

# Effects of Lime on Potassium Response

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## Key Messages

- There was no response to lime or potassium (K) in 2011 canola or 2012 wheat, but there was a statistically significant response to K in 2013 grown wheat (+0.34 t/ha)
- Plant tests indicated that K was adequate in 2011 and 2012, but deficient in 2013
- There was no effect of lime on K response in each of the 3 years of the trial.

## Aim

To determine whether lime has an effect on potassium (K) response.

## Background

- Many acid soils are low in potassium (K).
- Soil tests indicate that marginal K was present (0-10cm: 44 mg/kg, 10-20cm: 31mg/kg, 20-30cm: 33 mg/kg) as well as severe sub soil acidity (10-20cm: 4.2, 20-30cm: 4.1).
- This trial was set up to determine whether the application of lime had an impact on K requirements.

## Trial Details

Property	Joe Steenson, Wongan Hills
Plot size & replication	40m x 2.5m x 3 replications
Soil type	Yellow sand plain
Soil pH (CaCl <sub>2</sub> )	0-10cm: 4.0 10-20cm: 4.1 20-30cm: 4.1
EC (dS/m)	0.05
Sowing date	17/05/13
Seeding rate	64 kg/ha Cobra wheat
Fertiliser	See below
Paddock rotation	2010: wheat, 2011: canola, 2012: wheat
Herbicides	14/05/1: 1.5 L/ha Powermax, 2 L/ha Boxer Gold, 1 L/ha Treflan, 35 g/ha Logran
Growing Season Rainfall (2013)	196mm

## Results

**Table 1:** Crop yield (t/ha) for 10 different fertiliser and lime regimes, grown in 2013 at Wongan Hills.

Trt No#	2011 Lime (t/ha)	2011, 2012 and 2013 IBS (t/ha)	2011, 2012 and 2013 Banded (kg/ha)	2011, 2012 and 2013 N P K			2013 Banded (L/ha)	2013 Z21 (L/ha)	2011 Canola (t/ha)	2012 Wheat (t/ha)	2013 Wheat (t/ha)
1	-	-	-	0	0	0	-	-	0.58	1.87	1.28
2	-	-	94 Agstar Extra	68	13	0	30 FN	100 FN	1.07	2.47	1.82
3	-	-	110 K-Till Extra	68	13	12	35 FN	100 FN	1.09	2.19	2.15
4	-	50 MoP	94 Agstar Extra	68	13	25	30 FN	100 FN	1.13	2.24	2.07
5	-	100 MoP	94 Agstar Extra	68	13	50	30 FN	100 FN	1.12	2.28	2.24
6	2.6	-	-	0	0	0	-	-	0.65	2.02	1.32
7	2.6	-	94 Agstar Extra	68	13	0	30 FN	100 FN	1.16	2.33	1.72
8	2.6	-	110 K-Till Extra	68	13	12	35 FN	100 FN	1.15	2.27	2.06
9	2.6	50 MoP	94 Agstar Extra	68	13	25	30 FN	100 FN	1.21	2.51	2.04
10	2.6	100 MoP	94 Agstar Extra	68	13	50	30 FN	100 FN	1.07	2.19	2.12
LSD Fertiliser									0.11	0.30*	0.11***
LSD Lime									ns	ns	ns
LSD Lime x Fertiliser									ns	ns	ns

*Nitrogen supply matched up with Flexi-N applied to treatments 2-5, and 7-10; treatments 1 and 6 have not had N fertiliser applied.*

**Table 2:** Nutrient treatments and crop yields of 2011-2013 seasons, plus the economics of applying potassium.

Trt	2011, 2012 and 2013				2011	2012	2013	Potassium Economics*		
	IBS (t/ha)	Banded (kg/ha)	P	K	Canola (t/ha)	Wheat (t/ha)	Wheat (t/ha)	Returns (\$/ha)	Cost (\$/ha)	Profit (\$/ha)
1 & 6	-	-	0	0	0.61	1.95	1.30	-	-	-
2 & 7	-	94 Agstar Extra	1 3	0	1.11	2.40	1.77	-	-	-
3 & 8	-	110 K-Till Extra	1 3	1 2	1.12	2.23	2.11	84	72	12
4 & 9	50 MoP	94 Agstar Extra	1 3	2 5	1.17	2.38	2.06	71	105	-34
5 & 10	100 MoP	94 Agstar Extra	1 3	5 0	1.10	2.23	2.18	103	210	-108

*\*Economic assumptions: Canola \$500/t; APW \$250/t; K in MoP \$1.40/kg; K in K-Till Extra \$2.00/kg.*

### Economics

Economics are based on 2013 responses to K (including the cost of K applied in 2011, 2012 and 2013) – responses to K in 2011 and 2012 were not statistically significant.

### Comments

There was no response to lime or potassium (K) in 2011 or 2012, but there was a statistically significant response to K in 2013. As yet, there has been no yield response to lime and lime has had no effect on K response. Although there was no response to lime or K in 2011 or 2012 (and lime in 2013), the response to K in 2013 shows the need to be careful that lime applications are not at the expense of required nutrients. Returns from 12 kg K/ha applied in 2011, 2012 and 2013 were about breakeven after three years.

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