

**Li**

# LIME AND DOLOMITE FOR ACID SOILS

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## AIM

To investigate the effects of Lime, Gypsum and Dolomite on grain production on acid soils.

## BACKGROUND

Various soil amendments have been recommended for acid “Wodjil soils” in the northeastern wheatbelt. This trial was established in 2003 to examine the benefits of lime, gypsum and dolomite on grain production. In 2003 various rates of lime, dolomite, gypsum and various combinations of these were applied. Wheat and triticale were planted and yields were improved by about 8% with applications of gypsum in both species. Soil testing in early 2004 showed a significant pH increase where lime or dolomite had been applied in 2003. Extractable aluminium had also decreased. Plots where gypsum had been applied had higher EC's throughout the top 30cm. Lupins were sown in 2004 and yields increased where lime or dolomite had been applied in the previous year. Nodulation was severely impaired where gypsum had been applied in the previous year resulting in poor growth and a yield reduction. In 2005 wheat and barley were sown.

## TRIAL DETAILS

<b>Property</b>	Keith Carter, Jibberding
<b>Plot size &amp; replication</b>	2m x 20m x 3 reps
<b>Soil type</b>	Brown yellow sandy loam
<b>Sowing date</b>	16 <sup>th</sup> May 2005
<b>Seeding rate</b>	Carnamah Wheat @ 90 kg/ha and Hamelin Barley @ 88 kg/ha
	100 kg/ha Agstar Extra, 100 kg/ha Potash IBS, 75 L/ha Flexi N IBS, 80 L/ha
<b>Fertiliser (kg/ha)</b>	Flexi N 6 WAS 79.5 N, 14.1 P, 49.5 K, 9.1 S
<b>Paddock rotation</b>	2002 = Failed Lupins, 2003 = Wheat/Triticale, 2004 = Lupins 16 <sup>th</sup> May 2005: 1 L/ha Sprayseed & 1.5 L/ha trifluralin.
<b>Herbicides</b>	15 <sup>th</sup> June 2005: 200 g/ha Achieve + 1% Supercharge + 1 L/ha Hoegrass + 500 mL Tigrex

## SOIL ANALYSIS

Depth	pH	Salt	OC	N (Nit)	N (Amm)	P	Fe	K	S	Extrac. Al
Nil Plot 0-10cm	4.8	0.065	0.74	5	6	41	618	77	12.2	1.37
Nil Plot 10-20cm	4.3	0.041	0.42	2	2	18	695	43	11.5	3.53
Nil Plot 20-30cm	4.3	0.028	0.22	2	1	7	661	29	17.3	4.93

Treatments			
	2003	2004	2005
1	Wheat - Nil	Lupins	Wheat
2	Wheat - 2 t/ha lime	Lupins	Wheat
3	Wheat - 2 t/ha gypsum	Lupins	Wheat
4	Wheat - 2 t/ha dolomite	Lupins	Wheat
5	Wheat - 2t/ha lime + 2 t/ha gypsum	Lupins	Wheat
6	Wheat - 2 t/ha gypsum + 2 t/ha dolomite	Lupins	Wheat
7	Triticale - Nil	Lupins	Barley
8	Triticale - 2 t/ha lime	Lupins	Barley

9	Triticale - 2 t/ha gypsum	Lupins	Barley
10	Triticale - 2 t/ha dolomite	Lupins	Barley
11	Triticale - 2t/ha lime + 2 t/ha gypsum	Lupins	Barley
12	Triticale – 2 t/ha gypsum + 2 t/ha dolomite	Lupins	Barley

## RESULTS:

Table 1: 2004 Soil test results 0cm to 30cm.

Treatment	pH	pH	pH
	0-10cm	10-20cm	20-30cm
Nil	4.8	4.33	4.27
2t Lime	5.57	4.40	4.50
2t Gypsum	5.07	4.27	4.30
2t Dolomite	5.87	4.67	4.53
2t Lime + 2t Gypsum	5.57	4.43	4.33
2t Gypsum + 2t Dolomite	5.73	4.80	4.40
LSD	0.29	0.213	nsd

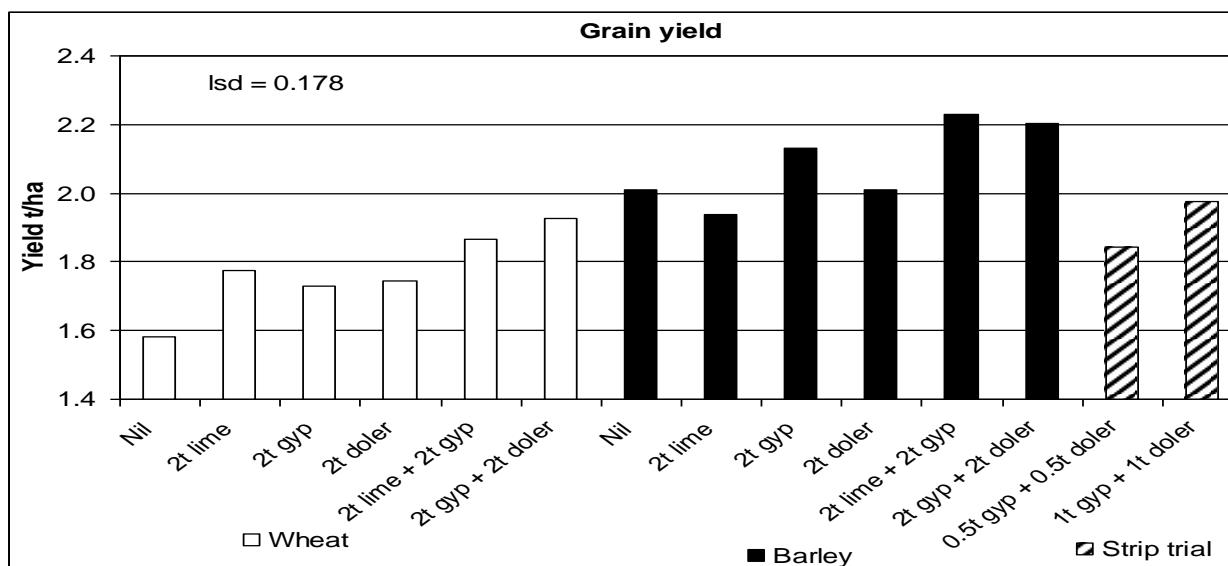


Figure 1: Yields of wheat and barley 2005.

## DISCUSSION:

Visually throughout the growing season the nil plots for both the wheat and barley appeared poorer than all other treatments. The barley was frosted in August and also showed signs of aluminium toxicity which limited final yields. The wheat appeared to be unaffected by frost.

All treatments in the wheat produced significant yield responses over the nil, with gypsum in combination with either lime or dolomite producing the highest yields. The gypsum and dolomite combination increased yields by 344 kg/ha over the nil treatment. There were no differences in grain quality with screenings averaging 2.4% and protein 14.6%.

A similar pattern emerged in the barley with combinations of gypsum and lime, or dolomite producing the highest yields. Barley yields where lime and gypsum or lime and dolomite had been used together increased by over 200 kg/ha compared to the nil treatment. No differences in grain quality were recorded due to the treatments with proteins averaging 12.6% and screenings 45.6%. The high screenings are probably related to a combination of the frost effects and aluminium toxicity given barley is more sensitive than wheat.

Final soil sampling was conducted in January 2006 and pH and extractable aluminium down to 30cm will be compared. Complete results available at the Liebe group autumn update in March.

**SUMMARY:**

- Lime or dolomite were both effective tools for increasing pH in this trial.
- The use of gypsum in combination with either lime or dolomite gave the highest yields for both wheat and barley.

**PAPER REVIEWED BY: DR STEPHEN LOSS**