Drip Irrigation: Water per Plant and Daily Run Time

Daily water per plant and per hectare under drip irrigation and the emitter run time, from reference evapotranspiration, crop coefficient, spacing and wetted area.

Input parameters

Unit system: SI

Parameter	Value	Unit
Reference evapotranspiration (mm per day)	6.0000	
Crop coefficient	0.90000	
Row spacing	3.0000	m
Plant spacing in the row	2.0000	m
Wetted (shaded) area factor	60.000	%
Application efficiency	90.000	%
Emitters per plant	4.0000	
Emitter flow (litres per hour)	4.0000	

Calculated results

Parameter	Value	Unit
Water per plant per day (litres)	21.600	
Run time per day	1.3500	h
Plants per hectare	1,666.7	
Water per hectare per day	36.000	m³
System flow per hectare while running	26.667	m³/h

Notes for this case

• Crop water use is the reference evapotranspiration times the crop coefficient. Drip wets only part of the field, so the daily need per plant is reduced by the wetted (canopy) factor and divided by the application efficiency; 1 mm over 1 m² is 1 litre. The emitters must deliver that in the run time W/(n q). Split the run into shifts if the pump cannot supply the whole field at once.

Formula and method

$$W_p = \frac{ET_0 K_c P_w S_r S_p}{\eta}, \quad t = \frac{W_p}{n_e q_e}$$

Variables

ET_0	Reference evapotranspiration (mm per day)	-
K_c	Crop coefficient	-
S_r	Row spacing	m
S_p	Plant spacing in the row	m
P_w	Wetted (shaded) area factor	-
η	Application efficiency	-
n_e	Emitters per plant	-
q_e	Emitter flow (litres per hour)	-
W_p	Water per plant per day (litres)	-
t	Run time per day	s
N	Plants per hectare	-

W_{ha}	Water per hectare per day	m³
Q_{ha}	System flow per hectare while running	m³/s

Method and standards

Drip design.

Assumptions and limits

- Daily average conditions; no rainfall.

Report details

Report reference	FCC-39E1-2TYN (the same inputs always give the same reference)
Generated	23 November 2026, 17:34 UTC
Calculator	Drip Irrigation: Water per Plant and Daily Run Time
Method last reviewed	17 November 2026
Software release	FireCAD Calc, release of 22 November 2026
Release checks	3 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/civil/irrigation-farm/drip-irrigation-design

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.