

SOUTH AFRICAN SUGAR INDUSTRY
AGRONOMISTS' ASSOCIATION

Code No: FTK 1 E.Tv1/87
Cat No : 1672

Title: TIMING OF POTASSIUM APPLICATION TO WINTER CUT CANE

Particulars of project

This crop	: 6th Ratoon	Soil analysis		Date: 17.5.87		
Site	: Ngwenya: Field 28 Malelane	<u>pH</u>	<u>OM%</u>	<u>Clay%</u>	<u>P.D.I.</u>	
Region	: Northern area	7,7		>30		
Soil system	: Komatipoort	<u>ppm</u>				
Soil form	: Shortlands	<u>P</u>	<u>K</u>	<u>Ca</u>	<u>Mg</u>	<u>Zn</u> <u>Al</u>
Design	: Random block	51	204	6748	1269	
Variety	: N14	Age: 11,3 m Dates: 11.5.87-22.4.88				
Fertilizer (kg ha ⁻¹)	: N P K 140 - *	Irrigation: 32 mm on 7 day cycle				
16.6.87	* See treatments					

Objectives:

1. To test whether delayed application of K fertilizer to winter cut cane growing in Ca and Mg saturated soils in the Lowveld influences crop responses to K.
2. To confirm whether or not it is necessary to introduce a seasonal correction factor for leaf K threshold value on these soils, and/or increase soil K threshold value.

Treatments

	<u>Potassium (kg ha⁻¹)</u>	
	Timing	
	4 weeks after harvest	October
1.	0	0
2.	300	0
3.	300	300
4.	600	0
5.	0	300
6.	0	600

Notes on treatments

Nitrogen in the form of ammonium sulphate was applied one day before the first potassium treatments were applied. Potassium was applied in the form of KCl (50%) on 17 June 1987 in treatments 2, 3 and 4 and on the 16 October 1987 in treatments 3, 5 and 6.

Soil moisture during winter months

Months	May	June	July	August
Effective irrig. (mm)	165	148	80	154
Rainfall (mm)	7	7	0	38
TOTAL	172	155	80	192
Eo mm/month	100	87	108	118
Et mm/month	40	61	92	118
Accum. excess mm (Total - Et)	132	226	214	288

Soil temperature at 5 cm (8.00 am at Mhlati)

May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
18	13	13	16	19	21	25	26	28	27	25	22

Soil depth was generally greater than 1,0 m

Results

1. Soil nutrient levels (ppm) per treatment

Treatments	17 May (before K application)				28 April (at harvest)			
	P	K	Ca	Mg	P	K	Ca	Mg
1. 0 + 0	58	201	6865	1242	58	179	4845	1052
2. 300 + 0	52	199	6730	1235	49	202	4968	1062
3. 300 + 300	57	194	7240	1293	57	233	4883	1125
4. 600 + 0	51	211	6798	1267	45	231	4833	1075
5. 0 + 300	42	214	6183	1333	40	212	4640	1137
6. 0 + 600	48	207	6670	1245	48	242	4782	1043

3rd Leaf nutrients (% dm)

Treatments	Reps 1, 2 and 3 24 July 1987					Reps 1, 2 and 3 10 February 1988				
	N	P	K	Ca	Mg	N	P	K	Ca	Mg
1.	2,37	0,17	0,26	1,30	0,69	1,91	0,21	0,68	0,50	0,32
2.	2,31	0,17	0,30	1,20	0,58	1,75	0,21	1,02	0,38	0,28
3.	2,32	0,18	0,28	1,25	0,71	1,78	0,20	1,09	0,35	0,30
4.	2,25	0,15	0,36	1,08	0,63	1,77	0,20	1,13	0,36	0,28
5.	2,30	0,17	0,31	1,20	0,60	1,68	0,20	1,04	0,36	0,30
6.	2,29	0,18	0,27	1,23	0,59	1,75	0,21	1,06	0,36	0,27
MEAN	2,31	0,17	0,30	1,21	0,63	1,77	0,21	1,00	0,39	0,29

	Reps 4, 5 and 6 24 July 1987					Reps 4, 5 and 6 10 February 1988				
	N	P	K	Ca	Mg	N	P	K	Ca	Mg
1.	2,29	0,13	0,26	1,10	0,66	1,76	0,18	0,76	0,42	0,33
2.	2,66	0,15	0,39	1,17	0,67	1,55	0,18	1,16	0,29	0,26
3.	2,47	0,15	0,37	1,13	0,57	1,58	0,17	1,15	0,29	0,26
4.	2,36	0,15	0,40	1,09	0,58	1,67	0,18	1,16	0,32	0,28
5.	2,14	0,11	0,28	1,09	0,68	1,70	0,17	1,15	0,32	0,22
6.	2,27	0,13	0,30	1,04	0,64	1,59	0,16	1,14	0,30	0,20
MEAN	2,37	0,14	0,33	1,10	0,63	1,64	0,17	1,09	0,32	0,26

3rd leaf K levels at various ages (% dm)

Date age (m)	24.7.87 2,5	14.9.87 4	13.11.87 6	10.2.88 9
Treatment				
1.	0,25	0,33	0,39	0,72
2.	0,35	0,51	0,75	1,09
3.	0,32	0,50	0,78	1,12
4.	0,38	0,59	0,91	1,15
5.	0,30	0,33	0,53	1,10
6.	0,30	0,28	0,54	1,10

Soil nutrient levels by replication (ppm)

Replication	17 May 1987 (before K application)				28 April 1988 (at harvest)			
	P	K	Ca	Mg	P	K	Ca	Mg
1.	80	235	9533	1543	80	250	6298	1290
2.	80	221	8865	1207	80	228	6331	987
3.	59	241	7342	1262	57	233	5160	1058
4.	25	200	4753	1243	24	206	3613	1103
5.	12	165	4027	1263	14	179	3141	1100
6.	51	165	5967	1097	43	202	4406	953

Treatments	17 May 1987 (before 1st K application)				15 October 1987 (before 2nd K application)			
	P	K	Ca	Mg	P	K	Ca	Mg
1.	80	245	9860	1240	80	168	4940	1050
2.	80	217	8460	1170	80	160	4580	1090
3.	80	215	9850	1260	80	184	4610	960
4.	80	225	9260	1200	80	121	5310	950
5.	80	206	7380	1230	80	145	5150	930
6.	80	216	8380	1140	80	148	4780	980

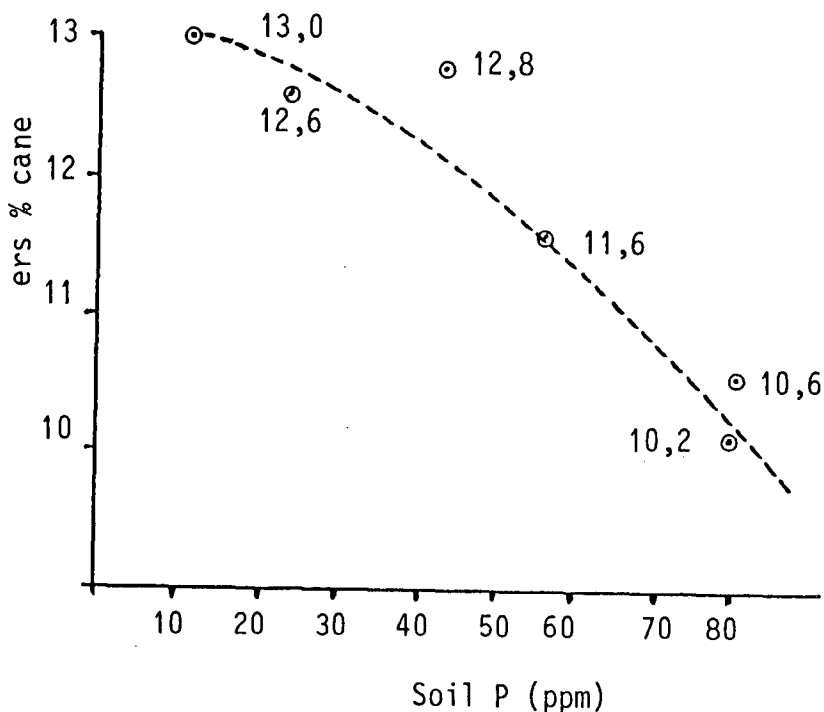
Treatments	P	K	Ca	Mg
1.	80	256	6620	1020
2.	80	219	5940	1020
3.	80	225	5940	870
4.	80	205	6990	910
5.	80	213	6650	910
6.	80	237	6310	920

Potassium levels according to leaf and midrib number

Leaf No.	1.12.87 (6,5 months)					12.2.88 (9 months)				
	1+2	3	4	5	6	1+2	3	4	5	6
Treatment										
1.	1,02	0,56	0,49	0,41	0,32	1,26	0,75	0,68	0,55	0,52
2.	1,40	1,02	0,77	0,73	0,63	1,63	1,22	0,98	0,89	0,93
5.	1,41	0,99	0,84	0,68	0,58	1,48	1,14	1,07	0,88	0,89

Midrib No.	1.12.87					12.2.88				
	1+2	3	4	5	6	1+2	3	4	5	6
Treatment										
1.	1,38	0,93	0,66	0,44	0,29	1,23	1,14	0,78	0,69	0,49
2.	1,54	1,52	1,29	1,00	0,91	1,32	1,26	1,21	1,13	1,26
5.	1,81	1,49	1,16	0,84	0,55	1,26	1,22	1,24	1,14	0,91

Figure 1: Soil P levels and cane quality by blocks



Growth measurements

Treatments	19.1.88		9.3.88	22.4.88	
	Stalk ht (cm)	Stalk popln (x1000 ha ⁻¹)	Stalk ht (cm)	Stalk ht (cm)	Stalk popln (x1000 ha ⁻¹)
1.	164	140	216	240	104
2.	181	156	236	273	106
3.	179	148	233	266	112
4.	155	153	236	278	107
5.	177	148	242	262	103
6.	166	147	220	255	108
MEAN	170	149	231	262	107

Yield data at harvest

Treatments	Cane (t/ha)	Pol (%C)	Suc (t/ha)
1. 0 + 0	88	13,2	11,6
2. 300 + 0	112**	13,5	15,1**
3. 300 + 300	111**	13,6	15,0**
4. 600 + 0	114**	13,3	15,1**
5. 0 + 300	101	13,1	13,3
6. 0 + 600	106*	14,2*	15,1**
MEAN	105	13,5	14,2
CV %	13,4	5,4	14,5
S.E.D.	8,2	0,4	1,2
LSD (P=0,05)*	16,9	0,87	2,5
LSD (P=0,01)**	22,9	1,2	3,3

Comments

Despite more than adequate soil potassium levels 3rd leaf levels remained well below the threshold level (1,05%) up to 9 months of age in untreated plots.

Potassium levels were slow to rise in all K fertilizer treatments and only reached threshold levels after November (6 months old).

There appears to have been a relationship between soil phosphate levels and cane quality at harvesting (see Figure 1).

The substantial response (P=0,01) to the early application of 300 kg K ha⁻¹ was not improved by either split or single applications of 600 kg ha⁻¹. These responses were equalled by applying 600 kg K ha⁻¹ on the later date partly due to a significant (P=0,05) improvement in cane quality.

Note: Fusilade Super was applied by aircraft on 8.3.88 - 6 weeks before harvesting.