SOUTH AFRICAN SUGAR INDUSTRY
AGRONOMISTS' ASSOCIATION

Code No. : FT K1/86
Cat. No. : 1633

Title: Rates of potassium application on heavy soils.

1. Particulars of project

This crop : 2nd ratoon
Site : Experiment Station Mount Edgecombe
Region : North Coast Coastal
Soil system : Umzinto Coast Lowlands
Soil form/series: Arcadia/Rydalvale
Design : Latin Square x 6 replications
Variety : NCo376
Fertilizer/ Ameliorants : N 125, P 30, K ↓ See treatments

Soil analysis Date: 4.6.1986

pH	O.M.%	Clay %	P.D.I
5,30	-	>30	0,29

ppm

P	K	Ca	Mg	S	Zn	Al
29	98	1028	360	18	2,3	3

Age: 15,0 mths **Dates:** 5/6/86-3/9/87
Rainfall: 1091mm 110% of LTM 989 mm
Irrigation: Nil

2. Objectives:

To test the need for a higher threshold value and optimum K levels for this heavy black clay soil (Rydalvale series).

3. Motivation:

A proposed increase in the soil K threshold value for heavy textured soils (Folio 52, File 8.1.9) requires verification in field trials for soils with vertic A horizons such as the Rydalvale series (Arcadia form).

The need for rates of K in excess of currently recommended FAS rates also requires to be established where exchangeable K values are low and K fixation is a problem (see Folio 47, File 8.1.9).

The soil has an average KDI value of 0,83 which is only moderately K fixing. However, it is of the Arcadia form which, is likely to have examples of higher K fixation. It would be useful to relate KDI value to K response when a greater number of soils have been tested.

4. Treatments:

	K kg ha^{-1}
K0 = No K	= Nil
K1 = 1 x FAS	= 175
K2 = 2 x FAS	= 350

4.1 **Notes on Treatments:-**

° K application to all plots in plant and 1st ratoon was:

Plant : 200 kg K ha^{-1}
1st Ratoon : 250 kg K ha^{-1}

° Potassium as Muriate of Potash (50) was applied on 10/9/1986 to treatments K1 and K2 at appropriate levels 3,2 months after harvest.

° P as single supers (10,5) was applied on 10/9/86 at 286 kg ha^{-1} to all plots.

° N as Urea (46) was applied on 10/9/86at 347 kg ha^{-1} to all plots.

° At establishment the cane was ratooning evenly with 4-5 leaves per stalk and height (to the top visible dewlap) of about ±10cm.

° 12,9mm of rain occurred two days prior to establishment.

Rainfall, LTM (mm)

Months	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
1986-87	24	4	40	35	89	85	164	131	116	93	52	54
LTM	20	24	53	88	98	111	107	138	134	116	56	70
1987	112	7	82	4	TOTAL : 1091 mm							
LTM	23	24	53	9	TOTAL : 989 mm							

5. **Results:**

Table 1: Yield and crop characteristics at harvest

Treatments Applied K (kg ha^{-1})	t ha^{-1} cane	Sucrose % cane	t ha^{-1} sucrose	Stalk counts X10^3 ha^{-1}	Stalk Heights (cm)
K0 = Nil	100	14,61	14,6	122	220
K1 = 175 K	100	14,60	14,6	120	221
K2 = 350 K	97	14,58	14,1	122	224
MEAN	99	14,60	14,4	121	222
C.V. %	6,7	1,6	7,6	4,3	
S.E. treatment of mean ±	2,70	0,97	0,44	2,12	
S.E.D. ±	3,81	0,14	0,63	2,99	
L.S.D. (0,05)	9,34	0,34	1,54	7,33	
(0,01)	14,19	0,51	2,34	11,14	

Table 2: Third leaf % dm analysis at 7, 8, 9 and 10 months of age sampled on 18/1, 12,/2, 11/3 and 15/4/87 respectively

Treatments	7,1 months		8,3 months		9,2 months		10,4 months	
Applied K (kg ha^{-1})	18/1/78		12/2/87		11/3/87		15.4.87	
	N	K	N	K	N	K	N	K
K0 = Nil	1,72	1,07	1,62	1,11	1,70	1,09	1,68	1,11
K1 = 175 K	1,75	1,16	1,66	1,21	1,76	1,14	1,73	1,23
L2 = 350 K	1,75	1,13	1,64	1,20	1,71	1,17	1,70	1,18

Table 3: Changes in soil status at the beginning of 2nd ratoon and at the end of 2nd ratoon crop

K kg ha^{-1}	pH	ppm							%		Sampling Dates
		P	K	S	Ca	Mg	Zn	Aℓ	Clay	O.M.	
Beginning of 2nd Ratoon											
K0	5,35	28	123	-	1048	220	2,38	5,3	30	-	4/6/86
K1	5,31	22	125	-	1039	220	2,60	5,2	30	-	
K2	5,33	28	112	-	1084	220	2,35	5,3	30	-	
End of 2nd Ratoon											
K0	5,11	17	104	56	1070	350	1,9	6	50	3,88	3/9/87
K1	5,16	19	124	58	1141	350	-	5	47	4,03	
K2	5,47	28	107	48	1255	350	2,1	1	41	3,17	

6. **Comments:**

Rainfall: This was 110% of the longterm mean and was reasonably evenly distributed except for high records in June 1987. The yield was 6,6 tc ha^{-1} m^{-1} and 9,1 tc ha^{-1} 100 mm^{-1}.

Yield: There was no response to treatment with potassium in either cane or sucrose yields.

Crop measurements: Likewise no treatment differences were apparent in either stalk length or population.

Leaf nutrients: Nitrogen was just above threshold at seven months of age in January and there were no differences between treatments.

Potassium was also above threshold in all treatments at all sampling dates but levels in leaves from zero potassium plots were lower than those from plots with potassium.

Soil nutrients: All nutrients except K (120 ppm - >30% clay) were adequate prior to the application of treatments at the start of the experiment. (Potassium had been applied to all plots in the plant and first ratoon crops).

At the end of the second ratoon, inspite of potassium soil levels being decreased this was not consistent with treatments.

Phosphorus levels also were markedly reduced after the second ratoon crop was harvested but were still above threshold.

Future: This trial will be continued with the same treatments on the same plots.

PETT/1b
19 January 1990

SOUTH AFRICAN SUGAR INDUSTRY

AGRONOMISTS' ASSOCIATION

Cat No : 1633
Project No :
Code No : FTK 1/86

Title : Rates of potassium application on heavy soils

1. Particulars of project

This crop : 3rd ratoon

Site : Experiment Station Mount Edgecombe

Region : North Coast Coastal

Soil system : Umzinto Coast Lowlands

Soil form/series: Arcadia/Rydalvale

Design : Latin Square x 6 replications

Variety : NCo376

Fertilizer/ Ameliorants : N 125, P 30, K ↓ See treatments

Soil analysis Date: 03.09.87

pH	OM %	Clay %	PDI
5.25	3,69	46	-

ppm

P	K	Ca	Mg	S	Zn	Al
21	112	1155	>350	54	2,0	4

Age: 13,1 months

Dates: (3/9/87 - 6/10/88)

Rainfall: 1998 mm

179% of LTM: 1116 m

Irrigation: Nil

2. Objectives:

To test the need for a higher threshold value and optimum K levels for this heavy black clay soil (Rydalvale Series)

3. Motivation

A proposed increase in the soil K threshold value for heavy textured soils (Folio 52 File 8.1.9) requires verification in field trials for soils with vertic A horizons such as the Rydalvale series (Arcadia form)

The need for rates of K in excess of currently recommended FAS rates also requires to be established where exchangeable K values are low and K fixation is a problem (see Folio 47, File 8.1.9)

This soil has an average KD1 value of 0.83 which is only moderately K fixing. However, it is of the Arcadia form which is likely to have examples of higher K fixation. It would be useful to relate KD1 value to K response when a greater number of soils have been tested.

4. Treatments K Kg ha^{-1}

K0 = NO K = Nil
K1 = 1 x FAS = 175
K2 = 2 x FAS = 350

4.1 **Notes on treatments:**

- K application to all plots in plant and 1st ratoon was :

  Plant : 200 kg K ha^{-1}

  1st ratoon : 250 kg K ha^{-1}

- Potassium as muriate of potash (50) was applied on 02/11/1987 to treatments K1 and K2 at appropriate levels 60 days after harvest
- P as single supers (10,5) was applied on 2/11/87 at 286 Kg ha^{-1} to all plots
- N as urea (46) was applied on 2/11/87 at 347 kg ha^{-1} to all plots
- At establishing the trial the cane ratooning evenly with shoot height to the top visible dewlap ± 10 cm.

Rainfall, LTM (mm)

Months	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Total
1987-1988	503	73	144	84	64	195	387	20	346	49	23	82	28	1	1998 mm
LTM	80	98	111	107	138	134	116	56	70	23	24	53	88	19	1116 mm

5. Results:

Table 1: Yield and other crop characteristics at harvest

Treatments Applied (K Kg ha^{-1})	t ha^{-1} cane	Sucrose % cane	t ha^{-1} sucrose	Stalk counts x10^3 ha^{-1}	Stalk length (cm)
K0 = Nil	96	14,87	14,3	124	190
K1 = 175	100	15,09	15,1	127	196
K2 = 350	102	14,70	15,0	129	199
Mean	99	14,89	14,8	127	195
CV %	5,0	2,4	6,5	3,8	
SE of treatment mean ±	2,01	0,15	0,39	1,99	
SED ±	2,85	0,21	0,55	2,82	
LSD (0,05)	6,97	0,50	1,36	6,91	
(0,01)	10,59	0,77	2,06	10,50	

Table 2 : Third leaf % dm analysis at 4, 5 and 7 months of age sampled on 8 January, 12 February and 30 March 1988 respectively

Treatments	4,2 months		5,3 months		6,9 months	
	8/1/1988		12/2/1988		30/3/1988	
Applied K (Kg ha^{-1})	N	K	N	K	N	K
K0 = Nil	1,91	1,01	1,83	0,93	2,03	1,16
K1 = 175	1,97	1,29	1,90	1,10	2,06	1,37
K2 = 350	2,03	1,37	1,94	1,11	2,08	1,37
SED ±	0,028	0,045	0,032	0,028	0,38	0,034

Table 3 : Eldana Damage

Treatments	Stalks damaged	% stalk damaged	Eldana 100 $stalks^{-1}$	Total joints	% joints bored
Applied K (Kg ha^{-1})					
K0 = Nil	19	38	5,7	15	4,98
K1 = 175	24	49	7,3	16	6,75
K2 = 350	23	47	5,3	15	7,31
SED ±		6,55	5,53	0,28	1,15

Table 4 : Changes in soil status at the beginning of 2nd ratoon and at the end of 2nd and 3rd ratoons

K Kg ha^{-1}	pH	ppm							%		Sampling dates
		P	K	S	Ca	Mg	Zn	Aℓ	Clay	OM	
Beginning of 2nd ratoon											
K0	5,35	28	123	-	1048	>220	2,38	5,3	> 30	-	
K1	5,31	22	125	-	1039	>220	2,60	5,2	> 30	-	4/6/86
K2	5,33	28	112	-	1084	>220	2,35	5,3	> 30	-	
End of 2nd ratoon											
K0	5,11	17	104	56	1070	>350	1,9	6	50	3,88	
K1	5,16	19	124	58	1141	>350	-	5	47	4,03	3/9/87
K2	5,47	28	107	48	1255	>350	2,1	1	41	3,17	
End of 3rd ratoon											
K0	5,43	24	84	-	1385	>350	-	1,0	> 30	-	
K1	5,32	31	122	-	1305	>350	-	2,6	> 33	-	18/11/88
K2	5,42	30	122	-	1389	>350	-	4,3	> 30	-	

6. Comments

Rainfall: This was 179% of the long term mean due to the heavy falls in September 1987 just after harvesting the previous crop and in February and March 1988. All fertilizer was applied in November 1987. The yields were 7,6 tc ha^{-1} m^{-1} and 4.9 tc ha^{-1} 100 mm^{-1} gross rainfall.

Yield: Although not reaching a level of statistical significance there was evidence of a response to potassium fertilisation in both cane and sucrose yields. However, there was little difference between potassium rates in cane yield and no difference in sucrose yield.

Crop measurement: Crop measurements at harvest also followed this trend with shorter stalks and lower populations in zero potassium plots (not statistically significant).

Leaf nutrients: Potassium values were lower in leaves from the zero potassium treatments and below threshold at 4 and 5 months sampling ages.

There was a similar trend in nitrogen leaf values although this did not fall below the threshold.

The final sampling at 7 months in March indicated adequacy in both potassium and nitrogen for all treatments.

Soil nutrients: At the end of the third ratoon (this crop) all nutrients were adequate except potassium and this was markedly lower in zero potassium plots reflecting the lack of application in the two crops.

Potassium values in the two treatments were similar indicating no build up in potassium reserves in the topsoil from treatment with high ratio.

Eldana: Borer damage did occur in the trial but there was no obvious differences between treatments in eldana counts or damage.

Future: The trial will be continued with the same treatments.

PETT/cvp
6 February 1990

SOUTH AFRICAN SUGAR INDUSTRY

AGRONOMISTS' ASSOCIATION

Cat No : 1633
Project No :
Code No : FT K1/86

Title : Rates of potassium application on heavy soils

1. Particulars of project

This crop : 4th ratoon

Site : Experiment Station Mount Edgecombe

Region : North Coast Coastal

Soil system : Umzinto Coast Lowlands

Soil form/series: Arcadia/Rydalvale

Design : Latin Square x 6 replications

Variety : NCo376

Fertilizer/ Ameliorants :

N	P	K
140	-	↓

See treatments

Soil analysis Date: 18.11.88

pH	OM %	Clay %	PDI
5.39	-	> 31	-

ppm

P	K	Ca	Mg	Zn	Al
28	109	1359	>350	2,7	14

Age: 12,0 months

Dates: (6/10/88 - 5/10/89)

Rainfall: 982 mm

97% of LTM: 1015 mm

Irrigation: Nil

2. Objectives:

To test the need for a higher threshold value and optimum K levels for this heavy black clay soil (Rydalvale Series)

3. Motivation

A proposed increase in the soil K threshold value for heavy textured soils (Folio 52 File 8.1.9) requires verification in field trials for soils with vertic A horizons such as the Rydalvale series (Arcadia form)

The need for rates of K in excess of currently recommended FAS rates also requires to be established where exchangeable K values are low and K fixation is a problem (see Folio 47, File 8.1.9)

This soil has an average KD1 value of 0.83 which is only moderately K fixing. However, it is of the Arcadia form which is likely to have examples of higher K fixation. It would be useful to relate KD1 value to K response when a greater number of soils have been tested.

4. **Treatments** K Kg ha^{-1}

K0 = NO K = Nil
K1 = 1 x FAS = 175
K2 = 2 x FAS = 350

4.1 **Notes on treatments:**

° K application to all plots in plant and 1st ratoon was :

Plant : 200 kg K ha^{-1}

1st ratoon : 250 kg K ha^{-1}

° Potassium as muriate of potash (50) was applied on 25/11/1988 to treatments K1 and K2 at appropriate levels 19 days after harvest

° P was not applied in this 4th ratoon crop

° N as urea (46) was applied on 25/11/88 at 306 Kg ha^{-1} to all the plots

Rainfall, LTM (mm)

Months	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Total
1988-1989	63	113	165	63	296	21	108	22	12	33	15	63	8	982
LTM	79	111	107	138	134	116	56	70	23	24	53	88	16	1015

5. **Results:**

Table 1: Yield and other crop characteristics at harvest

Treatments Applied (K Kg ha^{-1})	t ha^{-1} cane	Sucrose % cane	t ha^{-1} sucrose	Stalk counts x10^3 ha^{-1}	Stalk length (cm)
K0 = Nil	89	14,57	13,0	130	212
K1 = 175	96	15,22	14,6	136	224
K2 = 350	96	15,36	14,7	138	222
Mean	94	15,05	14,1	135	219
CV %	6,0	4,1	6,9	4,4	
SE of treatment mean ±	2,28	0,25	0,40	2,42	
SED ±	3,22	0,35	0,56	3,42	
LSD (0,05)	7,88	0,86	1,38	8,37	
(0,01)	11,98	1,31	2,10	12,73	

Table 2 : Third leaf % dm analysis at 4.2, and 6.0 months of age sampled on 13 February and 5 April 1988 respectively

Treatments	4,2 months			6,0 months		
	13/2/1989			05/04/1989		
Applied K (Kg ha^{-1})	N	P	K	N	P	K
K0 = Nil	1,70	0,20	1,02	1,75	0,24	1,15
K1 = 175	1,72	0,20	1,22	1,80	0,24	1,36
K2 = 350	1,73	0,20	1,28	1,74	0,22	1,35
SED ±	0,026	0,004	0,051	0,027	0,007	0,053

Table 3 : Eldana Damage

Treatments	Stalks damaged	% stalk damaged	Eldana 100 $stalks^{-1}$	Total joints	% joints bored
Applied K (Kg ha^{-1})					
K0 = Nil	16,2	32,3	3,7	14,3	4,90
K1 = 175	15,7	31,3	3,0	14,8	4,14
K2 = 350	17,7	35,3	2,7	14,1	5,17
SE DIFF ±		5,64	1,56	0,41	1,02

Table 4 : Changes in soil status at the beginning of 2nd ratoon and at the end of 2nd and subsequent ratoons

K Kg ha^{-1}	pH	ppm							%		Sampling dates
		P	K	S	Ca	Mg	Zn	Aℓ	Clay	OM	
Beginning of 2nd ratoon											
K0	5,35	28	123	-	1048	>220	2,38	5,3	> 30	-	
K1	5,31	22	125	-	1039	>220	2,60	5,2	> 30	-	4/6/86
K2	5,33	28	112	-	1084	>220	2,35	5,3	> 30	-	
End of 2nd ratoon											
K0	5,11	17	104	56	1070	>350	1,9	6	> 50	3,88	
K1	5,16	19	124	58	1141	>350	-	5	> 47	4,03	3/9/87
K2	5,47	28	107	48	1255	>350	2,1	1	> 41	3,17	
End of 3rd ratoon											
K0	5,43	24	84	-	1385	>350	-	1,0	> 30	-	
K1	5,32	31	122	-	1305	>350	-	2,6	> 33	-	18/11/88
K2	5,42	30	122	-	1389	>350	-	4,3	> 30	-	
End of 4th ratoon											
K0	5,36	20	86	33	1180	>350	3,02	-	> 30	-	
K1	5,22	15	123	34	1034	>350	2,75	-	> 30	-	05/10/89
K2	5,34	17	155	34	1155	>350	2,50	-	> 33	-	

6. Comments

Rainfall: Rainfall distribution was erratic with very high falls in February 1989 (at 4 months of age) and a total that was 97% of the long term mean. Low yields were 7,8 tc ha^{-1} m^{-1} and 9,6 tc ha^{-1} 100 mm^{-1} gross rainfall.

Yield: There was an increase in both cane and sucrose yields in response to potassium application but no difference between ratios of 175 and 350 kg K ha^{-1}.

Crop measurements: These differences in yield were also reflected in taller stalks and slightly higher populations.

Leaf nutrients: Nitrogen and phosphorus were above threshold at each sampling date and in each treatment. Potassium was however below threshold in the zero potassium plots at the first sampling in February (4 months). This subsequently improved and was above the threshold at 6 months of age but still below that of each potassium treatment.

Soil nutrients: Potassium values in the soil at the end of this fourth ratoon clearly reflected the added potassium and contrary to the end of the third ratoon crop there appeared to be evidence of a build up in soil K for the high application rate.

Future: The trial has been continued for one more crop with the same treatment on the same plots.

PETT/cvp
5 February 1990

SOUTH AFRICAN SUGAR INDUSTRY
AGRONOMISTS' ASSOCIATION

Cat. No. : 1633
Project No. :
Code No. : FTK1/86/R5

Title: Rates of potassium on heavy soils

1. PARTICULARS OF PROJECT :

This crop	: 5th Ratoon
Site	: Experiment Station - Mount Edgecombe
Region	: North Coast - Coastal
Soil System	: Umzinto Coast Lowlands
Soil form/	: Arcadia/
Series	: Rydalvale
Design	: Latin square x 6 reps
Variety	: NCo376
Fertilizer/ Ameliorants	: N P K : 140 - See treatments

Soil analysis: Date 5.10.89

pH	Clay %
5,31	30

ppm

P	K	Ca	Mg	Zn	Al
17,3	121	1123	342	2,76	-

Age: 12,4 months
Dates: 05.10.89 - 18.10.90
Rainfall: 1213 mm 110% of LTM: 1105 mm
Irrigation: Nil

2. OBJECTIVES

To test the need for a higher threshold value and to select the optimum K levels for this heavy black clay soil (Rydalvale series).

3. MOTIVTION

The increase in the soil K threshold now used for heavy textured soils in the irrigated areas needs to be considered for similar soils under rainfed conditions.

4. TREATMENTS

	K kg ha^{-1}
KO = No K	Nil
K1 = 1X FAS	175
K2 = 2X FAS	350

4.1 Notes on treatments:

* Potassium as muriate of potash (50%) was applied on 1.11.89 to treatments K1 and K2 at appropriate levels 27 days after harvesting the previous crop.

* P was not applied in this 5th ratoon crop
* N as urea was applied to all plots at the rate of 140 kg/ha.

5. RAINFALL (mm)

Actual and long term mean (LTM)

Months	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Total
1989-90	106	313	43	131	107	226	56	28	4	2	130	25	42	1213
LTM	75	112	106	126	226	110	70	56	33	27	42	70	52	1105

6. RESULTS

Table 1 : Yield and other crop characteristics at harvest

Treatments (K rates kg ha^{-1})	Yield			Measurements		Flowering counts
	Cane (t ha^{-1})	Sucrose (% cane)	Sucrose (t ha^{-1})	Stalk length (cm)	Stalk popln (x 1000 ha^{-1})	
K0 = Nil	79	13,09	10,4	164	134	57
K1 = 175	87	13,63	11,9	170	127	59
K2 = 350	86	13,29	11,3	168	126	63
CV %	6,5	4,9	7,6		4,5	42,3
SED ±	3,1	0,378	0,49		3,3	14,5
LSD (0,05)	7,7	0,926	1,20		8,1	35,6

Table 2 : Nutrient analysis of third leaf samples (% dry matter) taken on 14.3.90 at 5 months of age

Treatments (K rates kg ha^{-1})	Nutrients						
	N %	P %	K %	S %	Ca %	Mg %	Zn (ppm)
K0 = Nil	1,38	0,19	0,93	0,15	0,30	0,26	16,3
K1 = 175	1,41	0,18	1,17	0,15	0,26	0,22	15,3
K2 = 350	1,38	0,17	1,11	0,15	0,29	0,22	14,8
SED ±	0,031	0,012	0,043	0,062	0,017	0,010	0,92

Table 3 : Eldana and Sesamia damage

Treatments (K rates kg ha^{-1})	% stalks damaged	Eldana /100 stalks	Sesamia /100 stalks	% joints bored
K0 = Nil	8,0	0,7	0,3	0,83
K1 = 175	10,7	0	0,7	1,04
K2 = 350	10,0	0	1,0	0,98
SED ±	2,18		0,93	0,21

Table 4 : Soil nutrient status at the end of each ratoon

Treatments (K kg ha^{-1})	pH	ppm							Sampling dates
		P	K	S	Ca	Mg	Zn	Al	
Beginning of 2nd ratoon									
Nil	5,35	28	123	-	1048	220	2,38	5,3	04.06.86
175	5,31	22	125	-	1039	220	2,60	5,2	
350	5,33	28	112	-	1084	220	2,35	5,3	
End of 2nd ratoon									
Nil	5,11	17	104	56	1070	350	1,9	6	03.09.87
175	5,16	19	124	58	1141	350	-	5	
350	5,47	28	107	48	1255	350	2,1	1	
End of 3rd ratoon									
Nil	5,43	24	84	-	1385	350	-	1,0	18.11.88
175	5,32	31	122	-	1305	350	-	2,6	
350	5,42	30	122	-	1389	350	-	4,3	
End of 4th ratoon									
Nil	5,36	20	86	33	1180	350	3,02		05.10.89
175	5,22	15	123	34	1034	350	2,75		
350	5,34	17	155	34	1155	350	2,50		
End of 5th ratoon									
Nil	5,24	14	65	40	1181	390	-	-	18.10.90
175	5,33	14	133	40	1128	350	-	-	
350	5,30	13	144	41	1162	350	-	-	

Table 5 : Yields for 2nd to 5th ratoon

Treatments K rates kg ha^{-1}	Cane (t ha^{-1})				Sucrose (% cane)				Sucrose (t ha^{-1})			
	R2	R3	R4	R5	R2	R3	R4	R5	R2	R3	R4	R5
0	100	96	89	79	14,61	14,87	14,57	13,09	14,6	14,3	13,0	10,4
175	100	100	96	87	14,60	15,09	15,22	13,63	14,6	15,1	14,6	11,9
350	97	102	96	86	14,58	14,70	15,36	13,29	14,1	15,0	14,7	11,3

Comments

Rainfall:

This was erratic but provided 110% of the long term mean. Yields were 6,8 tc ha^{-1} mth^{-1} and 6,9 tc ha^{-1} 100 mm^{-1} which were considerably less than yields produced in the 4th ratoon with only 97% of the long term mean rainfall.

Yield:

Yields of cane and sucrose were higher in plots which received potassium. However there was no added response to the high rate of potassium.

Crop measurements:

Cane which received potassium was marginally taller but there was an indication of lower populations which did not correspond with previous results or trends in sucrose and cane yield.

Leaf nutrients:

Nitrogen was below threshold for all treatments and the potassium level was low in plots which did not receive any added potassium fertilizer. Plots with added potassium tended to have lower P, Ca, Mg and Zn nutrient levels in the third leaf.

Soil nutrients:

The level of potassium in the soil has been depleted considerably in the zero K plots. At the high rate of added potassium there is evidence of a possible build up in the soil.

Future:

The trial has been continued with the same treatments.

PETT/pw
March 14, 1991

PETT/cvp
17 March 1992

SOUTH AFRICAN SUGAR INDUSTRY AGRONOMISTS' ASSOCIATION

Cat.No. : 1633
Project No. :
Code No. : FTK1/86/R6

Title: Rates of potassium on heavy soils

1. Particulars of project:

This crop : 6th ratoon **Site** : Experiment Station Mount Edgecombe **Region** : North Coast Coastal **Soil System** : Umzinto C Lowlands **Soil form** : Arcadia **Design** : Latin square x 6 Reps **Variety** : NCo376 **Fertiliser** : **N** 140 **P** 30 **K** See Treatments	Soil analysis Date : 18/10/1990 **pH** 5,3 **OM%** - **Clay%** 52 **PDI** - ppm **P** 14 **K** 114 **Ca** 1157 **Mg** 363 **S** 40 **Zn** 2,5 **Na** 43 **Age** : 11,7 months **Dates** : 18/10/90 - 9/10/91 **Rainfall** : 1100 mm 117% of **LTM:** 942 mm **Irrigation** : Nil

2. Objectives

To test the need for a higher threshold value and to select the optimum K levels for this heavy black clay soil.

3. Motivation

The increase in the soil K threshold now used for heavy textured soils in the irrigated areas needs to be considered for similar soils under rainfed conditions.

4. Treatments

	K(kg/ha)
K0 = No K	Nil
K1 = 1 x FAS rate of K	175
K2 = 2 x FAS rate of K	350

Note on treatments:

* Potassium as KCL(50%) was applied on 23/11/90 to treatments K1 and K2 at appropriate levels 33 days after harvesting the previous crop.

* Phosphorus as single supers (10,5% P) was applied on 23/11/90 to all plots at a rate of 30 kg/ha P.

* Urea (46% N) was applied on 23.11.90 to all plots at a rate of 140 kg/ha N.

Rainfall : (mm) Mount Edgecombe

Months	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept
1990/91	120	59	149	107	191	169	10	87	34	35	22	92
LTM	38	112	106	126	123	110	70	56	33	27	42	70
1991	25	Total : 1100										
LTM	29	Total : 942										

5. Results

Table 1: Yield and crop characteristics at harvest

Treatments K rates (Kg/ha)	Stalk length (cm)	Stalk ppm ($x10^3$/h)	Cane (t/ha)	Sucrose (% cane)	Sucrose (t/ha)
K0	171	127	87	12,03	10,4
K175	192	124	105	13,57	14,2
K350	194	127	102	13,57	13,9
CV %	4,3	5,3	5,9	4,9	7,2
SE diff ±	5,67	3,12	3,35	0,371	0,54
LSD (0,05)	13,87	7,63	8,20	0,908	1,32

Table 2: Third leaf nutrient analysis of samples taken on 22/2/91 and 27.4.91 at 4 and 6 months respectively

Treatments K rates (kg/ha)	4 months					6 months				
	N	P	K	Ca	Mg	N	P	K	Ca	Mg
K0	1,60	0,21	0,84	0,29	0,22	1,66	0,25	1,10	0,27	0,22
K175	1,63	0,20	1,22	0,25	0,19	1,64	0,22	1,28	0,27	0,21
K350	1,63	0,20	1,27	0,24	0,18	1,60	0,21	1,33	0,25	0,20
SE diff ±	0,014	0,004	0,042	0,009	0,005	0,042	0,009	0,041	0,011	0,016

Table 3: Eldana survey results

Treatments K rates (kg/ha)	% stalks damaged	Eldana /100 stalks	Sesamia /100 stalks	% Joints bored
K0	9,0	0,3	0,0	1,17
K175	11,7	0,7	1,0	1,46
K350	13,7	0,0	0,7	1,69
SE diff ±	3,15	0,52	0,47	0,475

Table 4: Sucrose yields for 2nd to 6th ratoons (t/ha/annum)

Treatments	2	3	4	5	6
K0	11,7	13,1	13,0	10,1	10,7
K175	11,7	13,8	14,6	11,5	14,6
K350	11,3	13,7	14,7	10,9	14,3

6. **Comments**

General

Rainfall was 117% of the long term mean and well distributed. Yields were 8,4 tc/ha/m and 8,9 tc/ha/100 mm.

Potassium rates

As for ratoons 3, 4 and 5 cane and sucrose yields were increased by potassium application but there was no advantage to the higher rate.

Quality

Cane quality was also improved significantly by the application of potassium.

Leaf nutrients

At four months leaves from cane which had received no potassium, were far below threshold for this element. However at six months they were above threshold but still inferior to cane from plots with added potassium.

As in the previous crop additions of potassium tended to suppress P, Ca, Mg and Zn in the leaf.

Soil nutrients

No detailed sampling was carried out after the 6th ratoon but this will be done after the 7th ratoon.

Future

These treatments have been re-applied to the same plots.