

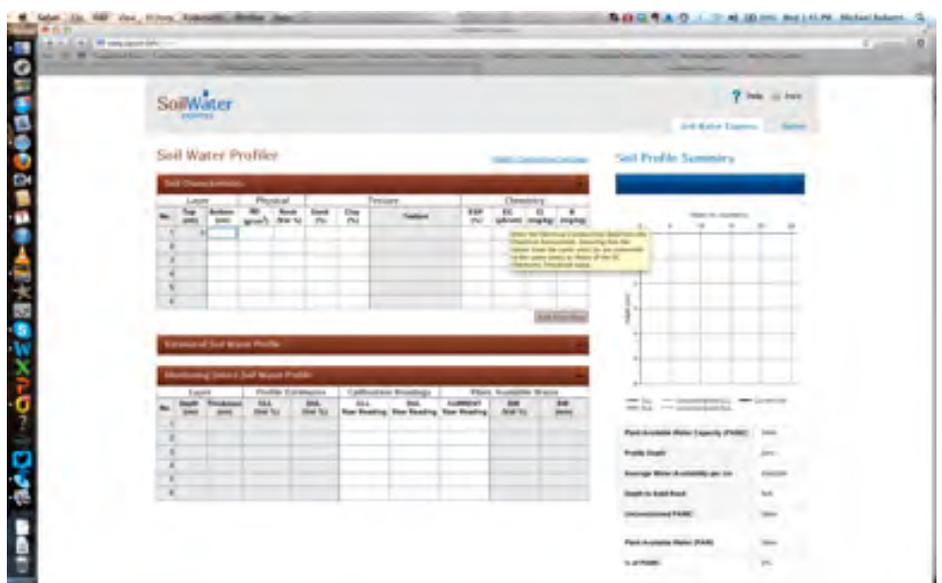
Be quick! Wet soils shortcut soil water capacity measurement.

Written for Grain & Graze 2 by Mike Roberts Communications, Research and Consulting

More and more advisors each year are turning to Yield Prophet to help their clients discover and understand the implications of knowing exactly how much plant available water and nitrogen is present in their soil for a given crop in a particular year. Yield Prophet is a modeling tool that is changing the way we manage our crops and in the process, taking a good deal of the risk out of making farm profit.

One of the reasons for the acceleration of uptake for Yield Prophet technology has certainly been the extensive work carried on with GRDC and Grain & Graze 2 funding to get more soil characterizations into the national database. Nearly 70 soil types around SA have been characterized since 2005. Unlike much of the earlier work on soils done by state departments and universities which looked at soil texture and chemistry, these new characterizations additionally set out to describe 'bucket size' or how much plant available water (PAW) the soil could hold.

These detailed characterizations are available via a number of means but most simply through the new iPad/tablet app called **SoilMapp**. Using a tool like this means you can generally match the soil you might be standing on to one that has already been characterized or one that is a close enough match for you to then run in the Yield Prophet model.



However, sometimes you might actually be working with a soil that has not yet been characterized. Then what? Grain and Graze 2 spoke with Brett Cocks, CSIRO soil scientist about some tips for doing your own characterization work.



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In order to describe 'bucket size' for a given soil, in addition to knowing something about its texture, horizon levels and chemistry you actually have to measure how much water it holds against gravity at drained upper limit (DUL) and compare it to what remains after a crop has extracted all that it can at the crop lower limit (CLL). That usually means wetting up soil profiles, doing bulk density measurements and erecting rainout shelters post flowering to get accurate CLL figures in spring.

Wetting up soil profiles without a bit of help from Mother Nature is not always the easiest thing to do. It involves selecting a site away from trees and other vegetation, inserting a neutron moisture meter to 180cm, covering the 4m square area with plastic sheeting and applying water. Lots of water needs to be applied at a trickle for many weeks depending on the dryness of the soil in order to reach saturation.

That is why; with the current seasonal conditions in SA at the time of writing (7 August 2013) it is worth considering heading out in the paddock to do some measurements on the currently full soil profiles. In some areas with full profiles, no tanks, plastic sheeting and no waiting weeks for wetting up are required at the moment.

Brett Cocks says getting the right, properly calibrated sampling equipment is important. "It's better not to improvise with tin cans as errors can multiply dramatically. Make sure that where you decide to do your characterization is not compromised in any way. Sample in a reasonably consistent part of the paddock away from trees, headlands, old fence lines and wheel tracks." Sample the predominant soil type in the paddock that is likely to have the greatest influence on the crop.

"If you are doing a bulk density (BD) sample, ensure you don't sample deeper than the size/

height of the BD ring. This avoids compacting the sample and impacting on your BD measurement. Ensure sampling equipment is clean and not contaminated with sand or loose soil material from the surface when you are sampling further down the profile."

"If you are using a hand driven system the rule of thumb is don't hit it hard. Hit softly but hit it often. That will limit the compression from around the tip of the tube and that way any impact from that compression will be limited to small amounts so you are not influencing the bulk density unduly."

"Programs like Yield Prophet have set sampling depths that normally work quite well but sometimes it is better to sample by horizon rather than by a nominated depth. Watch out for where your A and B horizons intersect and adjust to either side if necessary."

The crop lower limit (CLL) measurement requires the set up of an exclusion tent over the top of the crop at flowering.





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An urgent message to advisors is that if you are not confident that the soil you are working with is represented in APSOIL and SoilMapp then you'll need some BD samples and chemistry down to the estimated rooting depth of the crop. Do this NOW while many paddocks have a full soil water profile. If you leave it until summer when it is dead dry it will take many thousands of litres of water to wet up so you can take DUL and BD measurements.

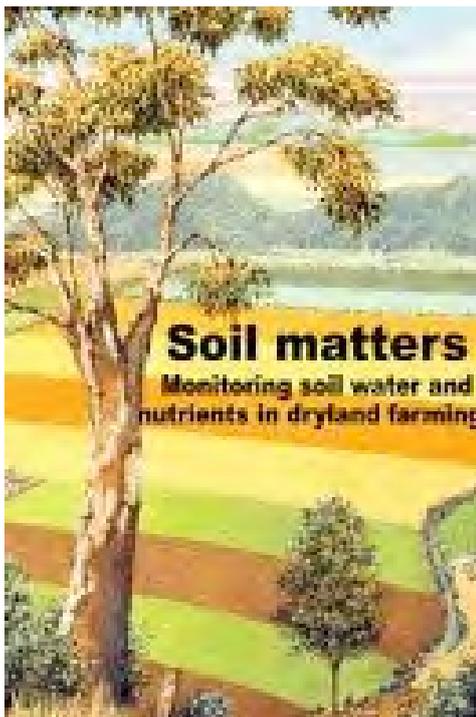
A 'rain-out' shelter



A rain exclusion tent placed in position in a cotton crop. Air vents are provided at the apex of both ends of the tent to allow flow of moist air from the tent.

You still allow air to go through so it's basically a rain out shelter. That allows the crop to extract water to the CLL. It excludes any additional rain post flowering and lets the crop draw down to as far as it can to finish off.

However, in a year like this year we might still have water in the profile. The crop may not use all of that water so we might need to set up our tents quite early to be sure we are extracting all the water out of the system post flowering.



A great source of detailed information is the CSIRO Soil Matters book put together by Neal Dalgliesh and Mike Foale. One more thing: if you find you do need to do some more soil characterization work after checking out the soil databases then let the Grain & Graze 2 team know and they may be able to help set up a couple of more characterizations before the program finishes. However, **you can save yourself lots of time and effort by getting a bulk density test done while the soil is sitting at DUL.** Then all you have to do is set up a tent at the end of August to draw down on that water in a setting of a soil type as described.

Grain & Graze 2 would like to thank Brett Cocks from CSIRO and Bill Long of Ag Consulting Co for their contribution to this article.