

## SOIL SAMPLING TECHNIQUES FOR MONITORING WATER AND NITROGEN

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Making management decisions based on information on the status of available soil water and nitrogen is essential to improve the efficiency of crop production in sub-tropical Australia. There is a need to improve methods used for the monitoring of soil water and nitrogen in order to increase the use of this information by farmers and advisers. This paper highlights recent improvements which make soil sampling more streamlined and hence more accessible to the agricultural community.

### SAMPLING EQUIPMENT

Two methods of insertion and extraction of soil tubes are in use, either: a) manually, using a wooden hammer and jack: or b) by the use of hydraulics. The manual equipment (1) is readily accessible and allows farmers and consultants to learn more about their soil. This has led to an increased interest in the benefits of soil sampling and improvements in the design of broad-scale sampling equipment. An hydraulic sampling rig able to be fitted to either a tractor or a utility has been developed.

### SAMPLING AND PROCESSING METHODS

To reduce error when sampling at the paddock scale, research undertaken on the clay soils of the Darling Downs indicated that a sampling intensity of 10 cores per 40 ha paddock is necessary to obtain a level of accuracy of  $\pm 20\%$  of the mean for nitrate and  $\pm 7\%$  of the mean for soil water (2). The routine procedure now in use *on-farm* is based on these findings with 2 sets of 5 cores being bulked per paddock. Soil samples are placed in wet strength paper bags prior to in-field weighing and laboratory drying at  $105^{\circ}\text{C}$  to determine gravimetric soil water. These samples are then used for nitrate analysis. Recent findings (Dalglish, unpublished data) show that sample drying temperature has minimal effect on nitrate concentration when air drying is compared to drying at  $105^{\circ}\text{C}$  in a fan forced oven or drying by microwave oven.

### CONCLUSIONS

The main source of error in determining soil water and nitrogen *on-farm* is the spatial variability within the paddock. Any loss in accuracy through modification of sampling technique is outweighed by the potential inaccuracies of insufficient sample numbers. The methods described provide a suitable sampling intensity with techniques designed to be efficient and cost-effective.

### REFERENCES

1. APSRU. 1994. Exploring the soil on your farm. APSRU, DPI; Toowoomba
2. Jones, P.N. 1994. IPP&P Biometrics Unit Report IPPP/BU/94/15. CSIRO, Brisbane