

MASTER — Crop responses to lime

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Summary

This Primefact reports crop responses to lime application. Introducing crops into grazing systems can make lime profitable in the short term. Soil acidity is a more limiting factor than nitrogen on highly acidic soils.



Wheat crops on limed (left) and unlimed treatments (right)

Crop responses to lime

- Introducing crops into grazing systems can make lime profitable in the short term.
- Crop response to lime was observed in the first year of liming.
- Wheat yields increased by more than 100% when lime was added (Table 1). Acid-tolerant wheat varieties Dollarbird and Diamondbird were used.
- Canola yield doubled with lime (Table 1).
- Triticale had a 47% yield increase with lime in 1997–2003 excluding 1998 (late frost damage).
- Narrow-leaf lupins 'Merrit' produced commercially viable grain yields since 1997. However, no lime responses have been measured in lupins, presumably due to the high tolerance of narrow-leaf lupins to acidity.
- Oats yielded poorly, irrespective of lime treatment, possibly due to herbicide interactions.
- However, field peas were not a viable option due to fungal disease infections and poor competition against weeds. Broadleaf lupins failed in 1996 and 1997 due to waterlogging and insect damage (Table 1).

Table 1. Average crop responses to lime from 1992 to 2003 (excluding 1994)

Treatment	Phase	Crop	Limed treatment	Unlimed treatment	Lime responses	
			(t/ha)	(t/ha)	(t/ha)	%
AP/C	Phase 2,4,6	Wheat (1992-2003)	3.01	1.45	1.56	107
PP/C	Phase 4	Oats (1993-1996)	2.48	1.96	0.52	26
		Triticale (1997, 1999-2003)	2.77	1.88	0.89	47
		Canola (1998, 2000, 2001, 2003)	1.66	0.83	0.84	101
	Phase 5	Peas (1992-1995)	1.21	0.36	0.86	241
		Lupins (1996-2003)	1.41	1.39	0.02	1
	Phase 6	Wheat (1992-2003)	3.19	1.45	1.73	119

AP/C: Annual pasture/crop rotation; PP/C: Perennial pasture/crop rotation



Wheat grain yield and available soil nitrogen at sowing

- Adding nitrogen to a crop without liming will have limited benefits in highly acidic soils.
- No yield response was observed to the increased available soil nitrogen at sowing in the unlimed treatment (Fig. 1), indicating acidity was a more limiting factor than nitrogen in this case.
- Wheat had a strong positive response to available soil nitrogen at sowing on the limed treatment (Fig. 1).

Wheat grain yield and weeds

- With lime, there is a significant reduction in weed burden, primarily due to increased crop competitiveness.
- There were strong negative relationships between grain yield and weed dry matter at flowering.
- The grain yield was reduced by 0.5 tonne per hectare as the weed dry matter increased by 1 tonne per hectare.

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Further information

- Li, GD, Helyar, KR, Conyers, MK, Cullis, BR, Cregan, PD, Fisher, RP, Castleman, LJC, Poile, GJ, Evans, CM, Braysher, B 2001, 'Crop responses to lime in long term pasture/crop rotations in a high rainfall area in south-eastern Australia', *Australian Journal of Agricultural Research* **52**, 329–41.
- [Primefact 31, MASTER — Experimental design](#)
- [Primefact 32, MASTER — Soil acidity and lime responses](#)
- [Primefact 34, MASTER — Pasture responses to lime](#)

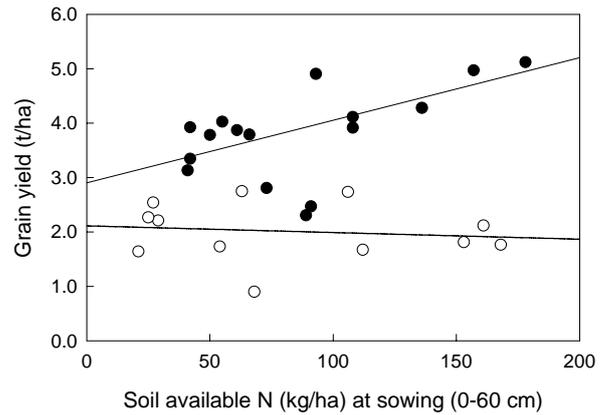


Fig. 1. Relationship between wheat grain yields (t/ha) and soil available N (kg/ha) at sowing (0-60 cm). Solid and open symbols for limed and unlimed treatments respectively.



Triticale crops on limed (left) and unlimed treatment (right)

- [Primefact 35, MASTER — Sheep responses to limed pastures](#)
- [Primefact 36, MASTER — Nitrate leaching and deep drainage on acid soils](#)
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