6400/20(b) NITORGEN TOP-DRESSING TRIAL SIX MONTHS AFTER PLANTING

Catalogue: 1187

Object: To determine the effects of nitrogen topdressing on six month old sugarcane in March, i.e. after the termination of the main rains.

This crop: Plant Age: 12,2 months (26,9.78 - 1.10.79)

Location: ZRSA Experiment Station, Impala Block, A2-4

Soil type: PE.1 sandy clay loam derived from gneiss

Design: Three randomised blocks, main plots levels of nitrogen applied one month after planting, and sub plots levels of nitrogeen topdressed in March at six months of age.

Variety/Spacing: NCo 376, with 1,5 m between rows

Fertiliser: Levels of nitrogen (see treatments) - source Ammonium nitrate 60 kg/ha P_2O_5-source Single superphosphate

Rainfall: 704 mm Irrigation: 907 mm

Treatments: Nitrogen levels (applied 1 month after planting) Main plots

1 0 kg N/ha
2 90 "
3 180 "

Nitrogen topdressed 6 months after planting, in March
Sub plots

1 0 kg N/ha
2 30 "
3 60 "
4 90 "

RESULTS:

Relevant data are summarised in the attached tables.

(a) Cane yields. There were no significant responses to initial applications of nitrogen or to topdressing nitrogen six months after planting. However, there was a significant quadratic interaction (M"S"*), indicating an advantage in applying 30 kg/ha N as a topdressing, but no benefit from higher levels.

(b) ERC% cane. The main effect of nitrogen on quality was a highly significant linear decline in ERC% cane with increasing topdressing levels.

(c) TERC/ha. Due to the harmful effects of topdressing nitrogen on quality, there was a significant linear decline in TERC/ha with increasing levels of nitrogen beyond 30 kg/ha.

(d) Stalk counts, stalk lengths and diameters. The lack of cane yield responses to nitrogen topdressing were due to nitrogen having no effect on stalk counts, stalk lengths and stalk diameters.

CONCLUSIONS

Cane yields are largely dependent on most of the plants' total nitrogen requirements being applied during the tillering phase, i.e. before tiller densities become static. Hence the virtual lack of response to cane yields from late topdressings of nitrogen which were also detrimental to cane quality.

RJH/November, 1979.

6400/20 (b) NITROGEN TOPDRESSED. MONTHS AFTER PLANTING

PLANT CROP DATA

Treatments	Cane t/ha	ERC% cane	TERC/ha	Stalk counts x 10^{-3}	Stalk length (m)	Stalk diam. (cm)
Initial nitrogen						
0 kg/ha N	129,4	13,35	17,26	136,2	2,43	2,01
90 "	142,4	12,90	18,37	150,4	2,61	1,96
180 "	140,7	12,35	17,37	161,5	2,59	1,88
Significance	Nil	Nil	Nil	-	-	-
S.E. main plots ±	10,7	0,99	2,06	-	-	-
S.E. mean ±	3,1	0,29	0,59	-	-	-
C.V. %	7,8	7,68	11,64	-	-	-
Topdressing nitrogen						
0 kg/ha N	134,1	13,34	17,86	149,1	2,48	1,99
30 "	140,3	13,02	18,23	152,4	2,56	1,92
60 "	136,2	12,93	17,61	146,8	2,53	1,92
90 "	139,4	12,18	16,97	149,1	2,59	1,98
Linear effects	N.S.	0,001	0,05	-	-	-
L.S.D. P=0,05	6,0	0,44	0,98	-	-	-
P=0,01	8,2	0,60	1,34	-	-	-
S.E. subplots ±	6,1	0,45	0,99	-	-	-
S.E. mean ±	2,0	0,15	0,33	-	-	-
C.V. %	4,4	3,45	5,59	-	-	-
Significant interactions	M'S'* M"S"*	N.S.	N.S.	-	-	-
Trial mean	137,5	12,87	17,67	149,4	2,54	1,95

CANE YIELDS (kg/ha^{-1}) - INTERACTION TABLE

	Nitrogen levels at topdressing kg/haN				Means
Initial levels of N	0	30	60	90	
0 kg/ha N	121,2	132,1	130,4	133,9	129,4
90 "	140,4	140,9	145,1	143,0	142,4
180 "	140,5	148,0	133,0	141,5	140,7
Means	134,1	140,3	136,2	139,4	137,5

SOUTH AFRICAN SUGAR ASSOCIATION

AGRONOMISTS' ASSOCIATION

6400/20 b NITROGEN TOPDRESSING TRIAL SIX MONTHS AFTER RATOONING

Catalogue No.: 1187

Object : To determine the effects of nitrogen topdressing on six month old sugarcane in March i.e. after the termination of the main rains.

This crop : 1st ratoon Age: 12 months (1.10.79 to 29.9.80)

Location : ZSA Experiment Station, Impala Block C 1 - 3

Soil type : P.E.1 sandy clay loam derived from gneiss

Design : Three randomised blocks, main plots levels of nitrogen applied one month after planting, and subplots levels of nitrogen topdressed in March.

Variety/spacing : NCo 376 in 1,5 m rows.

Fertiliser : Levels of nitrogen (see treatments) - source ammonium nitrate. 60 kg P_2O_5 ha $^{-1}$ - source single superphosphate

Rainfall : 835 mm

Irrigation : 892 mm

Treatments :

Nitrogen levels (applied one month after ratooning) main plots.

1. 0 kg N ha^{-1}
2. 90 kg N ha^{-1}
3. 180 kg N ha^{-1}

Nitrogen topdressed six months after planting during March

1. 0 kg N ha^{-1}
2. 30 kg N ha^{-1}
3. 60 kg N ha^{-1}
4. 90 kg N ha^{-1}

RESULTS :

Relevant data are summarised in the attached tables

a) Cane yields. There was a highly significant linear increase in cane yields at harvest with increasing levels of initial nitrogen and similarly after topdressing nitrogen six months after planting. The greater cane yields after the initial nitrogen application were associated with greater stalk densities and to a lesser degree stalk lengths, while the greater cane yields after topdressing were only associated with greater stalk lengths.

b) ERC % cane Nitrogen levels had no significant effect on cane quality.

c) TERC ha^{-1}. The significant linear increase in TERC ha^{-1} after initial and topdressing nitrogen were largely due to increases in cane yields obtained from the greater levels of nitrogen.

2./ d) .....

d) Stalk counts, lengths and diameters. Increasing initial levels of nitrogen markedly increased stalk densities while stalk lengths only increased up to 90 kg N ha^{-1}. Topdressing nitrogen only increased stalk lengths and nitrogen had no measurable effect on stalk diameters.

e) Estimated lodging %. Ther was a linear increase in lodging with increasing levels of ititial nitrogen and also slightly greater lodging occurred when at least 30 kg N ha^{-1} was topdressed.

PROGRESS REPORT

Planted : 26.9.78

Harvested :	Harvested	Age
	P 1.10.1979	12,2 months
	1R 29.9.80	12,0 months

RESULTS

f) Cane yields. Initial nitrogen applications in the plant crop increased cane yields up to 90 kg N ha^{-1} while in the first ratoon there was a significant linear response. Topdressing nitrogen six months after planting had no significant effect on the plant crop although there was a significant initial nitrogen x topdressing nitrogen interaction. This interaction showed a response to topdressing nitrogen when no nitrogen was applied initially. In the 1st ratoon there was a significant linear response to nitrogen topdressings.

g) ERC% cane. Increasing initial levels of nitrogen in both the plant and 1st ratoon produced a consistant small non significant decline in cane quality. And only in the plant crop there was a further decline in quality from nitrogen topdressings.

h. TERC ha^{-1}. As often observed there were no TERC ha^{-1} responses to initial levels of nitrogen in the plant crop while there was a linear response in the 1st ratoon. Topdressing nitrogen in the plant and 1st ratoon crops produced the opposite effects, i.e. in the plant crop TERC ha^{-1} declined linearly with increasing levels of nitrogen due to the harmful effects of topdressing nitrogen on quality while in the 1st ratoon TERC ha^{-1} increased due to topdressing nitrogen increasing cane yields and having no effect on quality.

Stalk counts, lengths and diameters. The greater cane yields from initial levels of nitrogen were largely associated with greater stalk densities and stalk lengths, while responses to nitrogen topdressings were entirely associated with greater stalk lengths. Stalk diameters were unaffected by levels of nitrogen.

CONCLUSIONS

This data has shown that the ability of sugarcane to store greater quantities of sugar is largely dependent on stalk volume per unit area i.e. stalk densities, lengths and diameters. Hence the importance of initially supplying adequate quantities of nitrogen is shown by both the greater stalk densities and stalk lengths obtained. In the event of nitrogen starvation occurring early or in the later phases of growth, topdressing nitrogen can be beneficial by increasing stalk lengths. However, as also indicated by the data, luxury uptake

3./ of nitrogen .....

of nitrogen appears to retard the accumulation of sugar and nitrogen per se had no effect on stalk diameters.

R.J.H. Nov. 1980.
rw

6400/20b NITROGEN TOPDRESSING TRIAL, SIX MONTHS AFTER PLANTING, 1ST RATOON DATA

Table 1.

Treatments	Cane t ha^{-1}	ERC % cane	TERC ha^{-1}	Stalk counts x 10^{-3}	Stalk lengths (m)	Stalk diameters (cm)	Estimated lodging %
Initial nitrogen							
0 kg N ha^{-1}	99,5	13,62	10,81	116,3	1,94	1,9	0
90 " " "	126,0	13,57	17,09	135,3	2,67	1,9	45
180 " " "	140,7	13,31	18,73	143,7	2,62	2,0	88
Linear effects	P=0,01	N.S.	P=0,01	-	-	-	-
Quadratic effects	N.S.	N.S.	N.S.	-	-	-	-
L.S.D. P=0,05	23,8	0,39	3,38	-	-	-	-
P=0,01	39,5	0,64	5,60	-	-	-	-
S.E. main plots ±	21,0	0,34	2,98	-	-	-	-
S.E. means ±	6,7	0,10	0,86	-	-	-	-
C.V. %	18,2	2,52	19,18	-	-	-	-
Topdressing nitrogen							
0 kg N ha^{-1}	107,7	13,63	14,59	128,6	2,28	1,9	30
30 " " "	116,8	13,46	15,70	134,3	2,46	1,9	52
60 " " "	114,7	13,49	15,48	128,8	2,42	2,0	44
90 " " "	122,4	13,43	16,40	135,5	2,50	1,9	51
Linear effects	P=0,01	N.S.	P=0,05	-	-	-	-
Quadratic effects	N.S.	N.S.	N.S.	-	-	-	-
L.S.D. P=0,05	8,5	0,51	1,35	-	-	-	-
P=0,01	11,7	0,70	1,85	-	-	-	-
S.E. sub-plots ±	8,6	0,52	1,36	-	-	-	-
S.E. means ±	2,9	0,17	0,45	-	-	-	-
C.V.%	7,5	3,84	8,76	-	-	-	-
Significant interactions	N.S.	N.S.	N.S.	-	-	-	-
Trial mean	115,4	13,50	15,54	131,8	2,41	1,9	44

6400/20b NITROGEN TOPDRESSING TRIAL, SIX MONTHS AFTER RATOONING - PLANT AND 1ST RATOON DATA

Table 2.

Treatments	Cane t ha^{-1}		ERC % cane		ERC ha^{-1}		Stalk counts x 10^{-3}		Stalk lengths (m)		Stalk diameters (cm)	
	P	1R	P	1R	P	1R	P	1R	P	1R	P	1R
Initial nitrogen												
0 kg N ha^{-1}	129,4	99,5	13,35	13,52	17,26	10,81	136,2	116,3	2,43	1,94	2,0	1,9
90 "	142,4	126,0	12,90	13,57	18,37	17,09	150,4	135,3	2,61	2,57	2,0	1,9
180 "	140,7	140,7	12,35	13,31	17,37	18,73	161,4	143,7	2,59	2,62	1,9	2,0
Linear effects	N.S.	P=0,01	N.S.	N.S.	N.S.	P=0,01	-	-	-	-		
Quadratic effects	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	-	-	-	-		
L.S.D. P=0,05	12,1	23,8	1,12	0,39	2,33	3,38	-	-	-	-		
P=0,01	20,1	39,5	1,86	0,64	3,87	5,60	-	-	-	-		
S.E. main plots ±	10,7	21,0	0,99	0,34	2,06	2,98	-	-	-	-		
S.E. means ±	3,1	6,7	0,29	0,10	11,64	0,86	-	-	-	-		
C.V.%	7,8	18,2	7,68	2,52	0,59	19,18	-	-	-	-		
Topdressing nitrogen												
0 kg N ha^{-1}	134,1	107,7	13,34	13,63	17,86	14,59	149,1	128,6	2,48	2,28	2,0	1,9
30 "	140,3	116,8	13,02	13,46	18,23	15,70	152,4	134,3	2,55	2,46	1,9	1,9
60 "	136,2	114,7	12,93	13,49	17,61	15,48	146,8	128,8	2,53	2,42	1,9	2,0
90 "	139,4	122,4	12,18	13,43	16,97	16,40	149,1	135,5	2,59	2,50	2,0	1,9
Linear effects	N.S.	P=0,01	P=0,01	N.S.	P=0,05	P=0,05	-	-	-	-		
Quadratic effects	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	-	-	-	-		
L.S.D. P=0,05	6,0	8,5	0,44	0,51	0,98	1,35	-	-	-	-		
P=0,01	8,2	11,7	0,60	0,70	1,34	1,85	-	-	-	-		
S.E. subplots ±	6,1	8,6	0,45	0,52	0,99	1,36	-	-	-	-		
S.E. means ±	2,0	2,9	0,15	0,17	5,59	0,45	-	-	-	-		
C.V.%	4,4	7,5	3,46	3,84	0,33	8,76	-	-	-	-		
Significant interactions	M'F'* M"S"'*	N.S.	N.S.	N.S.	N.S.	N.S.	-	-	-	-		
Trial mean	137,5	115,4	12,87	13,50	17,67	15,54	149,4	131,8	2,54	2,41	2,0	1,9

6400/20b NITROGEN TOPDRESSING TRIAL, SIX MONTHS AFTER RATOONING - PLANT AND 1ST RATOON DATA

CANE YIELDS (kg/ha^{-1}) - INTERACTION TABLE, PLANT CROPP

TABLE 3

Initial levels of nitrogen	Nitrogen levels at topdressing kg N ha^{-1}				Means
	0	30	60	90	
0 kg N ha^{-1}	121,2	132,1	130,4	153,9	129,4
90 "	140,4	140,9	145,1	143,0	142,4
180 "	140,5	148,0	133,0	141,5	140,7
	134,1	140,3	136,2	139,4	137,5

SOUTH AFRICAN SUGAR INDUSTRY

AGRONOMISTS' ASSOCIATION

Title: NITROGEN TOPDRESSING TRIAL SIX MONTHS AFTER RATOONING 6400/20(b)

Cat No.: 1187

Object : To determine the effects of nitrogen topdressing on six month old sugarcane in March i,e. after the termination of the main rains.

This crop : 2nd ratoon **Age :** 11,8 mths. (29.9.80 - 22.9.81)

Location : ZSA Experiment Station, Impala Block C1-3

Soil type : P.E. 1 sandy clay loam derived from gneiss

Design : Three randomised blocks, main plots levels of nitrogen applied one month after planting, and sub-plots levels of nitrogen topdressed in March.

Variety/spacing : NCo 376 in 1,5 m rows.

Fertiliser : Levels of nitrogen (see treatments) - source ammonium nitrate. 60 kg/ha P_2O_5 - source single superphosphate.

Rainfall : 847 mm

Irrigation : 867 mm

Treatments :

Nitrogen levels (applied one month after ratooning) Main plots.

1. 0 kg N/ha
2. 90 kg N/ha
3. 180 kg N/ha

Nitrogen topdressed six months after planting during March

1. 0 kg N/ha
2. 30 kg N/ha
3. 60 kg N/ha
4. 90 kg N/ha

RESULTS

Relevant data are summarised in Table 1.

a) Cane yields. There was a significant linear cane yield response to greater levels of initial nitrogen whereas there were no significant responses to topdressing nitrogen six months after planting.

b) ERC % cane. There was a significant quadratic response to greater levels of initial nitrogen and a significant cubic response to topdressing nitrogen.

c) TERC/ha. Initial levels of nitrogen produced a significant linear TERC/ha response, whereas topdressing nitrogen produced no significant effects.

d) RS % cane, TF % cane and TF t/ha. Applying an initial application of 180 kg N/ha produced a slightly greater RS % cane than the other treatments. However, topdressing N had no effect on RS % cane. Otherwise TF % cane and TF t/ha produced the same treatment response trends as shown in ERC % cane and TERC/ha.

2./ e) Stalk .....

e) Stalk counts, stalk lengths and stalk diameters. Greater initial levels of nitrogen produced greater stalk populations and stalk lengths at harvest, whereas topdressing nitrogen had no effect on stalk populations. However, there was an increase in stalk lengths of about 12% from topdressing nitrogen. Levels of nitrogen had no effect on stalk diameters.

PROGRESS REPORT

Planted : 26.9.78.

Harvested :

Harvested		Age
P	1.10.79	12.2. months
1R	29.9.80	12,0 months
2R	22.9.81	11,8 months

RESULTS

Relevant data are summarised in Tables 2-4

a) Cane yields. There were no significant responses to greater initial levels of nitrogen in the plant crop, whilst there were significant responses in the 1st and 2nd ratoons. Topdressing N had no significant effects on cane yields in the plant and second ratoon. However, there was a significant response in the 1st ratoon. The significant interaction in the plant crop has shown that by topdressing plants which received no initial nitrogen, cane yields were increased.

b) ERC % cane. Initial levels of nitrogen had no effect on the plant and 1st ratoon crops. However, there was a quadratic response in the 2nd ratoon. Greater levels of nitrogen topdressings produced a significant decline in quality in the plant crop and a cubic response in the 2nd ratoon.

c) TERC/ha. There was a significant linear TERC/ha response to nitrogen in both ratoon crops and no response in the plant crop. Responses to nitrogen topdressings were variable. There was a significant linear decline in TERC/ha in the plant crop, whilst there was a significant increase in the 1st ratoon and no effects in the 2nd ratoon.

d) Stalk counts, stalk lengths and stalk diameters. These results clearly show that greater levels of initial nitrogen increased stalk populations and stalk lengths, whereas topdressing nitrogen had no effect on stalk populations at harvest, it was able to increase stalk lengths by about 11%. In all cases nitrogen had no effect on stalk diameters.

CONCLUSIONS

This data clearly shows that cane and sucrose yields are largely dependent on stalk volume per unit area, i.e. the size of the sink for sucrose storage. Stalk population, perhaps the most important component of stalk volume per unit area, is dependant on adequate initial nitrogen being applied (180 kg N/ha), which also largely determines final stalk lengths, the second component of stalk volume. However, when initial nitrogen applications are insufficient to maximise stalk populations, late nitrogen dressings have no effect on

3./ on stalk .....

stalk populations but they are able to promote greater stalk elongation. Also it is known that excess nitrogen uptake by plants can markedly delay stalk maturation. These data and other data have shown that average stalk diameters, the third component of stalk volume, are largely independent of levels of nitrogen.

RJH/Nov. '81.
rw

6400/20b NITROGEN TOPDRESSI● TRIAL, SIX MONTHS AFTER PLANTI● - 2ND RATOON DATA

Table 1

Treatments	Cane t/ha	ERC % cane	TERC/ha	RS% cane	TF% cane	TF/ha	Stalk counts x 10^{-3}	Stalk lengths (m)	Stalk diameters (cm)
Initial nitrogen									
0 kg N/ha	78,9	13,21	10,41	0,33	15,02	11,85	120,3	1,80	1,9
90 " "	121,8	13,40	16,32	0,28	15,19	18,50	153,0	2,48	2,0
180 " "	132,0	12,79	16,88	0,49	14,71	19,42	156,2	2,58	2,0
Linear effects	P=0,01	P=0,05	P=0,01	-	-	-	-	-	-
Quadratic effects	N.S.	P=0,05	P=0,05	-	-	-	-	-	-
L.S.D. P=0,05	21,6	0,34	2,62	-	-	-	-	-	-
P=0,01	35,9	0,57	4,35	-	-	-	-	-	-
S.E. main plots ±	19,1	0,30	2,31	-	-	-	-	-	-
S.E. means ±	5,5	0,09	0,67	-	-	-	-	-	-
C.V.%	17,2	2,31	15,91	-	-	-	-	-	-
Topdressing nitrogen									
0 kg N/ha	108,5	13,11	14,20	0,36	14,98	16,25	143,5	2,17	2,0
30 " "	110,8	13,23	14,64	0,36	15,08	16,71	142,7	2,27	1,9
60 " "	110,0	12,88	14,13	0,40	14,73	16,20	142,8	2,27	2,0
90 " "	114,1	13,31	15,17	0,35	15,10	17,23	143,8	2,42	2,0
Linear effects	N.S.	N.S.	N.S.	-	-	-	-	-	-
Quadratic effects	N.S.	N.S.	N.S.	-	-	-	-	-	-
Cubic effects	N.S.	P=0,05	N.S.	-	-	-	-	-	-
L.S.D. P=0,05	13,3	0,32	1,88	-	-	-	-	-	-
P=0,01	18,2	0,43	2,58	-	-	-	-	-	-
S.E. sub-plots ±	13,4	0,32	1,90	-	-	-	-	-	-
S.E. means ±	4,5	0,11	0,63	-	-	-	-	-	-
C.V.%	12,1	2,43	13,09	-	-	-	-	-	-
Significant interactions	N.S.	N.S.	N.S.	-	-	-	-	-	-
Trial means	110,9	13,13	14,54	0,37	14,97	16,59	143,2	2,28	2,0

6400/20b NITROGEN TOPDRESSING TRIAL, SIX MONTHS AFTER PLANTING - P-2R DATA

Table 2.

Treatments	Cane t/ha				ERC % cane				TERC/ha			
	P	1R	2R	Mean 1-2R	P	1R	2R	Mean 1-2R	P	1R	2R	Mean 1-2R
Initial nitrogen												
0 kg N/ha	129,4	79,5	78,9	79,2	13,35	13,62	13,21	13,42	17,26	10,81	10,41	10,61
90 " "	142,4	126,0	121,8	123,9	12,90	13,57	13,40	13,48	18,37	17,09	16,32	16,70
180 " "	140,7	140,7	132,0	136,4	12,35	13,31	12,79	13,05	17,37	18,73	16,88	17,80
Linear effects	N.S.	P=0,01	P=0,01	-	N.S.	N.S.	P=0,05	-	N.S.	P=0,01	P=0,01	-
Quadratic effects	N.S.	N.S.	N.S.	-	N.S.	N.S.	P=0,05	-	N.S.	N.S.	P=0,05	-
L.S.D. P=0,05	12,1	23,8	21,6	-	1,12	0,39	0,34	-	2,33	3,38	2,62	-
P=0,01	20,1	39,5	35,9	-	1,86	0,64	0,57	-	3,87	5,60	4,35	-
S.E. main plots ±	10,7	21,0	19,1	-	0,99	0,34	0,30	-	2,06	2,98	2,31	-
S.E. means ±	3,1	6,7	5,5	-	0,29	0,10	0,09	-	11,64	0,86	0,67	-
C.V.%	7,8	18,2	17,2	-	7,68	2,52	2,31	—	0,59	19,18	15,91	-
Topdressing nitrogen												
0 kg N/ha	134,1	107,7	108,5	108,1	13,34	13,63	13,11	13,37	17,86	14,59	14,20	14,40
30 " "	140,3	116,8	110,8	113,8	13,02	13,46	13,23	13,34	18,23	15,70	14,64	15,17
60 " "	136,2	114,7	110,0	112,4	12,93	13,49	12,88	13,18	17,61	15,48	14,13	14,80
90 " "	139,4	122,4	114,1	118,2	12,18	13,43	13,31	13,37	16,97	16,40	15,17	15,78
Linear effects	N.S.	P=0,01	N.S.	-	P=0,01	N.S.	N.S.	-	P=0,05	P=0,05	N.S.	-
Quadratic effects	N.S.	N.S.	N.S.	-	N.S.	N.S.	N.S.	-	N.S.	N.S.	N.S.	-
Cubic effects	N.S.	N.S.	N.S.	-	N.S.	N.S.	P=0,05	-	N.S.	N.S.	N.S.	-
L.S.D. P=0,05	6,0	8,5	13,3	-	0,44	0,51	0,32	-	0,98	1,35	1,88	-
P=0,01	8,2	11,7	18,2	-	0,60	0,70	0,43	-	1,34	1,85	2,58	-
S.E. sub-plots ±	6,1	8,6	13,4	-	0,45	0,52	0,32	-	0,99	1,36	1,90	-
S.E. means ±	2,0	2,9	4,5	-	0,15	0,17	0,11	-	5,59	0,45	0,63	-
C.V.%	4,4	7,5	12,1	-	3,46	3,84	2,43	-	0,33	8,76	13,09	-
Significant interactions	M*S*+M"S"	N.S.	N.S.	-	N.S.	N.S.	N.S.	-	N.S.	N.S.	N.S.	-
Trial means	137,5	115,4	110,9	113,2	12,87	13,50	13,13	13,32	17,67	15,54	14,54	15,04

6400/20b NITROGEN TOPDRESSING TRIAL, SIX MONTHS AFTER PLANTING - 2ND RATOON DATA

Table 3.

Treatment means	Stalk counts x 10^{-3}				Stalk lengths (m)				Stalk diameters (cm)			
	P	1R	2R	Mean 1-2R	P	1R	2R	Mean 1-2R	P	1R	2R	Mean 1-2R
Initial nitrogen												
0 kg N/ha	136,2	116,3	120,3	118,3	2,43	1,94	1,80	1,87	2,0	1,9	1,9	1,9
90 " "	150,4	135,3	153,0	144,2	2,61	2,67	2,48	2,58	2,0	1,9	2,0	2,0
180 " "	161,4	143,7	156,2	150,0	2,59	2,62	2,58	2,60	1,9	2,0	2,0	2,0
Topdressing nitrogen												
0 kg N/ha	149,1	128,6	143,5	136,0	2,48	2,28	2,17	2,22	2,0	1,9	2,0	2,0
30 " "	152,4	134,3	142,7	138,5	2,56	2,46	2,27	2,36	1,9	1,9	1,9	1,9
60 " "	146,8	128,8	142,8	135,8	2,53	2,42	2,27	2,34	1,9	2,0	2,0	2,0
90 " "	149,1	135,5	143,8	139,6	2,59	2,50	2,42	2,46	2,0	1,9	2,0	2,0
Trial means	149,4	131,8	143,2	137,5	2,54	2,41	2,28	2,34	2,0	1,9	2,0	2,0

Table 4. - Cane yield (t/ha) interaction table plant crop.

Initial levels of nitrogen	Nitrogen levels at topdressing kg/ha 0	30	40	90	Mean
0 kg N/ha	121,2	132,1	130,4	133,9	129,4
90 " "	140,4	140,9	145,1	143,0	142,4
180 " "	140,5	148,0	133,0	141,5	140,7
Mean	134,1	140,3	136,2	139,4	137,5

SOUTH AFRICAN SUGAR INDUSTRY

AGRONOMISTS' ASSOCIATION

Cat. No.: 1187

6400/20b NITROGEN TOPDRESSING TRIAL SIX MONTHS AFTER RATOONING

Object: To determine the effects of nitrogen topdressing on six month old sugarcane in March i.e. after the termination of the main rains.

This crop: 3rd ratoon **Age:** 12,2 months(22.9.81-27.9.82)

Location: ZSA Experiment Station, Impala Block C1-3.

Soil type: PE.1 sandy clay loam derived from gneiss.

Design: Three randomised blocks, main plots levels of nitrogen applied one month after planting, and sub-plots levels of nitrogen topdressed in March.

Variety/ Spacing NCO 376 in 1,5m rows.

Fertiliser: Levels of nitrogen (see treatments)

Rainfall: 404mm

Irrigation: 1143mm

Treatments:

Nitrogen levels (applied one month after ratooning)

1. No added nitrogen
2. 90kg N/ha
3. 180kg N/ha

Nitrogen topdressed six months after planting during March

1. No added N
2. 30 kg N/ha
3. 60 kg N/ha
4. 90 kg N/ha

RESULTS

Relevant data are summarised in tables 1 and 4

(a) Cane yields: There was a highly significant linear response to both greater initial and topdressings of nitrogen, as well as a significant (P=0,05) linear interaction (P=0,05) between initial and topdressings of nitrogen. This interaction showed that the greater levels of nitrogen topdressing increased cane yields by 54,22 and 9 per cent when applied to initial levels of 0,90 and 180kg N/ha respectively.

(b) ERC % cane: There was a significant quadratic response to initial levels of nitrogen whereas topdressing nitrogen had no affect.

(c) TERC/ha: Increasing initial and topdressings of nitrogen significantly increased TERC/ha

2/RS.% cane.....

(d) RS % Cane, TF % Cane and TF t/ha: There was a trend towards slightly greater RS % cane from greater initial and topdressings of nitrogen, whereas TF % cane and TF t/ha produced similar trends to those observed in ERC % cane and TERC/ha respectively.

(e) Stalk counts, stalk lengths and diameters: Increasing initial levels of nitrogen markedly increased stalk counts, but topdressing nitrogen had no effect on stalk counts. However stalk lengths were increased markedly by both initial and topdressings of nitrogen, whereas nitrogen had no effect on stalk diameters.

PROGRESS REPORT

Planted: 26.9.1978.

Harvested:	Harvested	Age
	P 1.10.1979	12,2 months
	1R 29. 9.1980	12,0 months
	2R 22. 9.1981	11,8 months
	3R 27. 9.1982	12,2 months

RESULTS:

Relevant data are summarised in tables 2-6.

(f) Cane yields: There was a highly significant linear increase in cane yields from increasing levels of initial nitrogen in all the ratoon crops. Although there was a mean trend towards greater cane yields from increased topdressings, differences were only significant in the plant and third ratoons. The interaction tables showed that the main response to nitrogen topdressings occurred in the absence of initial nitrogen, and the response was less pronounced when initial nitrogen had been applied

(g) ERC % cane: In the second and third ratoons there was a quadratic response to initial nitrogen applications and, in all cases, the quality was poorest when 180 kgN/ha had been applied. Nitrogen topdressings had little effect on quality, although in the plant crop there was a significant linear decline in ERC % cane with greater nitrogen topdressings.

(h) TERC/ha: In all the ratoon crops there was a significant linear response to greater initial levels of nitrogen and, except for the second ratoon, there was a significant linear response to greater topdressings of nitrogen.

(i) Stalk counts: In all crops increasing initial levels of nitrogen increased stalk counts and stalk lengths but had no effect on stalk diameters. Topdressing nitrogen increased stalk lengths, but had no effect on stalk counts or diameters.

/Conclusions....

CONCLUSIONS

Results have shown that 6-month old cane will respond to nitrogen top-dressing, and that the extent of the response is dependent on the amount of nitrogen applied initially. Yield response to initial nitrogen is associated with increased stalk populations and stalk lengths, whereas response to top-dressings is associated with stalk lengths only.

The linear nature of the nitrogen responses in this trial indicates that the level of both initial and top-dressed N should be increased in future ratoons so as to study the full response range.

RJH Nov'82
arg

6400/20b NITROGEN TOPDRESSING TRIAL, SIX MONTHS AFTER PLANTING - 3rd RATOON DATA

Table 1

Treatments	Cane t/ha	ERC % cane	TERC/ ha	RS % Cane	TF % cane	TF t/ha	Stalk counts x 10	Stalk lengths(m)	Stalk diam(cm)
Initial nitrogen									
0kg N/ha	72,3	14,20	10,26	0,28	15,98	11,55	129,0	1,88	1,9
90kg N/ha	125,4	14,41	18,07	0,28	16,28	20,41	156,3	2,42	2,0
180kg N/ha	153,3	13,76	21,09	0,43	15,75	24,14	166,3	2,74	2,0
Linear effects	P=0,001	P=0,05	P=0,001	-	-	-	-	-	-
Quadratic effects	P=0,05	P=0,05	P=0,01	-	-	-	-	-	-
L.S.D. P=0,05	10,4	0,33	1,60	-	-	-	-	-	-
P=0,01	17,3	0,55	2,66	-	-	-	-	-	-
S.E. main plots ±	9,2	0,29	1,41	-	-	-	-	-	-
S.E. means ±	2,7	0,08	0,41	-	-	-	-	-	-
C.V. %	7,9	2,07	8,58	-	-	-	-	-	-
Topdressing nitrogen									
0kg N/ha	104,2	14,30	14,82	0,31	16,18	16,82	149,7	2,25	2,0
30kg N/ha	116,2	14,16	16,40	0,32	16,00	18,56	148,0	2,31	2,0
60kg N/ha	120,9	13,94	16,85	0,33	15,82	19,14	152,1	2,38	2,0
90kg N/ha	126,7	14,09	17,82	0,37	16,01	20,28	152,3	2,45	1,9
Linear effects	P=0,001	N.S.	P=0,001	-	-	-	-	-	-
Quadratic effects	N.S.	N.S.	N.S.	-	-	-	-	-	-
L.S.D. P=0,05	5,8	N.S.	1,24	-	-	-	-	-	-
P=0,01	4,9	N.S.	1,69	-	-	-	-	-	-
S.E. subplots ±	5,8	0,62	1,25	-	-	-	-	-	-
S.E. means ±	1,9	0,21	0,42	-	-	-	-	-	-
C.V. %	4,9	4,39	7,58	-	-	-	-	-	-
Significant interactions	M*S*	N.S.	N.S.						
Trial means	117,0	14,12	16,47	0,33	16,00	18,70	150,5	2,35	2,0

6400/20b NITROGEN TOPDRESSING TRIAL SIX MONTHS AFTER PLANTING - 3rd RATOON DATA AND P-3R DATA

Table 2 - (P-3R) cane yields and ERC % cane

Treatments	Cane yields t/ha					ERC % cane				
	P	1R	2R	3R	Mean 1-3R	P	1R	2R	3R	Mean 1-3R
Initial nitrogen										
0kg N/ha	129,4	79,5	78,9	72,3	76,9	13,35	13,62	13,21	14,20	13,68
90kg N/ha	142,4	126,0	121,8	125,4	124,4	12,90	13,57	13,40	14,41	13,79
180kg N/ha	140,7	140,7	132,0	153,3	142,0	12,35	13,31	12,79	13,76	13,29
Linear effects	N.S.	P=0,01	P=0,01	P=0,001	-	N.S.	N.S.	P=0,05	P=0,05	
Quadratic effects	N.S.	N.S.	N.S.	P=0,05	-	N.S.	N.S.	P=0,05	P=0,05	
L.S.D. P=0,05	12,1	23,8	21,6	10,4	-	1,12	0,39	0,34	0,33	
P=0,01	20,1	39,5	35,9	17,3	-	1,86	0,64	0,57	0,55	
S.E. Main plots ±	10,7	21,0	19,1	9,2	-	0,99	0,34	0,30	0,29	
S.E. means ±	3,1	6,7	5,5	2,7	-	0,29	0,10	0,09	0,08	
C.V. %	7,8	18,2	17,2	7,9	-	7,68	2,52	2,31	2,07	
Topdressing nitrogen										
0kg N/ha	134,1	107,7	108,5	104,2	106,8	13,34	13,63	13,11	14,30	13,68
30kg N/ha	140,3	116,8	110,8	116,2	114,6	13,02	13,46	13,23	14,16	13,62
60kg N/ha	136,2	114,7	110,0	120,9	115,2	12,93	13,49	12,88	13,94	13,44
90kg N/ha	139,4	122,4	114,1	126,7	121,1	12,18	13,43	13,31	14,09	13,61
Linear effects	N.S.	P=0,01	N.S.	P=0,001	-	P=0,01	N.S.	N.S.	N.S.	
Quadratic effects	N.S.	N.S.	N.S.	N.S.	-	N.S.	N.S.	N.S.	N.S.	
Cubic effects	N.S.	N.S.	N.S.	N.S.	-	N.S.	N.S.	P=0,05	N.S.	
L.S.D. P=0,05	6,0	8,5	13,3	5,8	-	0,44	0,51	0,32		
P=0,01	8,2	11,7	18,2	4,9	-	0,60	0,70	0,43		
S.E. subplots ±	6,1	8,6	13,4	5,8	-	0,45	0,52	0,32	0,62	
S.E. means ±	2,0	2,9	4,5	1,9	-	0,15	0,17	0,11	0,21	
C.V. %	4,4	7,5	12,1	4,9	-	3,46	3,84	2,43	4,39	
Significant interactions	M'S'M"S"	N.S.	N.S.	M'S'*	-	N.S.	N.S.	N.S.	N.S.	
Trial means	137,5	115,4	110,9	117,0	114,4	12,87	13,50	13,13	14,12	

6400/20b NITROGEN TOPDRESSING TRIAL SIX MONTHS AFTER PLANTING P-3R DATA

Table 3 - (P-3R) TERC/ha and stalk counts.

	TERC/ha					Stalk counts x 10^{-3}				
	P	1R	2R	3R	Mean 1-3R	P	1R	2R	3R	Mean 1-3R
Initial Nitrogen										
0kg N/ha	17,26	10,81	10,41	10,26	10,49	136,2	116,3	120,3	129,0	121,9
90kg N/ha	18,37	17,09	16,32	18,07	17,16	150,4	135,3	153,0	156,3	148,2
180kg N/ha	17,37	18,73	16,88	21,09	18,90	161,4	143,7	156,2	166,3	155,4
Linear effects	N.S.	P=0,01	P=0,01	P=0,001	-	-	-	-	-	-
Quadratic effects	N.S.	N.S.	P=0,05	P=0,01	-	-	-	-	-	-
L.S.D. P=0,05	2,33	3,38	2,62	1,60	-	-	-	-	-	-
P=0,01	3,87	5,60	4,35	2,66	-	-	-	-	-	-
S.E. main plots ±	2,06	2,98	2,31	1,41	-	-	-	-	-	-
S.E. means ±	0,59	0,86	0,67	0,41	-	-	-	-	-	-
C.V. %	11,64	19,18	15,91	8,59	-	-	-	-	-	-
Topdressing nitrogen										
0kg N/ha	17,86	14,59	14,20	14,82	14,54	149,1	128,6	143,5	149,7	140,6
30kg N/ha	18,23	15,70	14,64	16,40	15,58	152,4	134,3	142,7	148,0	141,7
60kg N/ha	17,61	15,48	14,13	16,85	15,49	146,8	128,8	142,8	152,1	141,2
90kg N/ha	16,97	16,40	15,17	17,82	16,46	149,1	135,5	143,8	152,3	143,9
Linear effects	P=0,05	P=0,05	N.S.	P=0,001	-	-	-	-	-	-
Quadratic effects.	N.S.	N.S.	N.S.	N.S.	-	-	-	-	-	-
L.S.D. P=0,05	0,98	1,35	1,88	1,24	-	-	-	-	-	-
P=0,01	1,34	1,85	2,58	1,69	-	-	-	-	-	-
S.E. subplots ±	0,99	1,36	1,90	1,25	-	-	-	-	-	-
S.E. means ±	5,59	0,45	0,63	0,42	-	-	-	-	-	-
C.V. %	0,33	8,76	13,09	7,58	-	-	-	-	-	-
Significant interactions	N.S.	N.S.	N.S.	N.S.						
Trial means	17,67	15,54	14,54	16,47	15,52	149,4	131,8	143,2	150,5	141,8

6400/20b NITROGEN TOPDRESSING TRIAL SIX MONTHS AFTER PLANTING

3rd RATOON DATA AND P-3R DATA

Table 4 - Cane yield(t/ha)interaction table, 3rd ratoon data

Initial levels of nitrogen	Nitrogen levels at topdressing kg/ha				
	0	30	60	90	Mean
0kg N/ha	56,3	71,0	75,0	86,9	72,3
90kg N/ha	110,5	126,9	129,9	134,4	125,4
180kg N/ha	145,8	150,6	157,8	158,8	153,3
Mean	104,2	116,2	120,9	126,7	117,0

Table 5 - (P-3R) Stalk lengths and diameters

	Stalk lengths(m)					Stalk diameters(cm)				
	P	1R	2R	3R	Mean 1-3R	P	1R	2R	3R	Mean 1-3R
Initial levels of Nitrogen										
0kg N/ha	2,43	1,94	1,80	1,88	1,87	2,0	1,9	1,9	1,9	1,9
90kg N/ha	2,61	2,67	2,48	2,42	2,52	2,0	1,9	2,0	2,0	2,0
180kg N/ha	2,59	2,62	2,58	2,74	2,65	1,9	2,0	2,0	2,0	2,0
Topdressing Nitrogen										
0kg N/ha	2,48	2,28	2,17	2,25	2,23	2,0	1,9	2,0	2,0	2,0
30kg N/ha	2,56	2,46	2,27	2,31	2,35	1,9	1,9	1,9	2,0	1,9
60kg N/ha	2,53	2,42	2,27	2,38	2,36	1,9	2,0	2,0	2,0	2,0
90kg N/ha	2,59	2,50	2,42	2,45	2,46	2,0	1,9	2,0	1,9	1,9
Trial means	2,54	2,41	2,28	2,35	2,35	2,0	1,9	2,0	2,0	2,0

Table 6 - cane yield (t/ha) interaction table, plant crop.

Initial levels of nitrogen	Nitrogen levels at topdressing kg/ha				
	0	30	60	90	Mean
0kg N/ha	121,2	132,1	130,4	133,9	129,4
90kg N/ha	140,4	140,9	145,1	143,0	142,4
180kg N/ha	140,5	148,0	133,0	141,5	140,7
Mean	134,1	140,3	136,2	139,4	137,5