

# South African Sugar Industry Agronomists Association

Final Trial Report

Project Code:4603  
Trial Code:L+GxVar94  
Cat No.: 2190

## TITLE: Lime/gypsum/variety trial

### Particulars of Project:

Location: Rencken Farm, Dalton  
Region: Union Coop, Midlands  
System: Mistbelt  
Soil Form: Magwa

Trial design: Randomised block/split plot

Main treatments: 1. Control (C)  
2. Dolomitic lime 5 t/ha (L5)  
3. Dolomitic lime 10 t/ha (L10)  
4. Dolomitic lime 5 t/ha + gypsum 5 t/ha (L5+G5)

Sub-treatments: 1. N12  
2. N16

Plot size: 10 m x 6 rows (gross) @ 1.0 m row spacing  
8 m x 4 rows (net)

Initial soil analysis:

PH	Clay %	OM %	EAI ppm	K ppm	Ca ppm	Mg ppm	ASI %
4.2	59	6.8	397	76	111	53	75

Treatments applied: 15/3/95  
Planted: 16/3/95

Incorporated with heavy disc  
600 kg/ha 2:3:4 (30) + Zn in the furrow  
480 kg/ha MAP (33) + 250 kg/ha KCl top-dress  
Subsequent crops: as FAS recommendations

### Objectives:

1. To determine the yield response of two varieties (N12 and N16) to lime and gypsum on an acid clay soil.

2. To determine the effects of lime and gypsum on soil properties.

**Results:**

**1. Yield**

Plant crop (4/10/96)

Treatment	Variety	Cane t/ha	ERC %	t ERC/ha
0	N12	92.3	10.45	9.6
L5	N12	104.5	10.05	10.5
L10	N12	104.1	10.30	10.7
L5+G5	N12	109.1	10.00	10.9
0	N16	109.3	10.47	11.4
L5	N16	127.7	9.48	12.1
L10	N16	131.0	9.20	12.0
L5+G5	N16	142.7	9.34	13.4
LSD (p=0.05)		10.81	1.04	1.37

1<sup>st</sup> ratoon (30/3/98)

Treatment	Variety	Cane t/ha	ERC %	t ERC/ha
0	N12	140.3	10.82	15.7
L5	N12	145.6	10.11	14.7
L10	N12	133.0	10.90	14.5
L5+G5	N12	142.6	9.74	13.8
0	N16	133.8	10.91	14.6
L5	N16	152.8	10.23	15.6
L10	N16	154.6	10.76	16.6
L5+G5	N16	177.8	10.62	18.8
LSD (p=0.05)		19.5	1.09	2.55

2<sup>nd</sup> ratoon (14/10/99)

Treatment	Variety	Cane t/ha	ERC %	t ERC/ha
0	N12	66.9	14.98	10.0
L5	N12	68.4	14.85	9.8
L10	N12	67.8	14.75	9.7
L5+G5	N12	77.9	15.26	11.6
0	N16	56.7	15.3	8.7
L5	N16	81.1	14.98	12.1
L10	N16	89.7	15.04	13.5
L5+G5	N16	87.0	15.34	13.3
LSD (p=0.05)		10.6	0.80	1.70

3<sup>rd</sup> ratoon (19/4/01)

Treatment	Variety	Cane t/ha	ERC %	t ERC/ha
0	N12	85.0	10.31	8.9
L5	N12	87.8	11.69	10.4
L10	N12	86.8	11.93	10.4
L5+G5	N12	101.0	11.84	12.0
0	N16	61.6	10.69	6.4
L5	N16	78.3	11.02	8.5
L10	N16	92.6	11.70	10.8
L5+G5	N16	93.8	10.95	10.3
LSD (p=0.05)		19.4	1.43	1.83

4th ratoon (29/10/02)

Treatment	Variety	Cane t/ha	ERC %	t ERC/ha
0	N12	69.7	10.74	7.5
L5	N12	83.7	10.84	9.1
L10	N12	81.6	11.28	9.2
L5+G5	N12	84.0	10.59	8.9
0	N16	53.0	12.34	6.5
L5	N16	79.7	11.95	9.6
L10	N16	86.4	11.91	10.3
L5+G5	N16	84.7	11.88	10.1
LSD (p=0.05)		10.6	0.95	1.41

5th ratoon (18/9/03)

Treatment	Variety	Cane t/ha	ERC %	t ERC/ha
0	N12	46.0	11.12	5.1
L5	N12	55.9	11.10	6.2
L10	N12	50.6	10.41	5.3
L5+G5	N12	53.9	11.33	6.1
0	N16	41.5	10.49	4.4
L5	N16	58.0	9.97	5.7
L10	N16	55.4	10.02	5.5
L5+G5	N16	63.9	10.16	6.5
LSD (p=0.05)		14.7	1.06	1.00

## 2. Soil analysis

### a. Soil pH

	Sample date	15/3/95	25/10/96	27/10/98	29/8/02
	Depth (cm)	pH	pH	pH	pH
Control	0-30	3.92	3.92	4.13	4.36
	30-60	4.20	4.14	4.54	4.70
	60-90	4.50	4.51	4.80	4.91
L5	0-30	3.92	4.14	4.41	4.53
	30-60	4.20	4.22	4.58	4.77
	60-90	4.50	4.47	4.74	5.00
L10	0-30	3.92	4.32	4.61	4.84
	30-60	4.20	4.29	4.68	4.96
	60-90	4.50	4.50	4.84	4.88
L5 + G5	0-30	3.92	4.19	4.33	4.53
	30-60	4.20	4.18	4.73	4.85
	60-90	4.50	4.29	4.81	5.02

### b. Aluminium saturation index (ASI%)

	Sample date	15/3/95	25/10/96	27/10/98	29/8/02
	Depth (cm)	ASI%	ASI%	ASI%	ASI%
Control	0-30	84.0	81.7	77.1	87.8
	30-60	83.0	80.3	81.5	82.2
	60-90	82.0	81.8	79.9	78.2
L5	0-30	84.0	57.9	52.5	64.1
	30-60	83.0	68.6	71.9	74.5
	60-90	82.0	74.7	74.8	74.5
L10	0-30	84.0	46.2	26.0	46.1
	30-60	83.0	62.4	64.2	68.0
	60-90	82.0	71.2	70.1	75.7
L5 + G5	0-30	84.0	55.5	50.6	65.6
	30-60	83.0	71.8	65.2	68.1
	60-90	82.0	74.9	73.2	72.0

### 3. Comments

#### *Sucrose yields:*

1. N12 did not respond to lime during the first four crops, but did give a response ( $P < 0.05$ ) in the fourth and fifth ratoon crops.
2. N16 did not respond to lime in the plant and first ratoon crops, but there was a yield benefit ( $P < 0.05$ ) to lime applied at 5 and 10 t/ha in all subsequent ratoon crops.
3. The cumulative (P + 5R) yield response of N16 to lime was 19 tons more sucrose per hectare where 10 t/ha lime was applied, as compared with the control treatment.
4. The use of 5 t/ha gypsum and 5 t/ha lime resulted in 9 t/ha more sucrose from N16 over the cycle compared with 5 t/ha lime alone.
5. N12 did not respond to lime over the cycle, but the combination of lime plus gypsum resulted in a cumulative increase of 7 t/ha sucrose, compared with unlimed cane.

#### *Soil analysis:*

1. Over a three-year period (1995-1998) ASI in the topsoil (0-0.3 m) was reduced from 80% to 50% and 25% respectively where 5 and 10 t/ha lime had been applied.
2. The effect on ASI of the combination of 5 t/ha lime plus 5 t/ha gypsum was similar to that of 5 t/ha lime alone.
3. By 2002 topsoil ASI% had increased again in all lime treatments.
4. In the subsoil ASI values were not markedly affected; 5/10 t/ha lime respectively reduced ASI to about 65/70% within the 0.3-0.6 m soil layer, with the lime plus gypsum treatment being about as effective as 10 t/ha lime.
5. The lime treatments resulted in modest increases in topsoil pH from 4.2 to between 4.5-4.8 following application.