

Soil acidification in N.E. Victoria

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Long term experiments and demonstrations at Rutherglen confirm reports of other workers (1, 2, 3, 4) that soil acidification is increased by ammonium sulphate or clover pasture, but is little affected by superphosphate.

Expt. 1 Fertilizer application under fallow-wheat rotation 1912-1972, R.R.I.

In an experiment conducted from 1912-1972, soil pH (1:5 water) was little changed by superphosphate, was raised by lime, and was depressed by ammonium sulphate (Table 1).

Table 1 Soil pH changes under fallow-wheat rotation 1912-72, R.R.I.

Fertilizer applied to each wheat crop	pH	
	0-15 cm	15-30 cm
Nil	6.11	6.59
Superphosphate 62 kg ha ⁻¹	6.26	7.04
Superphosphate 125 kg ha ⁻¹	6.10	6.73
Superphosphate 250 kg ha ⁻¹	5.95	6.29
Superphosphate + Amm. sulphate 500 kg ha ⁻¹	5.57	6.04
Superphosphate + Lime 625 kg ha ⁻¹	6.81	7.15
L.S.D. (P<0.05)	0.38	0.77

Expt. 2 Pasture-wheat rotation experiment 1959-1972, R.R.I.

In a rotation experiment adjacent to Expt. 1, clover ley/wheat rotation treatments were conducted from 1959-1972. Superphosphate 125 kg ha⁻¹ was applied to each crop and pasture annually. Ammonium sulphate and clover ley both resulted in depressed soil pH (1:5 water) (Table 2). The soil was the same as in Expt. 1. but the area had been under clover ley for 10 years.

Table 2 Soil pH changes due to ammonium sulphate or clover ley 1959-72, R.R.I.

Rotation	Fertilizer	0-15 cm	15-30 cm
Continuous Fallow-Wheat	Super 125 kg ha ⁻¹	6.08	6.32
Continuous Fallow-Wheat	Super 125 kg ha ⁻¹	5.21	5.62
	+ Amm. sulphate 500 kg ha ⁻¹		
8 yrs Clover, 3 yrs Wheat	Super 125 kg ha ⁻¹	5.30	5.94
L.S.D. (P<0.05)		0.40	0.45

On a third site 800 m distant from Expts. 1 and 2, and on the same parent material but weakly gilgaied, a top-dressing demonstration was commenced in 1915. Native grassy pasture was either untreated or top-dressed with superphosphate 125 kg ha⁻¹ in alternate years, 1915-80 or 1955-80.

The top-dressing raised stocking capacity from 4 to 10 d.s.e. ha⁻¹, and raised sub-clover content of pasture from <10% to 40-60% by 1980. Soil pH (1:5 water) was then measured on samples composited from 40 cores/plot. Untreated soil pH's were 6.1 and 5.78 in gilgai puffs and hollows respectively, while top-dressed soil pH's were 4.95 and 5.20 (1915-80), or 5.01 and 4.77 (1955-80) in puffs and hollows respectively. The untreated pH's were significantly (P<0.05) higher than in the two top-dressed soils.

The evidence together indicates that superphosphate alone has little effect on soil acidity, while increased nitrogen inputs either from fertilizer or subterranean clover results in increased acidity.

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