

WEEKLY CROP EVAPOTRANSPIRATION (ET) ESTIMATES (INCHES PER WEEK) For the week June 15 through June 21, 2001

West of Sacramento			East of Sacramento	
Weekly Water Use	Accumulated Seasonal Use	Crop (Leafout Date)	Weekly Water Use	Accumulated Seasonal Use
2.24	22.56	Pasture-Turf	1.98	21.52
1.17	21.94	Alfalfa	1.91	20.88
1.69	17.05	Olives*	1.49	16.24
2.17	20.26	Almonds (3/1)*	1.91	19.27
2.17	19.56	Prunes (3/15)*1.03	1.91	18.66
2.17	17.51	Walnut (4/1)*	1.91	16.66
0.00	4.04	Rainfall (3/1)	0.00	3.88

Example of How to Use this ET Report with Impact Sprinklers:

Situation: Mature walnuts located east of the Sacramento River, 24 ft x 24 ft tree spacing, Sprinkler lateral lines located every other tree row (48 ft), 30 ft sprinkler spacing in the tree row, 7/64 nozzle size without vanes, operating pressure 55 psi at the pump.

Useful Conversion Factor: One inch of water applied to an acre of land equals 27, 154 gallons of water.

Useful Table to Determine Nozzle Discharge Rate in gallons per minute:

Pump Operating Pressure (psi)	3/32" Nozzles without vanes	7/64 " Nozzles without vanes	1/8" Nozzles without vanes
40	1.62	2.20	2.87
45	1.72	2.32	3.05
50	1.80	2.45	3.22
55	1.88	2.58	3.39
60	1.98	2.70	3.54

Step 1 – How many impact sprinklers per acre?

Sprinkler spacing is 48 ft (every other tree row) x 30 ft (in the tree row) so there are 30 impact sprinklers per irrigated acre.

Step 2 – What is the Sprinkler Application Rate in Inches per hour per Acre?

The pump operates at 55 psi and the nozzles are 7/64" without vanes. From the table above, the expected discharge rate is 2.58 gallons per minute per sprinkler for this operating pressure and these nozzle sizes. Multiplying the discharge rate of 2.58 gallons per minute by 60 minutes per hour results in hourly sprinkler discharge rate of 155 gallons per hour per sprinkler. Then by multiplying 30 sprinklers per acre by 155 gallons per hour per sprinkler, the hourly water application per acre is 4644 gallons per acre per hour. Dividing 4644 gallons of water per acre per hour by 27, 154 gallons of water (the gallons of water covering one acre of land one inch deep) results in an hourly sprinkler application rate of 0.17 inches per hour.

Step 3 – How long should I have run this impact sprinkler irrigation system this past week?

Looking at the second to last line on the right hand side of the weekly crop evapotranspiration report (eastside of Sacramento River), the estimate of soil moisture loss from June 15 through June 21, 2001 was 1.91 inches per acre. By dividing the estimate of soil moisture loss (1.91 inches per acre) by the average hourly water application rate of 0.17 inches per hour. The weekly hours of operation time equals 11.2 hours per week. But, this does not allow for the non-uniform application of water in the orchard.

Step 4 – What about non-uniform application of water with impact sprinklers?

No doubt impact sprinklers are subject to non-uniform water applications. Friction from water passing through the aluminum pipe results in pressure losses as distance increases from the pump, there may be changes in land elevation which may also affect pressure, wind can certainly affect the wetting pattern, and there may even be some mixed nozzle sizes or worn nozzles throughout the system. Fortunately, there are some factors working in favor of the sprinkler system too. First, checking nozzles to see they are all the same size and in good shape can be done by one person fairly quickly. Second, if you're trying to save on electrical costs you are probably already pumping a lot at night and in the early morning when the winds are usually more calm. Lastly, the crops root system tends to spread laterally to help offset some of the non-uniform application of water. In general, it is recommended to apply 15 to 30 percent additional water per irrigation set to account for non-uniform application of water and to assure all parts of the orchard are adequately irrigated. So in this specific situation, it would be prudent to increase the weekly irrigation time from 11.2 hours to 14 to 14 hours per week.

Step 5 - Do I need to irrigate weekly?

Maybe or maybe not, this is a site specific decision largely dependent on the orchard soil type and the soil's water holding and water infiltration characteristics. Consider irrigating more frequently on sandy or gravelly soils with low water holding capacity where you have reason to believe the root system is shallow. In situations with loam soils and deeper root systems less frequent irrigation may suffice. In the latter case, consider two consecutive weeks of the crop evapotranspiration reports into the decision making.

