

Grain yield, yield components and growth of wheat following soil amendment with lime and deep ripping

D.R. Coventry, H.D. Brooke, V.F. Burnett and T.G. Reeves

Rutherglen Research Institute, Department of Agriculture, Victoria

Wheat crops with stunted chlorotic patches are now widespread in northern Victoria. Both compacted soil layers (1) and soil acidity are associated with these areas of poor growth. In 1981 a long-term experiment was sown with wheat on an acid soil (pH 5.2, 0-10 cm) which had a compacted layer (bulk density 1.7 g/cc) at 10-15 cm depth. Growth and yield responses of the wheat were measured for 3 seasons following soil amendment by liming and deep ripping.

Methods

Lime was topdressed and incorporated in September 1980 (Table 1) and the plots were deep ripped to a depth of 35 cm before sowing in 1981 and 1982. A range of fertilizers and trace elements were sown with wheat (cv. Oxley). Grain yield and yield components were measured in the period 1981-83. The results presented are the main effects for lime and ripping. Herbage was harvested six times in 1983 from plots supplied with 26 kg P/ha.

Results and Discussion

The seasons differed considerably in rainfall, and ripping increased ($P < 0.05$) grain yield by 21, 46 and 11%. Lime (2.5 t/ha) increased ($P < 0.05$) grain yield by 81, 66 and 30% respectively for 1981, 1982 and 1983 (Table 1). Tillering was increased ($P < 0.05$) by lime and ripping in the 3 seasons, however, in 1981 and 1982 there was no difference between tiller numbers at the low lime rates but in 1983 the differences were large at all lime rates. Fertile spikelets/head and grains/head were increased ($P < 0.05$) with lime in 1981 and 1982 but there was no difference in 1983. With ripping an increase ($P < 0.05$) in spikelets and grains/head was obtained in 1983. The only instance of grain weight being increased with either treatment occurred in 1982 following ripping. In 1982 water-use at depth was much greater with this treatment (2), indicating deeper rooting depth. Increased root depth could also be responsible for the large difference in tillering obtained between ripped and unripped treatments in this extremely dry season. No differences were obtained between herbage harvested from ripped and unripped plots in the absence of lime in 1983. This non-response is similar to the grain yield result in 1981 and tillering results in 1981 and 1983 suggesting that with adequate moisture, liming of this acid soil is required to get full benefit from deep ripping. With 2.5 t/ha lime, large differences ($P < 0.05$) in herbage between the ripped treatments were obtained only with the final harvests (23 Aug; 9 Sept). Differences ($P < 0.05$) between the lime treatments (0; 2.5 t/ha) were obtained after the second harvest (30 June) and maintained throughout the season.

Table 1 Effect of lime and ripping on wheat grain yields (t/ha)

Lime t/ha	1981		1982		1983	
	No Rip	Ripped	No Rip	Ripped	No Rip	Ripped
0	1.34	1.26	0.25	0.51	1.64	1.81
0.5	1.23	1.62	0.44	0.63	1.84	2.25
1.0	1.76	2.53	0.60	0.89	2.09	2.35
2.5	2.16	2.66	0.51	0.76	2.12	2.38
5.0	2.16	2.38	0.70	0.89	2.09	2.03
LSD 5%; L:R	0.83:0.36		0.19:0.10		0.33:0.21	
Rainfall (mm)	838.2		295.9		639.6	

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