



## 3.1.2 WATER REQUIREMENTS

# How much water do you need?

As part of the process of planning an irrigation system, you should make an initial estimate of how much water you are likely to need.

## Estimating water requirements

A number of factors should be taken into account when determining gross irrigation requirements. These factors are:

- the amount of water used by the crop (which depends on crop type and climate)
- effective rainfall
- soil water holding capacity
- carry-over soil moisture from winter rainfall
- risk of not meeting soil moisture deficits
- irrigation efficiency
- the reliability of the water supply.

A dependable water supply cannot be based on average requirements, as the supply would meet the needs of the crop only half the time if the average was used. High value crops may justify a water supply that will fully meet the needs of the crop nine years out of ten, while with low value crops it may not be economical to supply total needs in more than seven years out of ten. Each case must be evaluated individually.

## Water quantity

For the purposes of initial planning, an approximation of how much water is needed can be calculated as follows:

$$\text{Flow rate (in m}^3\text{ lh)} = \frac{10 \times A \times d}{H}$$

- where  $A$  = area irrigated in hectares  
 $d$  = gross daily depth of water required in millimetres  
 $H$  = number of hours of irrigation per day



For example, a 100 hectare property may need a supply based on 5 mm per day to meet evapotranspiration requirements. If pumping will occur for an average of 23 hours per day, the flow rate required is:

$$\begin{aligned}\text{Flow rate} &= \frac{10 \times 100 \times 5}{23} \\ &= 217 \text{ m}^3 \text{ lh}\end{aligned}$$

To convert this to gallons per minute, multiply the answer by 3.68.

$$\begin{aligned}\text{Flow rate in gallons per minute} &= 217 \times 3.68 \\ &= 800 \text{ gpm}\end{aligned}$$

An alternative way of calculating the flow rate, taking into account the actual gross application depth and the rotation or cycle time, is:

$$\text{Flow rate (in m}^3\text{ lh)} = \frac{10 \times A \times D}{H \times F}$$

- where  $A$  = area irrigated in hectares  
 $D$  = depth of water applied in millimetres  
 $H$  = number of hours of irrigation per day  
 $F$  = cycle time or return interval in days

Again, assuming a 100 hectare farm, if 50 mm of water is going to be applied every 10 days and pumping will occur for 23 hours per day, the flow rate required is:

$$\begin{aligned}\text{Flow rate} &= \frac{10 \times 100 \times 50}{23 \times 10} \\ &= 217 \text{ m}^3 \text{ lh}\end{aligned}$$

The factors  $d$  (or  $D$ ) and  $F$  can be obtained from local irrigation specialists or regional councils. The factors  $A$  and  $H$  can be varied according to farmers' needs.

Any water requirements for frost protection, temperature control, or leaching, if appropriate, must also be taken into account.

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