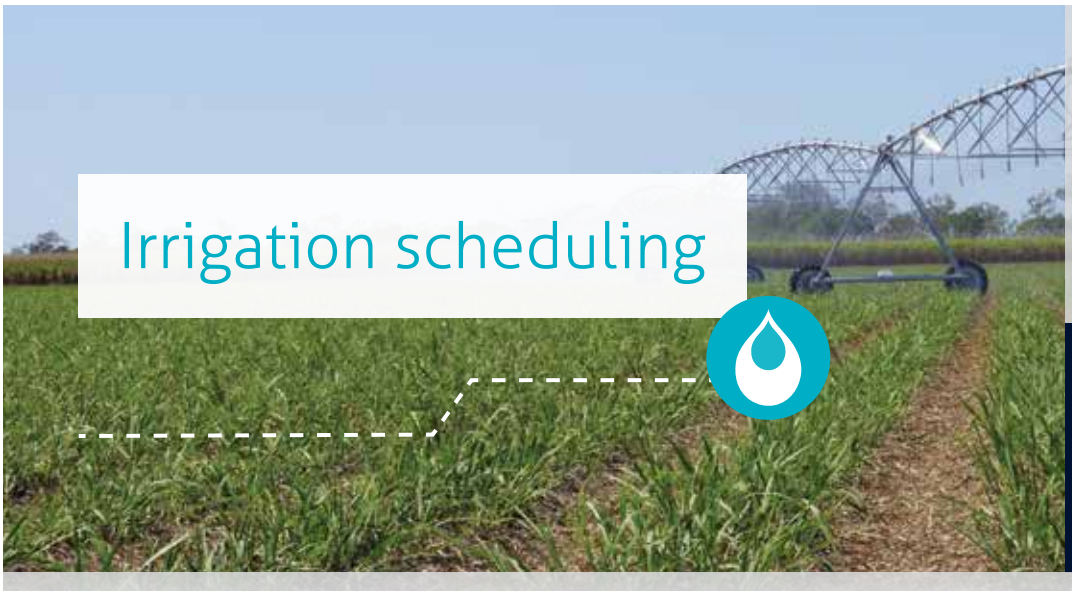

Irrigation scheduling

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Scheduling irrigation can help growers apply the right amount of water, in the right place, at the right time, to produce optimum yield. A range of tools are available to help with this important process.

The optimum level of irrigation

The frequency and amount of water to be applied will vary depending on soil type and crop growth stage.

Actively growing crops with a full canopy will require more frequent watering than small crops or those that are maturing for harvest. Different soil types will influence how much water the soil can hold and therefore how often irrigation will need to occur.

When determining an irrigation schedule you should aim to replace the readily available water (RAW). This is the amount of water held in the soil between the full point and the refill point.

The full point is the maximum amount of water the soil can hold against gravity. The refill point is the soil water content at which crops begin to stress. As a rule of thumb, it is halfway between the full point and permanent wilting point (**Figure 1**).

The RAW will vary, depending on soil type, the effective rooting depth of the crop and the crop itself.

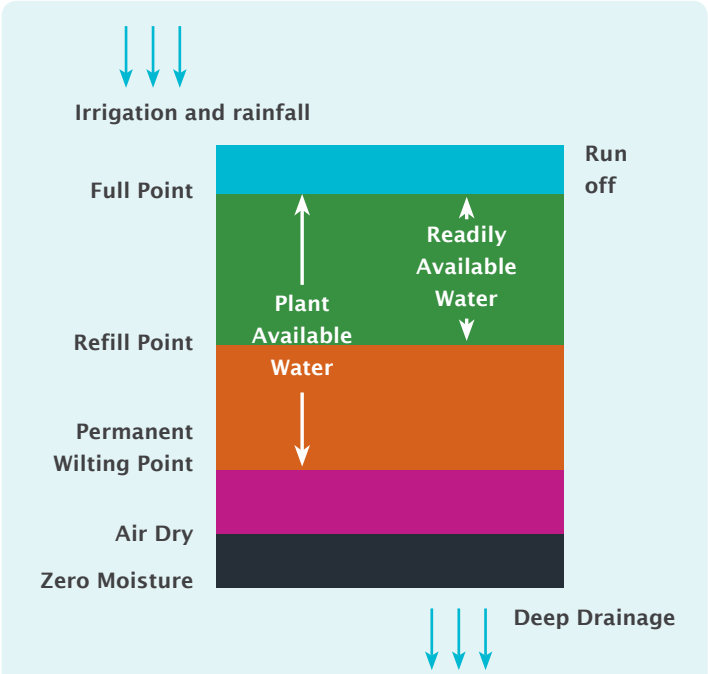


Figure 1 (above): Soil water types.

Irrigation scheduling tools

Capacitance probes

A capacitance probe can help to identify daily water use and to predict when a crop will require the next irrigation. When the soil moisture is maintained in the ideal range, crop yields will be maximised and water loss from deep drainage will be minimised.

A range of capacitance probes is available to purchase. These include but are not limited to products such as the EnviroSCAN from Sentek, the Field Connect from John Deere and the EnviroPro from Envirotek.

Making irrigation decisions from online data

Many of these systems work in a similar way because the information from the soil moisture monitoring equipment is sent from the infield equipment via a phone network to a computer server. The information is then made available to the user through a website that is password protected.

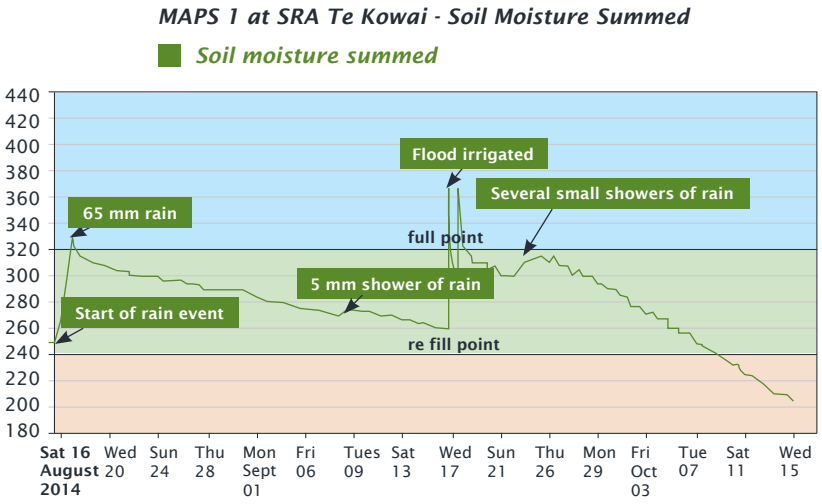


Figure 2 (above): An online chart shows the total soil water in the top 80 cm over the length of the probe. *Source: Mackay Area Productivity Services.*

Using a system like this enables the grower to see how much soil moisture is available for crop growth and when the next irrigation will be required.

This takes the guesswork out of irrigation scheduling and allows the grower to maintain the soil moisture in the zone that will maximise crop growth.

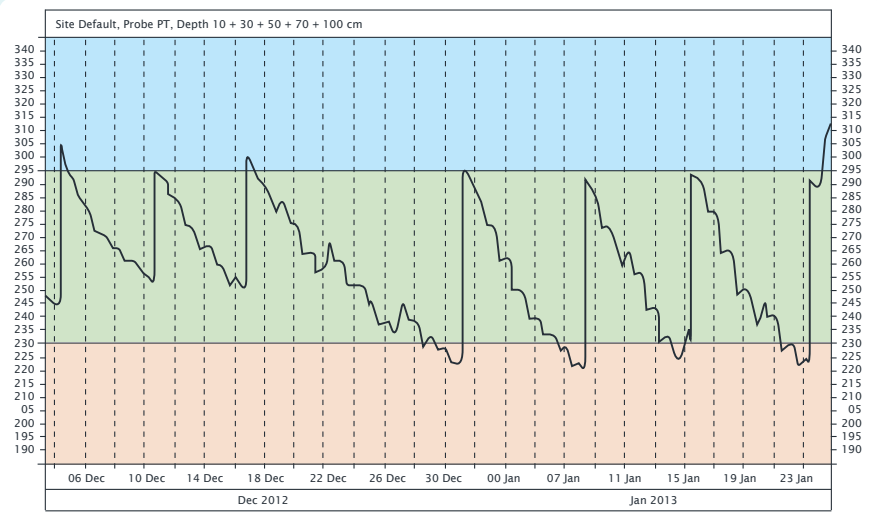
When deciding to buy a capacitance probe irrigation monitoring system, you need to consider the following points:

1. How robust and reliable is the infield equipment?
2. Is there a local service and support agent for the equipment?
3. How will you access the data from the system – a website or other system?
4. What is the annual cost of website access?
5. How user-friendly is the software on the website or on your computer?
6. What is the purchase price and ongoing cost of maintaining the system?

The cost of capacitance probes

The cost varies, depending on the size and complexity of the system. A single probe system will cost $3000–$5000 and the annual subscription to a website for data collection will range from $132 to $900.

Figure 3 (right): A capacitance probe chart showing daily water use. The blue zone on the chart is too wet, the green zone is the ideal range and the red zone is too dry.



Crop models

Crop water use can be estimated from evapotranspiration readings and crop factors. This will give an estimate of the amount of water being used daily or weekly by the crop. If the RAW and amount of water supplied by the irrigation system is also known, it is relatively easy to calculate when the crop will next require watering.

Tensiometers

Tensiometers consist of a hollow tube joined to a ceramic tip at the base, and a vacuum gauge and reservoir at the top. They measure the force that plants need to exert to obtain moisture from the soil.

As the soil dries, water moves out into the soil from within the tensiometer through the ceramic tip. The loss of water creates a vacuum in the tensiometer and is recorded as a suction reading. The higher the suction reading, the drier the soil. Irrigation begins again when the tensiometer gauge reads a predetermined level. After irrigation or rainfall, water moves back through the ceramic tip and the vacuum in the tensiometer is reduced.

A range of tensiometers is available in both manual and electronic formats. Manual tensiometers have a gauge on the side to show the level of soil suction. Electronic tensiometers can be connected to data loggers to measure soil tension over time. Tensiometers are at the lower price point for moisture monitoring equipment, with a range of models available between $200 and $300.

GDot: a new style of tensiometer

The GDot is gypsum block-type soil moisture sensor that uses a large dot display to show how hard it is for the plant to extract water from the soil. The large display on the unit allows them to be read from up to 15 m away, so a unit placed at the edge of the crop can easily be read from a vehicle on the headland. When all yellow dots are displayed, the crop has adequate soil moisture. As the soil dries out, fewer dots are displayed, showing that the crop requires irrigation.

The GDot unit was developed by Measurement Engineering Australia, and is available for purchase through Farmacist. The units are easy to install – all that needed is to auger a hole and bury the sensor in the active root zone and hang the GDot on a post. At around $300 per unit, the GDot is a low-cost option.

Right: A GDot system installed in the field. The yellow dots show that the crop has adequate soil moisture.

Helpful hints

- Irrigation scheduling allows you to match the water supplied to the crop with the water used by the crop.
- Tools are available to help with the management of soil water.
- Correct matching of water supply to water demand results in the best possible yield.

The following helpful information sheets can be found on the SRA website www.sugarresearch.com.au:

- IS13107: Soil water-holding capacity has more information on calculating RAW
- IS13023: Crop water use
- IS13027: Capacitance probes

Order your copy of the 2014 Irrigation of Sugarcane Manual by calling 1300 772 111. Or view it online at www.sugarresearch.com.au