



Farm Water Futures

CHOOSING A SOIL-WATER MONITORING TOOL

There is a wide range of soil moisture monitoring devices that are available to assist growers make more informed irrigation scheduling decisions. If you are in the market for a scheduling tool, make sure you match its capabilities with your requirements. To assist making a decision ask yourself the following questions.

How much time can I spend on taking measurements and interpreting data?

It may be that you know that irrigation is vital but you don't have the time to allocate to data collection and interpretation. In some cases, consultants can be the best option. For others who can spend time with soil moisture monitoring, it's a matter of matching tool requirements with the time you have to gather and interpret data. Some tools such as Diviners, Gophers and tensiometers require manual collection of data. Others like EnviroScans, C-Probes and Buddy's will log data automatically with little manual input required.

What level of technology am I comfortable with?

If you don't like to sit in front of computers, it's no good purchasing scheduling equipment that requires a lot of computer use. However, if you want a large amount of detailed information, most tools require a computer to display graphs. Choose a tool that won't have you quickly frustrated or conversely have you looking for more detail after only a short time. Tensiometers, Gophers and Diviners can be used as stand-alone units in the paddock with the option of downloading to a computer, if required. A computer is absolutely necessary to view data gathered by an Enviroscan, C-probe or Buddy.

How much money am I willing to spend?

The cost of equipment is relative to the level of information gathered and the amount of manual recording necessary. Irrigation is a crucial part of producing quality crops and poor management can be costly. Dollars spent now may be dollars gained later. Typical prices for individual units vary so check with suppliers.

What other factors should I consider?

Other factors to consider are listed below.

- Amount of soil variation across the property influences the number of units required.
- Enterprise size may influence who actually will be using the tool or for what purpose the tool will be used.
- Shallow-rooted crops are less likely to require tools with multiple sensor depths.
- Level of technical and maintenance support available.





A summary of some options available and their benefits and limitations is located in the following table.

Tool	Function	Benefits	Limitations
Shovel / Auger	Digging in areas to check soil moisture by interpreting soil look and feel.	<ul style="list-style-type: none"> • In-expensive • Numerous sites possible • Portable • Low-level tech • On the spot decision 	<ul style="list-style-type: none"> • Subjective interpretation of soil moisture • Labour and time intensive • No continuous records or comparable readings
Tensiometer	Ceramic tip on the end of a tube. Soil suction provides indication of moisture, which is converted into pressure reading.	<ul style="list-style-type: none"> • On the spot decision • Low-level tech • Recordable details • Comparable readings • Moisture at different depths • Very good for variable soils 	<ul style="list-style-type: none"> • Require maintenance • Installation critical • Can be damaged • Can be relocated but isn't portable • Can't operate in dry soils
Hydrosense	Two prong sensor that is inserted into soil and gives moisture reading on a display unit.	<ul style="list-style-type: none"> • Portable • Recordable value • Comparable readings • Mid-level tech 	<ul style="list-style-type: none"> • Only useable to 20 cm • Prongs easily damaged • Dry surface values affect overall readings
Full Stop	Funnel like object buried to required depth. Water collects and sends signal back to surface when soil moisture reaches a certain level. Used to shut off an irrigation shift.	<ul style="list-style-type: none"> • Ideal for use in automated systems • Low-level tech • Easy to relocate 	<ul style="list-style-type: none"> • Doesn't provide info at varying depths • Uses limited in non-automated systems • Buried depth critical
Gopher	Capacitance probe attached to end of staff. Access tubes are inserted at sites and the probe takes readings down through the profile. Readings shown on logger and graphed. Recording is done manually through logger	<ul style="list-style-type: none"> • Portable • Multiple depths and multiple sites • Logger can be used for on the spot decisions • PC software can be used • Readings are comparable • User can install tubes 	<ul style="list-style-type: none"> • Calibration can be difficult • Regular readings are necessary • Logger unit has small display • PC software is clumsy
Micro-Gopher	As above except access tube is much smaller.	<ul style="list-style-type: none"> • As above except installation of tube is much easier 	<ul style="list-style-type: none"> • As above
Diviner	Similar to the Gopher and Micro-Gopher except logger has more functions and a larger display.	<p>As above plus the following.</p> <ul style="list-style-type: none"> • Logger provides better graphing • Better on the spot decisions can be made • PC software is user-friendly • Readings taken automatically as probe is lowered 	<ul style="list-style-type: none"> • Unit is more expensive than the Gophers • Well proven machine • Calibration can be difficult if required • Regular readings are necessary

Table continued on next page.



Tool	Function	Benefits	Limitations
Gypsum Blocks	Numerous types available on the market with different software. Blocks measure electrical resistance and this is represented as a function of soil moisture. Probes can be buried at different depths that require monitoring. Probes can be continually monitoring.	<ul style="list-style-type: none"> • Continuous multi-depth moisture monitoring • Less expensive than other continuous multi-depth moisture monitoring devices • User can install sites • No manual recording 	<ul style="list-style-type: none"> • Multiple sites require additional units • No 'direct probe to portable logger' readings possible • PC is necessary • Lots of wires/cable • Installation can be difficult
EnviroSCAN	<p>Numerous capacitance probes attached to a staff, inserted into an access tube. Multiple tubes are then connected, via cable, to a logging device complete with solar panel and optional mobile phone unit for remote download.</p> <p>There are also available Enviroscans with telemetry, exactly the same as above but with no cables, radios can travel larger distances but machines are more expensive as would be expected with telemetry.</p>	<ul style="list-style-type: none"> • Continuous multi-site, multi-depth soil moisture monitoring • Data transfer via laptop to logger, logger to PC or mobile phone unit to PC modem • Battery requires limited maintenance • Large data storage available • PC software provides numerous options • Ample information for complete irrigation management decisions • No manual recording 	<ul style="list-style-type: none"> • Tubes must be within 700 m of logger • Cables can be cut, slashed, chewed, eaten etc. • Tube must be installed by professional • Ongoing cost for relocating tubes • No 'direct probe to portable logger' readings possible • PC is necessary • Reasonable computer skills required
C-Probes	As above except telemetry, cable is used to send information from probes back to logging devices. Data is then sent to regional receivers and then growers obtain data via their PC modem.	<ul style="list-style-type: none"> • Continuous multi-site, multi-depth soil moisture monitoring • Battery requires limited maintenance • Large data storage available • PC software provides numerous options • No long lengths of cable • Weather data can be linked • Ample information for complete irrigation management decisions • No manual recording 	<ul style="list-style-type: none"> • Tube must be installed by professional • Ongoing cost for relocating tubes • Distance between probes and receivers is dictated by topography • PC must have Internet access to obtain data • Ongoing cost to access data • Reasonable computer skills required

For more details contact Growcom on 07 3620 3844.