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In a Nutshell
Tulare County

April 5, 2018

Weekly Crop Evapotranspiration (Crop ET) Reports to Guide Irrigation Scheduling

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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 to assist with irrigation scheduling. The reports include water use information for a variety of crops including almonds, pistachios, walnuts, grapevines, citrus, and stone-fruit of mature bearing age. Adjusted on a weekly basis, water use estimates account for the changing growth stage and weather conditions at the Madera, Parlier, Lindcove, Stratford, Panoche, and Five-Points CIMIS weather stations. Each report gives crop-specific evapotranspiration (ETc, total crop water use including soil evaporation) estimates for the previous and coming week.

Beginning the Irrigation Season

One of the objectives of the weekly ET report is to help managers decide when to initiate the first irrigation. Irrigating too much and too early can lead to reduced growth and yield due to loss of fine feeder roots as well as root disease. Stored soil moisture from winter and early spring precipitation will reduce the need to irrigate early in the season. As ET rates increase and the seasonal crop water use exceeds accumulated rainfall, water managers should consider if there is adequate soil moisture to supply the difference or to begin to irrigation. The weekly ET report provides "Accumulated Precipitation" since January 1st and the "Accumulated Seasonal Water Use" since leaf-out. When water use exceeds precipitation, it may be time to irrigate. Irrigation decisions should be confirmed with field monitoring of soil moisture and plant water status.

Irrigation Frequency and Duration

Managers need to know the application rate of their irrigation system in either inches/hr or gallons/hr and the effective wetted volume (surface wetting and sub-surface lateral subbing) of the root zone as a % of the orchard floor (Figure 1). Different soils will have larger or smaller wetted zones as soils with different texture hold different levels of moisture. This will influence when seasonal irrigation should begin, the appropriate set duration, and frequency of irrigation events throughout the season.

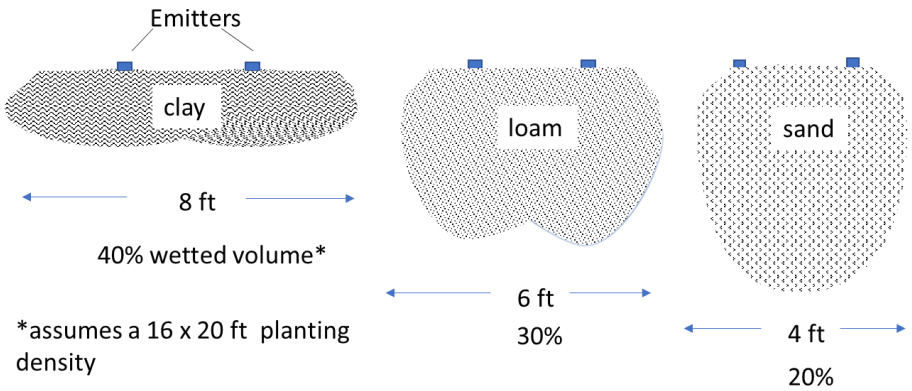

Figure 1. Hypothetical wetted volume of different soil types under a double line drip system. The estimated wetting volume would be for a 16 x 20 ft spacing, 1 gph emitters after a 12- hour set.

Example: If the effective wetted volume for a sandy loam soil is 25% of the whole orchard floor and crop ET for the week is given as 1.5" (0.21"/day), then the moisture extraction from the wetted area for the week = 1.5"/25% = 6". A sandy loam soil at field capacity that has approximately 0.8 inches plant available water per foot of soil would have 5" of available moisture in a 5-foot rooting zone. The weekly water use (6" every 7 days) will exceed soil plant available water in about 5 days. In this example, irrigation sets need to be more frequent than once a week, roughly every 3-4 days. The application time for a system with one gallon per hour (gph) emitters that deliver about 1"/day would be calculated as:

Application time = (0.21"/day ET * 3 days)/ 1"/day irrigation * 24 hr/day = 15 hours every 3 days

Irrigation recommendations for common crop spacings are shown in the report in units of inches or gallons of water needed per week. To convert inches per tree to gallons:

Gallons = (Inches * 27,154 gal/acre inch water) / # plantings per acre

Adjusting for System Efficiency

Different irrigation systems can vary greatly in efficiency. Those with high uniformity such as drip micro-irrigation, are roughly 80-95% efficient and require less output to meet crop needs than other systems like flood-furrow, with efficiencies as low as 50%. The recommended amount of water to apply is corrected for a range of irrigation system efficiencies. 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% (1.67 inches or 0.24 in/day) into the equation above, instead of 1.5 acre-inches.

If you would like to receive weekly reports, have questions or need more assistance contact:

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UCCE/DWR Weekly Crop Water Use Report

WEEKLY SOIL MOISTURE LOSS IN INCHES

(Estimated Crop Evapotranspiration or ET_C)

03/23/18 through 03/29/18

Crops (Leafout Date)	#188 Madera II			#39 Parlier			#86 Lindcove		
	3/23 - 3/29 Water Use	Accum'd Seasonal Water Use	3/30 - 4/1 Estimated ETc	3/23 - 3/29 Water Use	Accum'd Seasonal Water Use	3/30 - 4/1 Estimated ETc	3/23 - 3/29 Water Use	Accum'd Seasonal Water Use	3/30 - 4/1 Estimated ETc
Almonds (3/16) *	0.62	0.83	0.69	0.62	0.81	0.70	0.56	0.76	0.61
Pistachio (N/A) * **	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Citrus (2/1)	0.71	3.29	0.76	0.71	3.27	0.77	0.64	3.27	0.68
Raisin Grapes (3/16) (11 ft. row spacing) ***	0.07	0.08	0.07	0.07	0.08	0.07	0.06	0.07	0.07
Winegrapes (3/16) (10 ft. spacing on California Sprawl Trellis) ***	0.12	0.17	0.14	0.12	0.15	0.14	0.10	0.13	0.14
Walnuts (N/A)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Stone Fruit (3/16)	0.20	0.30	0.27	0.19	0.29	0.28	0.18	0.28	0.27
Past 7 days precipitation (inches)		0.00			0.01			0.00	
Accumulated precipitation (inches) (1/1/2017)		5.62			4.36			2.51	

Dates in parentheses above, indicate leaf out or starting date for ET accumulation for the specific crop

* Estimates are for orchard floor conditions where vegetation is managed by some combination of strip applications of herbicides, frequent mowing or tillage, and by mid and late season shading and water stress. Weekly estimates of soil moisture loss can be as much as 25 percent higher in orchards where cover crops are planted and managed more intensively for maximum growth.

** Very vigorous, non-salt affected peak season pistachio Kc can be as high as 1.19 – resulting in about 8% greater water use than shown in these tables.

*** Raisin Grapes and Winegrapes Irrigation should hold off until midday leaf water potential drops to -1.0 MPa, before that soil moisture reservoir is sufficient to supply the vine water demand. Update will be sent shortly once the county wide leaf water potential reaches approximate -1.0 MPa. Growers should adjust the irrigation start date based on the individual vineyard location and soil type.

PAST WEEKLY APPLIED WATER IN INCHES, ADJUSTED FOR EFFICIENCY [1]

Crops	#188 Madera II				#39 Parlier				#86 Lindcove			
System Efficiency >>	65%	75%	85%	95%	65%	75%	85%	95%	65%	75%	85%	95%
Almonds (3/16)	1.0	0.8	0.7	0.7	1.0	0.8	0.7	0.7	0.9	0.7	0.7	0.6
Pistachio (N/A)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Citrus (2/1)	1.1	0.9	0.8	0.7	1.1	0.9	0.8	0.7	1.0	0.9	0.8	0.7
Raisin Grapes (3/16) (late season table, 75% cover)***	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Winegrapes (3/16) (10 ft. spacing on California Sprawl Trellis) ***	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Walnuts (N/A)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stone Fruit (3/16)	0.3	0.3	0.2	0.2	0.3	0.3	0.2	0.2	0.3	0.2	0.2	0.2

1 The amount of water required by a specific irrigation system to satisfy evapotranspiration. Typical ranges in irrigation system efficiency are: Drip, 80%-95%; Micro-sprinkler, 80%-90%; Sprinkler, 70%-85%; and Border-furrow, 50%-75%.

PAST WEEKLY APPLIED WATER IN GALLON PER TREE OR VINE

Crops	#188 Madera II				#39 Parlier				#86 Lindcove			
Almonds 115 Trees/A	236.1	188.9	165.3	165.3	236.1	188.9	165.3	165.3	212.5	165.3	165.3	141.7
Pistachio 106 Trees/A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Citrus 110 Trees/A	271.5	222.2	197.5	172.8	271.5	222.2	197.5	172.8	246.9	222.2	197.5	172.8
Raisin Grapes 566 Vines/A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Winegrapes 622 Vines/A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Walnuts 76 Trees/A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stonefruit 172 Trees/A	47.4	47.4	31.6	31.6	47.4	47.4	31.6	31.6	47.4	31.6	31.6	31.6

For further information concerning all counties receiving this report, contact the Fresno Co. Farm Advisor's office at (559) 241-7526.

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WEEKLY SOIL MOISTURE LOSS IN INCHES

(Estimated Crop Evapotranspiration or ET_C)

03/23/18 through 03/29/18

Crops (Leafout Date)	#124 Panoche			#2 Five Points			#15 Stratford		
	3/23 - 3/29 of Water Use	Accum'd Seasonal Water Use	3/30 - 4/5 Estimated ETc	3/23 - 3/29 of Water Use	Accum'd Seasonal Water Use	3/30 - 4/5 Estimated ETc	3/23 - 3/29 of Water Use	Accum'd Seasonal Water Use	3/30 - 4/5 Estimated ETc
Almonds (3/16) *	0.64	0.87	0.76	0.70	0.94	0.81	0.70	0.93	0.81
Pistachio (N/A) * **	0.00	0.00	0.00	0.00	0.00	0.81	0.00	0.00	0.00
Citrus (2/1)	0.75	4.37	0.83	0.81	4.86	0.88	0.81	4.71	0.88
Raisin Grapes (3/16) (11 ft. row spacing) ***	0.05	0.06	0.00	0.06	0.07	0.00	0.06	0.07	0.00
Winegrapes (3/16) (10 ft. spacing on California Sprawl Trellis) ***	0.09	0.15	0.00	0.10	0.16	0.00	0.11	0.17	0.00
Walnuts (N/A)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Stone Fruit (3/16)	0.22	0.33	0.33	0.24	0.37	0.33	0.23	0.35	0.33
Past 7 days precipitation (inches)		0.05			0.00			0.00	
Accumulated precipitation (inches) (1/1/18)		2.01			2.85			1.35	

Dates in parentheses above, indicate leaf out or starting date for ET accumulation for the specific crop

* Estimates are for orchard floor conditions where vegetation is managed by some combination of strip applications of herbicides, frequent mowing or tillage, and by mid and late season shading and water stress. Weekly estimates of soil moisture loss can be as much as 25 percent higher in orchards where cover crops are planted and managed more intensively for maximum growth.

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PAST WEEKLY APPLIED WATER IN INCHES, ADJUSTED FOR EFFICIENCY [1]

Crops	#124 Panoche				#2 Five Points				#15 Stratford			
System Efficiency >>	65%	75%	85%	95%	65%	75%	85%	95%	65%	75%	85%	95%
Almonds (3/16)	1.0	0.9	0.8	0.7	1.1	0.9	0.8	0.7	1.1	0.9	0.8	0.7
Pistachio (N/A)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Citrus (2/1)	1.2	1.0	0.9	0.8	1.2	1.1	1.0	0.9	1.2	1.1	1.0	0.9
Raisin Grapes (3/16) (late season table, 75% cover)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Winegrapes (3/16) (50% cover)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Walnuts (N/A)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stone Fruit (3/16)	0.3	0.3	0.3	0.2	0.4	0.3	0.3	0.3	0.4	0.3	0.3	0.2

1 The amount of water required by a specific irrigation system to satisfy evapotranspiration. Typical ranges in irrigation system efficiency are: Drip, 80%-95%; Micro-sprinkler, 80%-90%; Sprinkler, 70%-85%; and Border-furrow, 50%-75%.

PAST WEEKLY APPLIED WATER IN GALLON PER TREE OR VINE

Crops	#124 Panoche				#2 Five Points				#15 Stratford			
Almonds 115 Trees/A	236	213	189	165	260	213	189	165	260	213	189	165
Pistachio 106 Trees/A	0	0	0	0	0	0	0	0	0	0	0	0
Citrus 110 Trees/A	296	247	222	197	296	272	247	222	296	272	247	222
Raisin Grapes 566 Vines/A	0	0	0	0	0	0	0	0	0	0	0	0
Winegrapes 622 Vines/A	0	0	0	0	0	0	0	0	0	0	0	0
Walnuts 76 Trees/A	0	0	0	0	0	0	0	0	0	0	0	0
Stonefruit 172 Trees/A	47	47	47	32	63	47	47	47	63	47	47	32

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