Delivering soil water information to growers and consultants

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Abstract

An understanding of soil water processes and knowledge of how individual soils store water are important components of risk management in Australian dryland agriculture. Awareness of soil water status at sowing or when considering nitrogen application, can directly assist in operational decision making, as well as provide the basis on which to investigate more strategic crop and systems issues, using simulation tools such as APSIM (Keating *et al.* 2003) and its derivative product Yield Prophet[?] (Hochman *et al.* 2005). When used as an input to simulation, location specific soil water information provides the opportunity to explore, at the paddock scale, the impact of management decisions on crop yield and gross margin (such as variety selection, sowing date, fertiliser timing and application rate) at low cost and little risk. As a result of a lack of specific soil water information for many regions of Australia, this project has focussed on farmer and consultant skills training in soil water management and the development of a database of soil characteristics appropriate for use at the paddock scale. This poster focuses on the type of training available to the agricultural fraternity and the functionality of the soils database.

Key Words

Soil database, soil workshops, soil characterisation, APSoil, APSIM, Yield Prophet[?]

Introduction

Whilst few would dispute the contention that soil water is one of the major drivers of agricultural production in Australia, the level of understanding of this critical resource amongst agricultural practitioners is often limited, and limiting to optimal production. A training package (Wockner *et al.* 2004), designed for use by both farmers and consultants, has been developed to provide an understanding of the soil water balance and to provide practical skills in resource monitoring and use of the information in management. Whilst the training workshop is designed to increase skill levels amongst agricultural practitioners it also provides an avenue for capturing location specific soil information for use in the wider community. The soils database (APSoil) has been developed as a national repository of soil water data useful in general agronomic practice as well as an input to simulation using tools such as APSIM and its derivative web based product Yield Prophet[?].

Approach and Outcomes

Soil workshops

The soil water action learning activity described in this paper was developed initially for the northern cropping regions of Australia and subsequently modified for use in the southern and western cropping regions. The workshop has been accredited under the National Training Framework for vocational training at Certificate 5 level, an initiative targeting consultants and their professional development. It aims to develop participant understanding of soil water through the use of an interactive style which includes hands-on field and bench top activities. Topics covered in the workshop include:

- Understanding the soil water balance
- Constraints to water capture and storage-optimising soil and management conditions
- Monitoring soil water-practical tools and techniques
- Managing soil water-rules of thumb to simulation

During the past 2-3 years over 400 farmers, 150 commercial consultants and 60 public sector advisors have undertaken soil water training in over 40 workshops around Australia. These participants are responsible for managing or consulting to over 2 million hectares of Australian agriculture.

APSoil database

The development of the APSoil database has resulted from consultant and farmer demand for easily accessed soil information relating directly to crop production, and the requirement of researchers for information that allows simulation at the paddock scale, thus enabling tools such as Yield Prophet[?] to be used in crop management. Yield Prophet[?] is a web based decision support tool designed to inform managers on crop production decisions in real time including such operational issues as sowing date, variety and fertiliser management. Critical to the success of Yield Prophet[?] is access to reliable soil information at the paddock scale.

Information collected through field soil characterisation and stored in APSoil includes the parameters required to calculate Plant Available Water Capacity (PAWC) (Figure 1). These include the Drained Upper Limit (DUL) of an individual soil, the Crop Lower Limit (CLL) for different crops grown on that soil, the Bulk density (BD) and any sub-soil constraints that may affect root extension and resource extraction, including Electrical Conductivity (EC), Chloride (Cl) and Exchangeable Sodium (ESP) (Dalgliesh and Foale, 1998; Hochman *et al*., 2006). To be useful in simulation, and to be of greater value in routine crop management, these parameters should describe the profile to depth of potential root extraction for a particular crop, which from experience is nearly always deeper than the traditional sampling depths used in each region. In addition APSoil also provides the opportunity for users to modify existing entries to better match known soil conditions and to create their own database of local soils within the APSoil framework. APSoil is now a component of APSIM releases and is also available for download at http://www.apsru.gov.au/apsru/.

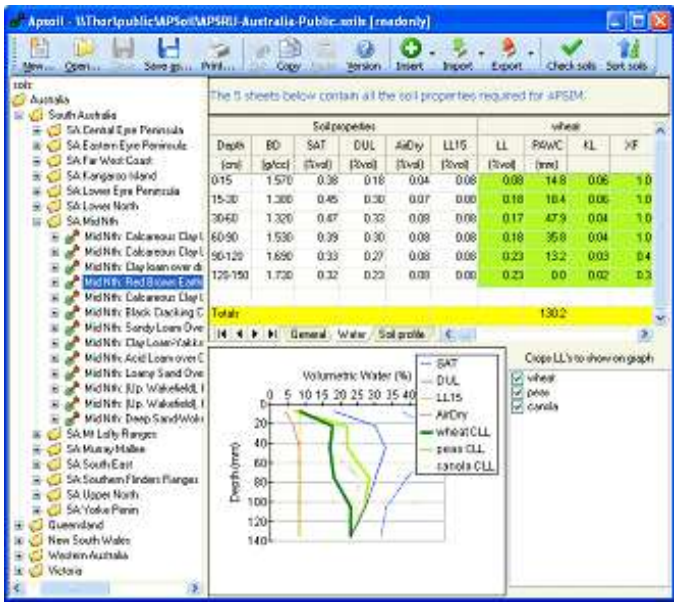

Figure1. Display screen for the APSoil database showing soil water parameters for a Red Brown Earth at Roseworthy, SA including the PAWC and CLL for wheat, peas and canola.

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