

Irrigation Basics Worksheet!

Simplified water budgeting approach.

I hope this touches on some questions about determining how much to water on a simple level. Use this as a reference but always check your soil moisture before and after watering. This will also give you a place to start with how long to water with your system. As well as using ETo to give you a guide to how much water you may need if your area.

Things to Gather at your site:

What is your dripline GPH? _____

What is the square footage of your garden or a garden bed? (not pathways) Length of bed x width of bed = 40 _____ sqft

1) Converting your bed size to acres.

$$\frac{\text{Bed area (ft}^2\text{)}}{43560} = \frac{40}{43560} = .0009 \text{ # acres/bed}$$

2) How much water (in gallons) would be needed to replace 1 inch of water in your garden bed?

$$\frac{27,154 \text{ Gallons in an acre inch}}{1} \times .0009 \text{ # acres/bed} = 25 \text{ gallons}$$

3). How many gallons of water per hour is delivered by this dripline?

$$\frac{\text{Flow rate per emitter}}{1} \times \text{\# of emitters in bed} = \text{gallons/hour/bed}$$

4). How long do we need to run irrigation per week on this bed to put down 1 inch of water?

$$\frac{\text{Gallons to apply}}{\text{gallons/hour/bed}} = \text{hours running drip}$$

5) Find your weekly reference ETo *and how much water to replace.

$$\frac{\text{Reference Eto}}{1} \times \text{minutes hours drip} = \text{hours to replace ETo**}$$

*

Notes:

*Reference Eto tells one the ET on a full grown field of grass so we must adjust for veggie crops and variable development stages.

**This is a good place to start for one deep initial irrigation in your garden with the new drip system to get to 100% FC . i

Along with checking Soil Moisture using your ETo is a good gauge for how long to water throughout the week. Remember to divide the amount of water needed to replace a weeks of ETo into multiple waterings.

Remember to adjust for crop development stage and crop type. With ETo this is done through looking at the Canopy Cover of the crop. Simply imagine if the crop is 25% of its full size water 25% of the ETo throughout the week. 50% of canopy size do 50% etc.. If you want to be more specific you can research crop coefficients online this is great for row crops but hard on a mixed crop system.

Remember:

Less water more frequently for seeds and young plants

Gradually more water less frequently as plants mature.

Also keep in mind most systems are likely running between 80%-90% efficiency. Slope on the ground can be one of several causes of poor uniformity.

Example From School Garden

Things to gather at your site:

What is your dripline GPH? .52gph

What is the square footage of your garden or a garden bed? (not pathways) Length of bed x width of bed = 40sqft

1) Converting your bed size to acres.

$$\frac{40}{\text{Bed area (ft}^2\text{)}} \quad /(\text{Divided}) \quad \frac{43560}{\text{ft}^2 \text{ in an acre}} \quad = \quad \frac{.0009}{\text{\# acres/bed}}$$

2) How much water (in gallons) would be needed to replace 1 inch of water in your garden bed?

$$\frac{27.154}{\text{Gallons in an acre inch}} \quad \times \quad \frac{.0009}{\text{\# acres/bed}} \quad = \quad \frac{24.4}{\text{gallons}}$$

3) How many gallons of water per hour is delivered by the dripline?

$$\frac{.52}{\text{Flow rate per emitter}} \times \frac{72 \text{ (18 per line at 4 lines)}}{\text{\# of emitters in bed}} = \frac{37.44}{\text{gallons/hour/bed}}$$

4) How long do we need to run irrigation per week on this bed to put down 1 inch of water?

$$\frac{24.4}{\text{Gallons to apply}} / \frac{37.44}{\text{gallons/hour/bed}} = \frac{.65 \text{ hours or 39 minutes}}{\text{hours running drip}}$$

5) Find your weekly reference ETo and how much water to replace.

$$\frac{1.1''}{\text{Reference Eto}} \times \frac{39}{\text{minutes running drip}} = \frac{43 \times 1.1 = 48 \text{ min total}}{\text{minutes to replace ETo X 1.1 for system inefficiency}}$$

Example: Kale at full canopy cover growth stage, I would separate the 48 minutes of watering to replace 1.1" at 90% efficiency into 2 ,24 minute watering sets. While also continually double checking FC to make sure plants are not thirsty or over saturated.

Example: Translated eggplants start at 50% canopy cover. $48 \text{ min} \times .5 \text{ (canopy cover)} = 24 \text{ min}$ separated into 3 waterings throughout the week of 8 minutes. Although I may overwater slightly doing 10-12 minutes to assure that the plant gets enough water. Always checking FC often on younger plants as they are more susceptible to drydown in the soil surface.

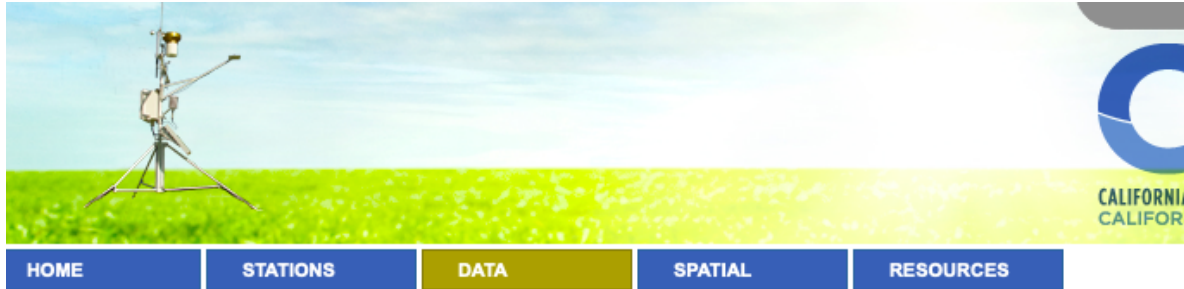
Resources to Dig Into this Deeper

<https://cimis.water.ca.gov>

Santa Cruz Station #104

Watsonville #209 & #129

Run a Limited Daily Report to get weekly ETo



CIMIS Station Reports

Full A

1. Select report style and date range

Create a **Limited Daily Report** in **English Units**

2. Select one-to-[many](#) stations. Click on Column headers to sort

Id	Name	Region	County	Status	Connect	Disconnect
091	Tulelake FS	Northeast Plateau	Siskiyou	Active	4/12/1989	---
092	Kesterson	San Joaquin Valley	Merced	Active	10/13/1989	---
099	Santa Monica	Los Angeles Basin	Los Angeles	Active	12/11/1992	---
103	Windsor	North Coast Valleys	Sonoma	Active	12/14/1990	---
104	De Laveaga	Monterey Bay	Santa Cruz	Active	9/28/1990	---
105	Westlands	San Joaquin Valley	Fresno	Active	4/17/1992	---

California Irrigation Management Information System (CIMIS)

CIMIS Daily Report

Rendered in ENGLISH Units.

Sunday, April 11, 2021 - Saturday, April 17, 2021

Printed on Sunday, April 18, 2021

De Laveaga - Monterey Bay - Station 104

Date	ETo (in)	Precip (in)	Sol Rad (Ly/day)	Avg Vap Pres (mBars)	Max Air Temp (°F)	Min Air Temp (°F)	Avg Air Temp (°F)	Max Rel Hum (%)	Min Rel Hum (%)	Avg Rel Hum (%)	Dew Point (°F)	Avg Wind Speed (mph)	Wind Run (miles)	Avg Soil Temp (°F)
4/11/2021	0.16	0.00	573	9.8	67.2	38.6	50.6	99	48	78	44.1	2.8	67.0	64.4
4/12/2021	0.12	0.00	471	10.8	59.5	43.0	49.9	98	72	88	46.5	2.5	58.9	64.5
4/13/2021	0.16	0.00	583	10.3	64.1	45.3	52.8	96	55	76	45.4	2.7	63.9	65.5
4/14/2021	0.16	0.00	574	10.0	59.5	43.8	50.9	97	62	79	44.5	2.8	68.2	65.9
4/15/2021	0.17	0.00	612	9.5	68.1	40.0	51.7	98	31	72	43.1	3.0	72.7	65.9
4/16/2021	0.17	0.00	629	9.7	65.5	37.7	50.1	96	49	79	43.8	3.1	73.7	65.6
4/17/2021	0.16	0.00	595	11.1	64.9	46.2	52.3	98	59	83	47.2	2.5	60.4	66.7
Tots/Avg	1.10	0.00	577	10.2	64.1	42.1	51.2	97	54	79	44.9	2.8	66.4	65.5

Flag Legend

<https://cimis.water.ca.gov/Resources.aspx>