

MEASURING PLANT-AVAILABLE SOIL WATER STORAGE CAPACITY IN NORTHERN AUSTRALIA

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Simulation modelling to predict crop performance requires information on the water holding characteristics of the soil. A program of soil characterisation has been undertaken on the vertisols of northern Australia to gather this information. In so doing, techniques for the *in-field* determination of bulk density (BD), drained upper limit (DUL) and lower limit (LL) have been developed or modified. This paper describes the techniques in use within the FARMSCAPE Project to measure these three soil properties required for the calculation of Plant Available Water Capacity (PAWC).

DRAINED UPPER LIMIT

A square of heavy-gauge plastic sheeting (4x4 m) is laid on the ground and the edges buried. Before ponding, a Neutron Moisture Meter (NMM) access tube is inserted into the centre of the area to monitor water movement during the wetting up and drainage phases. Water is applied regularly under the plastic, until saturation is reached. Use of the sheeting minimises evaporation and expedites the construction of the pond and the rehabilitation of the site. Tracking water movement with an NMM provides a picture of rates of profile recharge and allows for determining when recharge is complete. This may take a number of weeks.

BULK DENSITY

Bulk density in a cracking clay is best determined at drained upper limit. Both DUL and BD are determined using a common soil core. Low displacement, high volume tubes are pushed in using an hydraulic soil sampler. The consecutive use of differing diameter tubes (125, 100 and 75 mm) at each sampling point improves the ease of insertion and extraction of the tubes in wet clay soils. Samples from 3-4 points in each pond are collected.

LOWER LIMIT OF EXTRACTABLE SOIL WATER

A small rain exclusion shelter is erected over a crop for which the lower limit is to be determined. The shelter is installed no later than anthesis and only in vigorously growing crops which have the potential to extract maximum available water and reach terminal wilting by maturity. The shelter is designed to exclude rain but allow free flow of air. It is made of a material that does not adversely affect incoming radiation. Information on LL is required for each crop grown on a particular soil type as they differ in their ability to extract soil water.

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