace of mind about continuing to delay the first irrigation.

Additional water is needed to compensate for non-uniform application of water. Field evaluations conducted by the Tehama County Mobile Irrigation Lab suggest 10 to 15 percent more water may be necessary. Table 2 in the Weekly ET Report helps determine how much water is needed based upon your systems irrigation efficiency keeping in mind that less efficient irrigation systems apply water less uniformly.

Have Questions or Looking for More Assistance?

Contact: Curt Pierce, Ph.D., UCCE Area Irrigation and Water Resources Advisor, (530) 865-1153 or calpierce@ucanr.edu

Contact: Brian Bettencourt, California Department of Water Resources, Northern Region, (530) 529-7301 or Brian.Bettencourt@water.ca.gov