



# Irrigation Scheduling

## iii. Irrigation Scheduling using Evaporation

### Data and Crop Factors (M03-1001)

The water use of crops is very closely related to evaporation. In fact, crop water use is composed of evaporation of water from the soil surface and transpiration of water through the leaves. Combined, this is called evapotranspiration.

While evaporation is easily measured, transpiration is not. Therefore, it is much simpler to relate the crop evapotranspiration to daily evaporation via a crop factor. A crop factor is related to the percent of ground covered by the crop canopy and therefore will vary depending on the crop stage.

Canopy Cover	Crop Factor
Bare ground	0.3
1/4 canopy	0.4
1/2 canopy	0.6
3/4 canopy	0.7
Full canopy	0.85
Maturing crop	0.65

Example:

A cane farmer wants to know how long it takes for a 50 mm irrigation to be used by the crop. The stage of crop growth is 1/2 canopy. Currently, average daily evaporation is 5mm per day.

To determine crop water use, multiply daily evaporation by the crop factor. In this case, the crop factor is 0.6.

$$5 \text{ mm/day} \times 0.6 = 3 \text{ mm/day crop water use}$$

The crop is using 3mm per day. To determine how long an irrigation of 50 mm will last, divide the irrigation amount by the crop water use:

$$50 \text{ mm} / 3 \text{ mm per day} = \text{approx. 17 days}$$

From the calculations, it can be seen that a 50 mm irrigation will be used by the crop in about 17 days. The farmer can now forecast when the paddock will need to be irrigated again.

Evaporation is usually measured by a Class 'A' Pan. However, Evaporation Minipans (BSES Blue Drums) have become more commonplace within the industry. These work in a similar way to the Class 'A' Pan, except that measured evaporation from a minipan is greater than that from a Class 'A' Pan.

$$\text{Class 'A' Pan Evap.} = \text{Evaporation Minipan Evap.} \times 0.875$$

Evaporation Minipans have a slightly different use in the sense that:

- the minipan is filled immediately after an irrigation event
- daily crop growth rates are collected over the irrigation cycle. Growth rates will peak usually 4-7 days after an irrigation event and then drop quickly
- when growth drops to 30% of the maximum growth rate, the draw-down level in the minipan is recorded.
- this value becomes the minipan deficit for that soil type

Once the water level in the minipan falls to this deficit level, the grower knows that irrigation is due.

**However, because minipan deficit figures are not a measurement of actual soil moisture deficits, it can only tell the grower when to irrigate. Use the evaporation and crop factor data to determine how much to apply.**

For more information, please ring your local Rural Water Use Efficiency Officer.

The Rural Water Use Efficiency Initiative is a joint venture between BSES, CANEGROWERS and the Queensland Government through the Department of Natural Resources and Mines.

