

The B.O.Z.O. lime movement study at Wollun on the Northern Tablelands

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A review of soil test data from 146 sites in an Armidale district soil sampling workshop series between 2001 and 2002 showed that 84% of topsoil samples (0-10 cm depth) recorded a pH(CaCl₂) of ≤ 5.0 (Edwards and Duncan 2002). Lime is recommended as an ameliorant for acid soils. There is little information on the rate of lime movement on acid granite soils of the Northern Tablelands of NSW. The B.O.Z.O (Bergen op Zoom and Ohio) lime movement study was established in 2001 to investigate the effect of top dressed lime on a fine granite soil

Methods

The site consisted of a soil with a pH(CaCl₂) of 4.6-4.8 at 0-10 cm and soil cation exchange capacity ranging from 3.0-4.8 (0-10 cm). It was located at Wollun, 25 km north-west of Walcha on the Northern Tablelands of NSW.

The experiment consisted of 3 lime treatments (nil, 2.5 and 4.0 t/ha) with 3 replications, on a pasture dominated by tall fescue and weeping grass. It was top dressed with lime in February 2001, and a test-dependent rate of fertiliser applied annually along with legume seed (white and subterranean clover). Soil tests were taken prior to the application of lime, and then at 6-month intervals to 3 depths (0-10 cm, 10-20 cm and 20-30 cm). All soil samples were analysed for pH(CaCl₂) and exchangeable cations. The experiment was defoliated with a mower as required when plant height reached 10-15 cm.

Results

Soil pH

There was a significant lime treatment effect in the topsoil (0-10 cm, $P < 0.05$) but not in the sub-soil, indicating that there was no apparent movement of the lime below 10 cm. At the 0-10 cm depth there was no significant difference between 2.5 and 4.0 t/ha of applied lime (Table 1).

Table 1. The effect of lime (0, 2.5 and 4.0 t/ha) on soil pH(CaCl₂) in a granite soil on the Northern Tablelands of NSW

Lime rate (t/ha)	Soil depth (cm)		
	0-10	10-20	20-30
0	4.57d ^a	4.82c	5.11ab
2.5	5.11ab	5.01bc	5.23a
4.0	5.27a	4.98bc	5.11ab

^a Means followed by the same letter are not significantly different ($P < 0.05$)

Exchangeable aluminium

There was no significant effect of lime on exchangeable aluminium at any depth (Table 2).

Table 2. The effect of lime (0, 2.5 and 4.0 t/ha) on mean exchangeable aluminium, expressed as a percentage of cation exchange capacity, in a granite soil on the Northern Tablelands of NSW

Lime rate (t/ha)	Soil depth (cm)		
	0-10	10-20	20-30
0	4.578a ^a	2.983a	1.656a
2.5	1.133a	1.950a	1.178a
4.0	0.756a	2.106a	1.527a

^a Means followed by the same letter are not significantly different ($P < 0.05$)

Discussion

The lighter textured granite soils of the Northern Tablelands have been highlighted as being at greatest risk of decline in soil pH (Harris and Duncan 1999). On the fine granite soils, a greater change in pH may have been expected under normal rainfall conditions. The drought of 2001-2003 (Feb-Dec 2001: 673 mm, Jan-Dec 2002: 435 mm, Jan-Aug 2003: 496 mm; annual average rainfall: 756 mm) is likely to have slowed the effect of lime since rainfall is known to influence movement of lime through the soil profile on granite soils (Fenton *et al.* 1996).

Ideally, this study should continue for another 4 to 5 years to gain a more complete picture of lime movement, however due to funding constraints this will not be possible. Further investigation of longer-

term studies will confirm the use of lime as a topdressing ameliorant.

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