

Water for Profit



WATERFORPROFIT

When and for how long should I irrigate?

Handshift and solid set sprinkler irrigation systems: Calculating when to irrigate

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.

Crop stress willing to be applied:	kPa	Month 2	m
		Month 3	m
		Month 4	m

Soil Texture	Readily Available Water (mm_{water} per m_{soil}) between field capacity and;				
Crop Stress Level	-20 kPa	-40 kPa	-60 kPa	-100 kPa	-200 kPa
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 crop rooting depth (in m)

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

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, select the appropriate daily evaporation rates (mm/day) from 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

Remember:

1 mm of water applied = 1 L/m²

100 mm of water applied = 1 ML/ha

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

Readily available water (in soil) ÷ crop water use = irrigation interval

To convert the crop water use to an appropriate volumetric measure

For spray irrigated systems: crop water use (L/m²/day) = crop water use (mm/day)

Month 1: mm/day = L/m²/day

Month 2: mm/day = L/m²/day

Month 3: mm/day = L/m²/day

Month 4: mm/day = L/m²/day

When and for how long should I irrigate? Continued

Month 1:	mm	÷	mm/day	=	days
Month 2:	mm	÷	mm/day	=	days
Month 3:	mm	÷	mm/day	=	days
Month 4:	mm	÷	mm/day	=	days

Calculating how long to irrigate

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/sprinkle.r

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 (L/hr) =
 volume in container (in Litres) ÷ time to fill container (in minutes) x 60 mins/hr

$$\text{Discharge rate} = \frac{\text{L}}{\text{mins} \times 60 \text{ mins/hr}} \text{ L/hr}$$

For spray systems:
 Need to convert the discharge rate to mm/hr

$$\begin{aligned} \text{Discharge (mm/hr)} &= \text{discharge (L/hr)} \div (\text{lateral spacing} \times \text{nozzle spacing along lateral}) \\ &= \text{L/hr} \div (\text{m} \times \text{m}) \\ &= \text{mm/hr} \end{aligned}$$

Step 3: use the data from steps 1 and 2 to calculate how long to irrigate

To calculate the period of irrigation

For spray irrigated systems:

Readily available water (mm) ÷ discharge rate (mm/hr)

Month 1:	mm	÷	mm/hr	=	hrs
Month 2:	mm	÷	mm/hr	=	hrs
Month 3:	mm	÷	mm/hr	=	hrs
Month 4:	mm	÷	mm/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.



A Growcom project conducted in collaboration with the Department of Primary Industries and the National Centre for Engineering in Agriculture with funding provided by the Queensland Government's Rural Water Use Efficiency Initiative

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