AGRICULTURE VICTORIA

IrriGate

Sustainable Irrigation Services - North East, mid and upper Goulburn Broken Dryland

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IRRIGATION SCHEDULING

- **Soil moisture probes**
- **Grants available**
- **Evapotranspiration rates**
- **Accessing data**

While the probes used to measure soil moisture have not changed much over the years, the gathering, presenting and storing of information has. One of these changes has been the ability to store data in the cloud. This allows data to be viewed just about anywhere and provide access to other users. There is also the use of blue tooth technology entering the market. Both of which give wireless access to your soil moisture data.

Irrigation scheduling

Applying the right amount of water at the right time is important to maximise crop or pasture yields. Stretching out irrigation intervals or applying lower than required application rates to save water and pumping costs are generally not economical, and results in lower yields per megalitre.

There are really only three ways to adequately schedule irrigation;

1. With soil moisture monitoring probes,
2. Using weather data, primarily Evapotranspiration data, or
3. With a shovel and hand texturing along with some gut feeling.

While the third option may not be ideal to fine tune irrigation scheduling, experience built up over time should not be ignored.

Soil Moisture Probes. There are a large number of soil moisture monitoring set ups available, Figure 1 shows just a few. These range from the low cost options such as a G-dot for a visual probe measuring one depth at one location ($330/unit and probe), to the higher cost more specialised types costing $5,000 or more. ***Contact the writer for information on grants to cover 50% of the cost. Max subsidy of $2,000*.**

Figure 1: Just a few of the soil moisture devices available

These more expensive types measure soil moisture at a number of depths and locations, can measure soil temperature and EC levels to trace fertiliser movement through the soil profile and use wireless technology to send information directly to your smart phone or computer. While there are a number of different ways to record, collect and display the data, the probes generally are split into two categories.

1. Those that measure in kPa ie how hard it is for the plants to extract moisture from the soil and as such reading can be compared across soil types. This probe is often referred to as gypsum block and they eventually break down and have to be replaced after several years.
2. The other type of probe often referred to as a capacitance probe, measures a soil water percentage. The importance of the percentage value relates to the soil type. If calibrated correctly data can refer to mm of moisture available. Unless damaged these probes do not need to be replaced.

Both sets of data can be very useful to keep track of water movement through the soil profile and at what depths crops are extracting moisture, and with experience can indicate when irrigation should occur to avoid plant moisture stress. Figure 2 provides an image where the soil moisture at four depths was measured in kPa.

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While this information can be invaluable, it is important to realise these probes only measure a small amount of soil around the probe and care needs to be taken when extrapolating this information across a whole paddock, especially when soil types and irrigation uniformity vary. The use of an EM survey could help with correct probe placement.

Evapotranspiration Given the probes represent a limited area evapotranspiration rates can provide an overarching theoretical plant use. Evapotranspiration rates in conjunction with a crop coefficient can be used as a guide to how much water crops are using and an indication on how much needs to be replaced. The evapotranspiration rate is multiplied by the Crop Coefficient. The crop coefficient relates specifically to different crop types and crop stages of growth. A healthy Lucerne crop has a crop coefficient of around 1.0, where as a newly planted crop with little ground cover may have a crop coefficient of only 0.4. A healthy maize crop in full swing may have a crop coefficient of 1.2.

While evapotranspiration rates vary from day to day and year to year Figure 3 shows the long term average over the year for the Yarrawonga area. **(*Contact the writer if you would like these figures for your region*).**

This means typically in the middle of an average January at Yarrawonga a healthy Lucerne crop will be using around 8.8 mm/day, or 62 mm in a week. Don't forget to account for any rainfall.

It is important to remember this is how much water the Lucerne is using not what should be applied. To determine the amount of water to apply, the irrigation efficiency should be factored in using the formula below.

Water to be applied = Potential Evapotranspiration x Crop Coefficient / irrigation efficiency

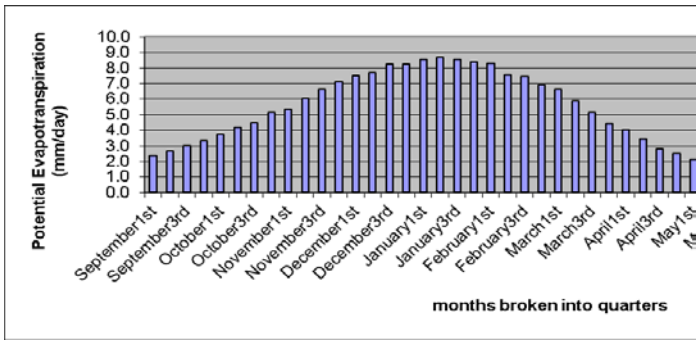

Figure 3: Average daily evapotransiration rates for Yarrawonga over the irrigation season

These figures are averages and can be higher or lower on any given day. Therefore to allow for more accurate irrigation scheduling Agriculture Victoria are sending willing participants a weekly email detailing the evapotranspiration rates for various locations. **Anyone interested in receiving the weekly email stating the evapotranspiration rates for the previous week please let the writer know.**

Ideally a combination of soil moisture monitoring and the use of evapotranspiration rates is the best way to ensure enough water is applied and at the right time.

If you are interested in anything in this newsletter, please contact Dennis Watson, Agriculture Victoria Irrigation Officer.

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