

## The effect of deep ripping on water use of wheat in a drought

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Rutherglen Research Institute has demonstrated that deep ripping through soil hardpans can increase wheat yields (1, 2). The benefits of deep ripping are thought to include improved root and water penetration into the subsoil. Where soils are too acid for maximum wheat production, deep ripping has been combined with liming to increase wheat yields over a range of seasons (2). This field experiment studied the effect of deep ripping (with and without lime) on soil water content and crop water use during 1982. Rainfall from sowing to harvest totalled 132 mm whilst evaporation (Class A pan) for the same period was 742 mm. The long-term averages are 393 mm of rainfall and 595 mm of evaporation.

### Methods

Soil water contents beneath wheat (cv. Oxley) were monitored weekly at 20 cm intervals to 1 m using a neutron moisture meter. The four treatments selected were:

- No rip, no lime (NRNL),
- + rip, no lime (RNL),
- No rip, 2.5 t ha<sup>-1</sup> lime (NRL) and
- + rip, 2.5 t ha<sup>-1</sup> lime (RL).

The water balance equation (3) was used to estimate values of water uptake for a drying soil profile. The ripping (to 35 cm) was carried out with a paraplow in March 1982, 6 weeks before sowing.

### Results and Discussion

The drought was so severe that only on two occasions did the soil water content at 20 cm increase from one week to the next. Prior to harvest the surface soil water content, in all treatments, was approximately 2% (W/W).

Ripping increased crop water use by 8 mm, regardless of lime treatment. Partitioning of water extraction data down the profile showed that there was no significant difference in water use, between treatments, in the 0-40 cm region of the profile. When ripping had taken place water use from the 40-100 cm depth interval however was 50-100% greater (20 mm average) than in the unripped treatments (12 mm).

The wheat grain yields (t/ha) obtained from the plots where soil water content was measured were NRNL 0.43, RNL 0.81, NAL 0.33 and RL 0.95 (LSD 5%, Lime 0.25, Rip 0.23). It was concluded that where soil water content was limiting wheat growth, ripping enabled roots to extract more water from deeper in the soil profile and significantly increased crop yields.

1. Ellington, A. (1982). Proc. 2nd Aust. Agron. Conf., Wagga Wagga, p. 204.
2. Reeves, T.G., Ellington, A., Coventry, D.R., Birth, J.R. and Steed, G.R. (1982). Proc. 2nd Aust. Agron. Conf., Wagga Wagga, p. 326.
3. Black, T.A., Gardner, W.R. and Tanner, C.B. (1970). *Agron. J.*, 62, 48-51.