

ESTIMATING SOIL WATER: TO KICK, TO STICK, TO CORE OR COMPUTE?

P.T. Hayman and I.J. Collett

NSW Agriculture, Tamworth Centre for Crop Improvement, RMB 944, Tamworth, NSW 2340

In the water-limited environment of northern NSW it is important for farmers to know how much water is stored in their soil. This information can help with the decision to sow or continue the fallow and if a crop is sown, which levels of inputs such as nitrogen should be applied. In June 1995, we compared a range of methods with the assistance of 8 farmers from the local LANDCARE group.

METHODS

We used one contour bay of a black soil paddock that had undergone a long fallow due to a failed wheat crop. After the landholder described the paddock history, including the rainfall record, we asked the group to kick the surface and write down their estimate of the depth of wet soil. We then asked the group to measure the depth of wet soil using a push probe according to their normal practice, (1 or 2 pushes). Finally, we asked them to record 15 pushes in a zig zag pattern across the paddock. At the same time we used a manual soil corer designed by the APSRU (1) to core to 1 m in 7 locations across the contour bay. We also entered the daily rainfall from property records for the 18 months since January 1994 (612 mm) into the computer simulation program HOWWET? (1).

RESULTS

All the methods compared in Table 1 were surprisingly close. The differences would be unlikely to change any management decisions. The soil core is not a perfect standard as we had to assume a bulk density ($1.3/cm^3$) and the fraction of total water that was unavailable (20%). We also had to assume the profile was 20% full in January 1994 for the HOWWET simulation.

Table 1. Estimates of soil moisture. 1 cm of wet soil was assumed to contain 1.8 mm of ASW.

Method	Wet soil (cm)	ASW (mm)	Range (mm)	CV	Compared to (6)
1. Guess from a kick	84	152	90-190	23%	+ 9%
2. First pushes	83	150	144-180	15%	+ 7%
3. Many pushes	77	138	108-147	21%	-1%
4. HOWWET?	(77)	138	107-182	18%	-1%
5. 25% of Rainfall (621 mm)	(86)	155			+ 11%
6. Coring	(78)	140			

The push probe overestimated the amount of available soil water (ASW) especially as the wetting front started to taper off around 60 cm. However, there was available water beneath 80 cm that led to an underestimate. This compensation probably explains the close results in this study and may make the probe a fairly robust tool providing it is not pushed too hard.

This study covered a long fallow with rain in the last month on a heavy soil. More care may be needed with the push probe in double crop or failed crop situations. Soil coring provides extra information and computers enable farmers to ask *what if*. However, in this limited study, a push probe was remarkably

accurate and farmers' guesses adequate for most decisions. Some individual estimates were poor but the accuracy gained by pooling farmers' results was similar to that from coring or computer estimate.

REFERENCES

1. Agricultural Production Systems Research Unit. 1995. Aust. Grain, February-March.