

Water for Profit



WATERFORPROFIT

When and for how long should I irrigate?

Tree/vine micro-irrigation systems with overlap of water from emitters along the row

You need to know:

- how much water is available in the soil? (requires soil texture, decision on the maximum level of water stress to be applied to the crop and a measure of the crop rooting depth)
- how much water should the crop be using? (requires type of crop, stage of crop growth, measure of climatic conditions including evaporation)

Step 1: you need to calculate the readily available water (RAW) in the crop root zone.

Soil type (texture):	Crop rooting depth:
Crop stress willing to be applied: kPa	Month 1: m
	Month 2: m
	Month 3: m
	Month 4: m

Table 1: effect of soil texture on readily available water content

Soil Texture	Readily Available Water (mm _{water} per m _{soil}) between field capacity and;				
	-20 kPa	-40 kPa	-60 kPa	-100 kPa	-200 kPa
Crop Stress Level					
Sandy	30	35	35	40	45
Loamy Sand	45	50	55	60	65
Sandy Loam	45	60	65	70	85
Loam	45	65	75	85	105
Sandy Clay Loam	40	60	70	80	100
Clay Loam	30	55	65	80	105
Light Clay	27	46	57	70	90
Medium Clay	24	43	55	65	83
Heavy Clay	21	40	53	60	81

To calculate the RAW in the crop root zone

RAW (in mm/m) x width of wetted area (in m) x crop rooting depth (in m)

Month 1:	mm/m x	m x	m	=	L/m of tape
Month 2:	mm/m x	m x	m	=	L/m of tape
Month 3:	mm/m x	m x	m	=	L/m of tape
Month 4:	mm/m x	m x	m	=	L/m of tape

To calculate the RAW available for each tree/vine

= RAW (L/m tape) x distance between plants along row (m)

Month 1:	L/m of tape x	m/plant	=	L/plant
Month 2:	L/m of tape x	m/plant	=	L/plant
Month 3:	L/m of tape x	m/plant	=	L/plant
Month 4:	L/m of tape x	m/plant	=	L/plant



When and for how long should I irrigate? Continued

Step 2: calculate the expected crop water use.

Crop water use (mm/day) = crop factor x evaporation (mm/day)

- Select the appropriate crop factor for your crop and growth stage from the following table.

Table 2: crop factors for selected horticultural crops

Crop	Crop factors (K _c)		
	Early season	Mid season	Late season
Apples	0.45	0.95	0.7
Apricots/peaches	0.5	0.9	0.65
Asparagus	0.5	0.95	0.3
Avocado	0.6	0.85	0.75
Bananas – 1 st year	0.5	1.1	1.0
Beans (green)	0.5	1.05	0.9
Broccoli	0.7	1.05	0.95
Carrots		1.05	0.95
Cauliflower		1.05	0.95
Citrus	0.7	0.65	0.7
Grapes – table	0.3	0.85	0.45
Grapes – wine	0.3	0.70	0.45
Lettuce		1.00	0.95
Potato		1.15	0.75
Pumpkin		1.00	0.8
Squash, zucchini		0.95	0.75
Tomato		1.15	0.8
Watermelon	0.4	1.00	0.75

Crop factors vary with the stage of crop growth. For most tree crops, early season irrigation refers

to the period prior to flowering, mid-season refers to the flowering period and late season refers to the fruit filling period.

- For each month during the crop growing period in your area, enter the appropriate daily evaporation rates (mm/day) in the following table

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily Evaporation (mm/day)												

- For each month and crop growth stage, multiply the crop factor (K_c) by the daily evaporation rate to calculate the expected daily water use.

	Crop factor	x	Evaporation (mm/day)	=	Crop water use (mm/day)
Month 1:		x	mm/day	=	mm/day
Month 2:		x	mm/day	=	mm/day
Month 3:		x	mm/day	=	mm/day
Month 4:		x	mm/day	=	mm/day

- convert the crop water use (expressed in mm/day) to a volumetric measure.

1 mm of water applied = 1 L/m²

100 mm of water applied = 1 ML/ha

To convert the crop water use to an appropriate volumetric measure

= crop water use (mm/day) x canopy area (m²/plant)

Month 1: mm/day x m²/plant = L/plant/day

Month 2: mm/day x m²/plant = L/plant/day

Month 3: mm/day x m²/plant = L/plant/day

Month 4: mm/day x m²/plant = L/plant/day

When and for how long should I irrigate? Continued

Step 3: use the data from steps 1 and 2 to work out the expected period between irrigations for each month.

To calculate the period between irrigations				
	=	RAW (L/plant) ÷	crop water use (L/plant/day)	
Month 1:		L/plant ÷	L/plant/day =	days
Month 2:		L/plant ÷	L/plant/day =	days
Month 3:		L/plant ÷	L/plant/day =	days
Month 4:		L/plant ÷	L/plant/day =	days

Calculating how long to irrigate

You need to know:

- Readily available water content of the area/volume wetted by the irrigation system
- Water application rate or discharge from the irrigation emitter/sprinkler

Step 1: you need to calculate the readily available water (RAW) in the crop root zone.

Use the same steps as for Step 1 in the section calculating when to irrigate above.

Step 2: measure the discharge from your irrigation application nozzle/emitter.

Discharge per emitter (L/hr) =	
volume in container (in Litres) ÷	time to fill container (in minutes) x 60 mins/hr
L ÷	mins x 60 mins/hr
Discharge rate =	L/emitter/hr
To calculate the total discharge per plant:	
=	Discharge rate (L/emitter/hr) x number of emitters per plant
=	L/emitter/hr x emitters/plant
=	L/plant/hr

To calculate the period of irrigation				
	=	Readily available water (L/plant) ÷	discharge (L/plant/hr)	
Month 1:		L/plant ÷	L/plant/hr =	hrs
Month 2:		L/plant ÷	L/plant/hr =	hrs
Month 3:		L/plant ÷	L/plant/hr =	hrs
Month 4:		L/plant ÷	L/plant/hr =	hrs

For more details contact the Growcom members access line on 1800 654 222

Disclaimer: This information is provided as a reference tool only. Seek professional advice for irrigation specifics.

