SOUTH AFRICAN SUGAR INDUSTRY AGRONOMISTS' ASSOCIATION

6400/20(a) NITROGEN TOPDRESSING TRIAL EIGHT MONTHS AFTER PLANTING

(Revised 7.11.1979)

Catalogue: 1182

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

This crop: Plant Age: 12 months (26.7.78 to 23.7.79)

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 nitrogen top-dressed 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: 608 mm Irrigation: 969 mm

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

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

Nitrogen top-dressed 8 months after planting, in March
Sub plots.

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

RESULTS:

Relevant data are summarised in the attached tables.

(a) Cane yields. There was a highly significant linear response to initial levels of nitrogen which was associated with greater stalk densities and stalk lengths. Topdressing plants with nitrogen eight months after planting in autumn had no significant effects on cane yields at harvest four months later. The significance of the interaction was caused by the fact that the nature of the response to topdressing varied in relation to initial levels of N. It was linear in the absence of N at planting, and quadratic in the other treatments.

(b) ERC% cane. Initial levels of nitrogen had no effect on quality. However, topdressing nitrogen linearly and significantly depressed ERC% cane when more than 30 kg/ha N was applied eight months after planting.

(c) TERC/ha. Increasing the initial applications of nitrogen from 0 to 180 kg/ha N significantly increased cane yields which largely accounted for the

greater TERC/ha. Topdressing nitrogen increased sugar yields in nitrogen starved plants, i.e. those receiving no nitrogen after planting. With 90 kg/ha N at planting the effect of top-dressing was to depress yields, but it caused marginal increases in the high N treatment,.

(d) Stalk counts, stalk lengths and diameters. Greater stalk densities and stalk lengths were associated with increasing levels of nitrogen after planting, which largely accounted for the greater cane yields. However, topdressing plants eight months after planting had no effect on stalk densities, lengths or 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 became static. Hence the virtual lack of response to cane yields from late topdressing of nitrogen which were also detrimental to cane quality.

RJH/November, 1979.

6400/20(a) NITROGEN TOPDRESSING TRIAL, EIGHT MONTHS AFTER PLANTING

PLANT CROP DATA

Treatments	Cane t/ha	ERC% cane	TERC/ ha	Stalk counts x 10^{-3}	Stalk lengths (m)	Stalk diam (cm)
Initial nitrogen						
0 kg/ha N	73,0	12,92	9,42	101,8	1,85	2,04
90 "	135,5	13,23	17,89	129,5	2,49	2,03
180 "	153,0	12,76	19,51	144,9	2,66	2,11
Linear effects	P=0,001	N.S.	P=0,001			
Quadratic effects	P=0,01	N.S.	P=0,01			
L.S.D. P=0,05	13,5	N.S.	2,25			
P=0.01	22,4	N.S.	3,72			
S.E. main plots	11,9	0,55	1,98			
S.E. mean	3,4	0,16	0,57			
C.V.%	9,9	4,25	12,70			
Top dressing nitrogen						
0 kg/ha N	117,6	13,20	15,48	124,6	2,37	2,06
30 "	118,8	13,27	15,80	125,2	2,35	2,05
60 "	123,5	12,67	15,51	126,3	2,29	2,04
90 "	122,2	12,73	15,62	125,4	2,32	2,09
Linear effects	N.S.	P=001	N.S.			
L.S.D. P=0,05	6,9	0,46	0,88			
P=0,01	9,4	0,62	1,21			
S.E. sub-plot ±	6,9	0,46	0,89			
S.E. Means ±	2,3	0,15	0,30			
C.V.%	5,8	3,54	5,72			
Significant interactions	M"S'**	N.S.	M"S"**			
Trial mean	120,5	12,97	15,60			

6400/20(a) NITROGEN TOPDRESSING TRIAL, EIGHT MONTHS AFTER PLANTING

CANE YIELDS (t/ha) INTERACTION TABLE 1

Initial levels of nitrogen	Nitrogen levels at topdressing kg/ha N				Means
	0	30	60	90	
0 kg/ha N	66,9	70,3	74,3	80,6	73,0
90 "	125,6	134,2	139,3	130,0	135,5
180 "	146,3	151,8	156,8	157,1	153,0
Means	117,6	118,8	123,5	122,2	122,2

TERC/ha - INTERACTION TABLE 2

Initial levels of nitrogen	Nitrogen levels at topdressing kg/ha N				Means
	0	30	60	90	
0 kg/ha N	8,89	9,14	9,68	9,94	9,42
90 "	18,69	18,41	17,50	16,94	17,89
180 "	18,86	19,85	19,35	19,98	19,51
Means	15,48	15,80	15,51	15,62	15,60

SOUTH AFRICAN SUGAR INDUSTRY

AGRONOMISTS' ASSOCIATION

6400/20 (a) NITROGEN TOPDRESSING TRIAL EIGHT MONTHS AFTER PLANTING

Catalogue: 1182

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

This crop: 1st ratoon Age: 12 months (23:7:79 to 21:7:80)

Location: ZSA Experiment Station, Impala Block A2-4.

Soil Types: PE.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 1,5m rows.

Fertiliser: Levels of nitrogen. See treatments - source ammonium nitrate. 60 kg P_2O_5 ha^{-1} - source singel superphosphate

Rainfall: 778mm

Irrigation: 842mm

Treatments: Nitrogen levels (applied one month after planting) main plots.

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

Nitrogen topdressed eight 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 response to initial levels of nitrogen which was associated with greater stalk densities and stalk lengths. Topdressing plants with nitrogen eight months after ratooning i.e. in March produced a highly significant linear cane yield response and a significant M'S' interaction. However the interaction only showed a cane yield response from topdressing when no nitrogen and 90 kg N ha^{-1} were initially applied.
These responses were associated with greater stalk lengths.

(b) ERC% cane. Increasing initial levels of nitrogen showed a significant (P=0,05) decline in ERC% cane whilst topdressing nitrogen had no significant effect. However, the significant M'S' interaction showed topdressing

2./ nitrogen...

nitrogen had no effect when the initial nitrogen applications were no nitrogen and 90 kg N ha^{-1}, and depressed quality when the initial application was 180 kg N ha^{-1}.

(c) TERC ha^{-1}. Largely due to the effects of nitrogen on cane yields, there was a highly significant (P=0,001) increase in sugar yields from increasing levels of initial dressings of nitrogen and a smaller response (P=0,05) to topdressing nitrogen. Similarly the significant (P=0,01) M'S' interaction showed an increase in sugar yields from topdressing initial applications of no added nitrogen and 90 kg N ha^{-1} and no response to topdressing 180 kg N ha^{-1}.

(d) Stalk counts, stalk lengths and diameters. Increasing initial levels of nitrogen markedly increased stalk densities and lengths whilst increasing levels of nitrogen topdressings increased stalk lengths and had no effect on stalk densities.

PROGRESS REPORT

Planted: 26th July, 1978.

Harvested:

Harvested	Age
P 23:7:79	12 months
1R 21:7:80	12 months

RESULTS

Relevant data are summarised in the attached tables.

(e) Cane yields. Responses to both initial and topdressing levels of nitrogen were generally similar in both the plant and 1st ratoon. i.e. There were highly significant linear responses to increasing initial levels of nitrogen. There was a highly significant linear response to increasing levels of nitrogen topdressing in the 1st ratoon. In both crops there were M x S interactions i.e. in the plant crop when no initial nitrogen was applied, topdressing nitrogen increased cane yields whilst in the 1st ratoon topdressing nitrogen increased cane yields in treatments which received no initial nitrogen and 90 kg N ha^{-1}.

(f) ERC% cane. Responses to treatments varied between the plant and 1st ratoon i.e. increasing levels of initial nitrogen in the 1st ratoon showed a linear decline in juice quality and had no effect in the plant crop. Increasing levels of nitrogen topdressings showed a significant linear decline in juice quality in the plant crop only. However, there was a significant M'S' interaction in the 1st ratoon

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which was associated with a linear decline in juice quality from increasing levels of nitrogen topdressing on plots which had received 180 kg N ha^{-1}.

(g) TERC ha^{-1}. Responses were largely due to treatment effects on cane yields which was accountable for the high significant linear estimated sugar yield responses to increasing initial levels of nitrogen and the smaller response (P=0,05) to increasing levels of nitrogen topdressings in the 1st ratoon. In the significant M x S interactions both crops showed a linear increase in estimated sugar yields when plots receiving no initial nitrogen were topdressed, an anomolous decline in estimated sugar yield was observed when plots receiving 90 kg N ha^{-1} were topdressed in the plant crop, and topdressing had no effect on estimated sugar yields when 180 kg N ha^{-1} was initially applied.

(h) Stalk counts, stalk lengths and diameters. The large differences in cane and estimated sugar yields after initial nitrogen applications were accountable to differences in stalk densities and stalk lengths. Topdressing nitrogen only increased stalk lengths especially when no nitrogen was applied to the initial application. Topdressings had no effect when 180 kg N ha^{-1} was applied and neither initial or topdressing nitrogen had an effect on stalk diameters.

CONCLUSIONS

The data clearly shows that the best results were obtained from applying all the plants nitrogen requirements i.e. 180 kg N ha^{-1} before stalk densities became static, since stalk densities were highly correlated with cane yields. When sub-optimum levels of nitrogen were applied initially i.e. no added nitrogen and 90 kg N ha^{-1} and plants topdressed eight months after planting or ratooning, cane and sugar yields were increased by increasing stalk lengths. However, these greater stalk lengths were nevertheless less than those obtained when 180 kg N ha^{-1} was applied in the initial application.

JH/Aug.'80.
rw.

6400/20 (a) NITROGEN TOPDRESSING TRIAL, EIGHT 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 diam (cm)
Initial nitrogen						
0 kg N ha^{-1}	61,0	14,56	8,88	103,4	1,81	2,1
90 kg N ha^{-1}	124,5	14,42	17,94	131,1	2,46	2,2
180 kg N ha^{-1}	157,0	14,00	21,98	144,5	2,86	2,2
Linear effects	P=0,001	P=0,05	P=0,001	-	-	-
Quadratic effects	P=0,01	N.S.	P=0,001	-	-	-
L.S.D. P=0,05	8,1	0,42	1,55	-	-	-
P=0,01	13,4	0,69	2,56	-	-	-
S.E. main plots ±	7,2	0,37	1,36	-	-	-
S.E. means ±	2,1	0,11	0,39	-	-	-
C.V. %	6,3	2,57	8,38	-	-	-
Topdressing nitrogen						
0 kg N ha^{-1}	110,2	14,45	15,89	126,2	2,28	2,2
30 kg N ha^{-1}	107,9	14,41	15,50	125,4	2,29	2,2
60 kg N ha^{-1}	118,3	14,09	16,56	126,2	2,44	2,2
90 kg N ha^{-1}	120,2	14,37	17,12	127,5	2,51	2,2
Linear effects	P=0,001	N.S.	P=0,05	-	-	-
L.S.D. P=0,05	7,8	0,30	1,19	-	-	-
P=0,01	10,7	0,42	1,63	-	-	-
S.E. subplots ±	7,9	0,31	1,20	-	-	-
S.E. means ±	2,6	0,10	0,40	-	-	-
C.V. %	6,9	2,14	7,40	-	-	-
Significant interactions	M'S'*	M'S'*	M'S'**	-	-	-
Trial mean	114,1	14,33	16,27	126,3	2,38	2,2

6400/20 (a) NITROGEN TOPDRESSING TRIAL, EIGHT MONTHS AFTER PLANTING - 1ST RATOON DATA.

Interaction tables.

Table 2a Cane yields

Initial levels of nitrogen	N levels at topdressing kg ha^{-1}				Means
	0	30	60	90	
0 kg N ha^{-1}	52,8	56,2	61,9	73,0	61,0
90 kg N ha^{-1}	118,3	114,8	136,1	128,8	124,5
180 kg N ha^{-1}	159,5	152,7	156,9	158,7	157,0
Means	110,2	107,9	118,3	120,2	114,1

Table 2b ERC% cane

Initial levels of nitrogen	N levels at topdressing kg ha^{-1}				Means
	0	30	60	90	
0 kg N ha^{-1}	14,53	14,45	14,48	14,79	14,56
90 kg N ha^{-1}	14,50	14,67	13,97	14,55	14,42
180 kg N ha^{-1}	14,32	14,11	13,81	13,77	14,00
Means	14,45	14,41	14,09	14,37	14,33

Table 2c TERC ha^{-1}

Initial levels of nitrogen	N levels at topdressing kg ha^{-1}				Means
	0	30	60	90	
0 kg N ha^{-1}	7,68	8,11	8,96	10,78	8,88
90 kg N ha^{-1}	17,15	16,85	19,01	18,74	17,94
180 kg N ha^{-1}	22,84	21,54	21,70	21,84	21,98
Means	15,89	15,50	16,56	17,12	16,27

6400/20 (a) NITROGEN TOPDRESSING TRIAL, EIGHT MONTHS AFTER PLANTING - PLANT AND 1ST RATOON DATA

Table 3.

Treatments	Cane t ha^{-1}		TERC % cane		TERC 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}	73,0	61,0	12,92	14,56	9,42	8,88	101,8	103,4	1,85	1,81	2,0	2,1
90 "	135,5	124,5	13,23	14,42	17,89	17,94	129,5	131,1	2,49	2,46	2,0	2,2
180 "	153,0	157,0	12,76	14,00	19,51	21,98	144,9	144,5	2,66	2,86	2,1	2,2
Linear effects	P=0,001	P=0,001	N.S.	0,05	P=0,001	P=0,001	-	-	-	-	-	-
Quadratic effects	P=0,01	P=0,01	N.S.	N.S.	P=0,01	P=0,01	-	-	-	-	-	-
L.S.D. P=0,05	13,5	8,1	N.S.	0,42	2,25	1,55	-	-	-	-	-	-
P=0,01	22,4	13,4	N.S.	N.S.	3,72	2,56	-	-	-	-	-	-
S.E. main plots	11,9	7,2	0,55	0,37	1,98	1,36	-	-	-	-	-	-
S.E. mean	3,4	2,1	0,16	0,11	0,57	0,39	-	-	-	-	-	-
C.V.%	9,9	6,3	4,25	2,57	12,70	8,38	-	-	-	-	-	-
Topdressing nitrogen												
0 kg N ha^{-1}	117,6	110,2	13,20	14,45	15,48	15,89	124,6	126,2	2,37	2,28	2,1	2,2
30 "	118,8	107,9	13,27	14,41	15,80	15,50	125,2	125,4	2,35	2,29	2,0	2,2
60 "	123,5	118,3	12,67	14,09	15,51	16,56	126,3	126,2	2,29	2,44	2,0	2,2
90 "	122,2	120,2	12,73	14,37	15,62	17,12	125,4	127,5	2,32	2,51	2,1	2,2
Linear effects	N.S.	P=0,001	P=0,01	N.S.	N.S.	P=0,05	-	-	-	-	-	-
L.S.D. P=0,05	N.S.	7,8	0,46	N.S.	N.S.	1,19	-	-	-	-	-	-
P=0,01	N.S.	10,7	0,62	N.S.	N.S.	N.S.	-	-	-	-	-	-
S.E. subplots ±	6,9	7,9	0,46	0,31	0,89	1,20	-	-	-	-	-	-
S.E. means ±	2,3	2,6	0,15	0,10	0,30	0,40	-	-	-	-	-	-
C.V.%	5,8	6,9	3,54	2,14	5,72	7,40	-	-	-	-	-	-
Significant interactions	M"S'**	M'S'*	N.S.	M'S'*	M*S'**	M'S'**	-	-	--	-	-	-
Trial mean	120,5	114,1	12,97	14,33	15,60	16,27	125,4	126,3	2,33	2,38	2,0	2,2

6400/20 (a) NITROGEN TOPDRESSING TRIAL, EIGHT MONTHS AFTER PLANTING - INTERACTION TABLES

Table 4a Cane yields, plant crop.

Initial levels of nitrogen	N levels at topdressing kg ha^{-1}				Means
	0	30	60	90	
0 kg N ha^{-1}	66,9	70,3	74,3	80,6	73,0
90 "	125,6	134,2	139,3	130,0	135,5
180 "	146,3	151,8	156,8	157,1	153,0
Means	117,6	118,8	123,5	122,2	122,2

Table 4b Cane yields, 1st ratoon.

Initial levels of nitrogen	N levels at topdressing kg ha^{-1}				Means
	0	30	60	90	
0 kg N ha^{-1}	52,8	56,2	61,9	73,0	61,0
90 "	118,3	114,8	136,1	128,8	124,5
180 "	159,5	152,7	156,9	158,7	157,0
Means	110,2	107,9	118,3	120,2	114,1

Table 4c ERC% cane, 1st ratoon

Initial levels of nitrogen	N levels at topdressing kg ha^{-1}				Means
	0	30	60	90	
0 kg N ha^{-1}	14,53	14,45	14,48	14,79	14,56
90 "	14,50	14,67	13,97	14,55	14,42
180 "	14,32	14,11	13,81	13,77	14,00
Means	14,45	14,41	14,09	14,37	14,33

Table 4d TERC ha^{-1}, plant crop

Initial levels of nitrogen	N levels at topdressing kg ha^{-1}				Means
	0	30	60	90	
0 kg N ha^{-1}	8,89	9,14	9,68	9,94	9,42
90 "	18,69	18,41	17,50	16,94	17,89
180 "	18,86	19,85	19,35	19,98	19,51
Means	15,48	15,80	15,51	15,62	15,60

Table 4e

Initial levels of nitrogen	N levels at topdressing kg ha^{-1}				Means
	0	30	60	90	
0 kg N ha^{-1}	7,68	8,11	8,96	10,78	8,88
90 "	17,15	16,85	19,01	18,74	17,94
180 "	22,84	21,54	21,70	21,84	21,98
Means	15,89	15,50	16,56	17,12	16,27

SOUTH AFRICAN SUGAR INDUSTRY
AGRONOMISTS' ASSOCIATION

Title: NITROGEN TOPDRESSING TRIAL EIGHT MONTHS AFTER PLANTING 6400/20(a)

Cat No.: 1182

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

This crop ; 2nd ratoon Age : 12,3 months (21.7.80 to 28.7.81)

Location : ZSA 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 nitrogen topdressed in March.

Varieties/spacing : NCo 376 in 1,5m rows

Fertilisers : Levels of nitrogen. See treatments - source ammonium nitrate. 60 kg P_2O_5/ha - source single superphosphate.

Rainfall : 870,3mm Irrigation : 1 020,0mm

Treatments : Nitrogen levels (applied one month after planting)- main plots.

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

Nitrogen topdressed eight months after planting in March - sub-plots.

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 highly significant quadratic response to greater initial levels of nitrogen. This was largely because of greater stalk populations and stalk lengths. Topdressing nitrogen produced no significant effects.

(b) ERC% cane. There was a significant (P=0,05) quadratic quality response to initial levels of nitrogen whilst topdressing nitrogen had no effect on quality.

(c) TERC/ha. There was a highly significant quadratic increase in TERC/ha from greater levels of initial nitrogen. Topdressing nitrogen had no significant effects.

(d) TF % cane and TF t/ha. In all cases TF % cane and TF t/ha closely paralleld responses to ERC% cane and TERC/ha.

2./ (e) Stalk...

(e) Stalk counts, stalk lengths and diameters. Greater levels of initial nitrogen applications markedly increased stalk populations and stalk lengths at harvest, whereas topdressing nitrogen had no effect on stalk populations but marginally increased stalk lengths at harvest.

CONCLUSIONS

This data shows that it is important to apply the plants' estimated total requirements in a single initial application so that the maximum stalk population can be obtained. Although there were no significant responses to nitrogen topdressings it does appear that there were some benefits.

PROGRESS REPORT

Planted : 26th July, 1978

Harvested :	Harvested :	Age :
P	23.7.79	12 months
1R	21.7.80	12 months
2R	28.7.81	12,3 months

Fertiliser : Nitrogen - see treatments - source ammonium nitrate
Phosphate - 60 kg P_2O_5/ha - source single super phosphate.

RESULTS Relevant data are summarised in tables 2 - 4.

(f) Cane yields. There were highly significant quadratic responses to increasing initial levels of nitrogen in all crops. Cane yield responses after topdressing were only significant in the 1st ratoon. The significant interactions between initial and topdressing nitrogen in the plant and 1st ratoons have shown that the greatest response to topdressing nitrogen occurred when no nitrogen was applied initially. There were no interactions in the 2nd ratoon.

(g) ERC% cane. The effects of initial and topdressing nitrogen on quality were variable. Applying an initial level of 90 kg N/ha produced slightly better quality than the control and 180 kg N/ha, whereas topdressing nitrogen linearly depressed quality in the plant crop but had no effect on the ratoons.

(h) TERC/ha. There was a highly significant (P=0,001) quadratic response to greater initial levels of nitrogen in all crops. Response to nitrogen topdressings were only significant (P=0,05) in the first ratoon. However, the significant interactions between initial nitrogen and topdressing nitrogen has shown that the greatest response to topdressing occurred when no nitrogen was applied initially.

(i) Stalk counts, stalk lengths and diameters. Increasing initial levels of nitrogen increased stalk populations and stalk lengths whereas topdressing nitrogen had no effect on stalk populations but increased stalk lengths in both the ratoon crops. Stalk diameters were independent of nitrogen.

3./ CONCLUSIONS..

CONCLUSIONS

The results show that the best results were obtained by applying the plants' total nitrogen requirements in a single application. These benefits were largely because of greater stalk populations at harvest. Applying less than the plants maximum nitrogen requirements produced fewer stalks. Although topdressing nitrogen had no effect on final stalk populations it did increase stalk lengths, when initial nitrogen was insufficient.

RJH/Oct. '81.
rw.

6400/20(a) NITROGEN TOPDRESSING TRIAL, EIGHT MONTHS AFTER RATOONING - 2ND RATOON

Table 1

Treatments	Cane t/ha	ERC % cane	TERC per ha	T.F. % cane	T.F. t/ha	Stalk counts x 10-3	Stalks length (m)	Stalk diam (cm)
Initial nitrogen								
0 kg N/ha	57,9	13,27	7,68	14,98	8,67	106,4	1,82	2,0
90 "	112,7	14,21	16,02	15,88	17,90	130,3	2,46	2,0
180 "	139,3	13,75	19,16	15,43	21,50	141,2	2,82	2,0
Linear effects	P=0,001	N.S.	P=0,001	-	-	-	-	-
Quadratic effects	P=0,001	P=0,05	P=0,001	-	-	-	-	-
L.S.D. P=0,05	3,3	0,62	0,32	-	-	-	-	-
P=0,01	5,4	1,03	0,53	-	-	-	-	-
S.E. main plots ±	2,9	0,55	0,28	-	-	-	-	-
S.E. means ±	0,8	0,16	0,82	-	-	-	-	-
C.V.%	2,8	4,00	1,96	-	-	-	-	-
Topdressing nitrogen								
0 kg N/ha	99,9	13,76	13,83	15,43	15,49	127,6	2,28	2.0
30 "	100,6	13,86	14,01	15,55	15,72	124,2	2,34	2,0
60 "	105,6	13,74	14,64	15,41	16,38	126,7	2,39	2,0
90 "	107,1	13,64	14,64	15,34	16,50	125,3	2,45	2,1
S.E. sub-plots ±	8,6	0,26	1,27	-	-	-	-	-
S.E. means ±	2,9	0,09	0,42	-	-	-	-	-
C.V.%	8,3	1,89	8,39	-	-	-	-	-
Significant interactions	N.S.	N.S.	N.S.	-	-	-	-	-
Trial means	103,3	13,75	14,28	15,43	16,02	12,60	2,36	2,0

6400/20(a) NITROGEN TOPDRESSING TRIAL, EIGHT MONTHS AFTER RATOONING, PLANT - 2ND RATOON DATA

Table 2.

Treatments	Cane t/ha			Mean	ERC % cane			Mean	TERC/ha			Mean
	P	1R	2R	1 - 2R	P	1R	2R	1 - 2R	P	1R	2R	1 - 2R
Initial nitrogen												
0 kg N/ha	73,0	61,0	57,9	59,4	12,92	14,56	13,27	13,92	9,42	8,88	7,68	8,28
90 "	135,5	124,5	112,7	118,6	13,23	14,42	14,21	14,32	17,89	17,94	16,02	16,98
180 "	153,0	157,0	139,3	148,2	12,76	14,00	13,75	13,88	19,51	21,98	19,16	20,57
Linear effects	P=0,001	P=0,001	P=0,001	-	N.S.	P=0,05	N.S.	-	P=0,001	P=0,001	P=0,001	-
Quadratic effects	P=0,01	P=0,01	P=0,001	-	N.S.	N.S.	P=0,05	-	P=0,01	P=0,01	P=0,001	-
L.S.D. P=0,05	13,5	8,1	3,3	-	N.S.	0,42	0,62	-	2,25	1,55	0,32	-
P=0,01	22,4	13,4	5,4	-	N.S.	N.S.	N.S.	-	3,72	2,56	0,53	-
S.E. main plots ±	11,9	7,2	2,9	-	0,55	0,37	0,55	-	1,98	1,36	0,28	-
S.E. means ±	3,4	2,1	0,8	-	0,16	0,11	0,16	-	0,57	0,39	0,82	-
C.V.%	9,9	6,3	2,8	-	4,25	2,57	4,00	-	12,70	8,38	1,96	-
Topdressing nitrogen												
0 kg N/ha	117,6	110,2	99,9	105,0	13,20	14,45	13,76	14,10	15,48	15,89	13,83	14,86
30 "	118,8	107,9	100,6	104,2	13,27	14,41	13,86	14,14	15,80	15,50	14,01	14,76
60 "	123,5	118,3	105,6	112,0	12,67	14,09	13,74	13,92	15,51	16,56	14,64	15,60
90 "	122,2	120,2	107,1	113,6	12,73	14,37	13,64	14,00	15,62	17,12	14,64	15,88
Linear effects	N.S.	P=0,001	N.S.	-	P=0,01	N.S.	N.S.	-	N.S.	P=0,05	N.S.	-
L.S.D. P=0,05	N.S.	7,8	N.S.	-	0,46	N.S.	N.S.	-	N.S.	1,19	N.S.	-
P=0,01	N.S.	10,7	N.S.	-	0,62	N.S.	N.S.	-	N.S.	N.S.	N.S.	-
S.E. sub plots ±	6,3	7,9	8,6	-	0,46	0,31	0,26	-	0,89	1,20	1,27	-
S.E. means ±	2,3	2,6	2,9	-	0,15	0,10	0,09	-	0,30	0,40	0,42	-
C.V.%	5,8	6,9	8,3	-	3,54	2,14	1,89	-	5,72	7,40	8,89	-
Significant interactions	M'S'**	M'S'*	N.S.	-	N.S.	M'S'*	N.S.	-	M'S'*	M'S'**	N.S.	-
Trial mean	120,5	114,1	103,3	108,7	12,97	14,33	13,75	-	15,60	16,27	14,28	-

6400/20(a) NITROGEN TOPDRESSING TRIAL EIGHT MONTHS AFTER RATOONING, PLANT - 2ND RATOON DATA

Table 3

Treatments	Stalk counts x 10-3			Mean	Stalk lengths (m)			Mean	Stalk diameters (cm)			Mean
	P	1R	2R	1 + 2R	P	1R	2R	1 + 2R	P	1R	2R	1 + 2R
Initial nitrogen												
0 kg N/ha	101,8	103,4	106,4	104,9	1,85	1,81	1,82	1,82	2,0	2,1	2,0	2,0
90 "	129,5	131,1	130,3	130,7	2,49	2,46	2,46	2,46	2,0	2,2	2,0	2,1
180 "	144,9	144,5	141,2	142,8	2,66	2,86	2,82	2,84	2,1	2,2	2,0	2,1
Topdressing nitrogen												
0 kg N/ha	124,6	126,2	127,6	126,9	2,37	2,28	2,28	2,28	2,1	2,2	2,0	2,1
30 "	125,2	125,4	124,2	124,8	2,35	2,29	2,34	2,32	2,0	2,2	2,0	2,1
60 "	126,3	126,2	126,7	126,4	2,29	2,44	2,39	2,42	2,0	2,2	2,0	2,1
90 "	125,4	127,5	125,3	126,4	2,32	2,51	2,45	2,48	2,1	2,2	2,1	2,2
Trial means	125,4	126,3	126,0	126,2	2,33	2,38	2,36	2,37	2,0	2,2	2,0	2,1

6400/20(a) NITROGEN TOPDRESSING TRIAL EIGHT MONTHS AFTER PLANTING - INTERACTION TABLES

Table 4a Cane yields plant crop

Initial levels of nitrogen	Nitrogen levels at topdressing (kg/ha)				
	0	30	60	90	Means
0 kg N/ha	66,9	70,3	74,3	80,6	73,0
90 "	125,6	134,2	139,3	130,0	135,5
180 "	146,3	151,8	156,8	157,1	153,0
Means	117,6	118,8	123,5	122,2	122,0

Table 4b Cane yields, 1st ratoon

Initial levels of nitrogen	Nitrogen levels at topdressing (kg/ha)				
	0	30	60	90	Means
0 kg N/ha	52,8	56,2	61,9	73,0	61,0
90 "	118,3	114,8	136,1	128,8	124,5
180 "	159,5	152,7	156,9	158,7	157,0
Means	110,2	107,9	118,3	120,2	114,1

Table 4c ERC% cane, 1st ratoon

Initial levels of nitrogen	Nitrogen levels at topdressing (kg/ha)				
	0	30	60	90	Means
0 kg N/ha	14,53	14,45	14,48	14,79	14,56
90 "	14,50	14,67	13,97	14,55	14,42
180 "	14,32	14,11	13,81	13,77	14,00
Means	14,45	14,41	14,09	14,37	14,33

Table 4d TERC/ha, plant crop

Initial levels of nitrogen	Nitrogen levels at topdressing (kg/ha				
	0	30	60	90	Means
0 kg N/ha	8,89	9,14	9,68	9,94	9,42
90 "	18,69	18,41	17,50	16,94	17,89
180 "	18,86	19,85	19,35	19,98	19,51
Means	15,48	15,80	15,51	15,62	15,60

Table 4e TERC/ha, 1st ratoon

Initial levels of nitrogen	Nitrogen levels at topdressing (kg/ha)				
	0	30	60	90	Means
0 kg N/ha	7,68	8,11	8,96	10,78	8,88
90 "	17,15	16,85	19,01	18,74	17,94
180 "	22,84	21,54	21,70	21,84	21,98
Means	15,89	15,50	15,56	17,12	16,27

SOUTH AFRICAN SUGAR INDUSTRY

AGRONOMISTS' ASSOCIATION

Cat. No.: 1182

6400/20 (a) NITROGEN TOPDRESSING TRIAL EIGHT MONTHS AFTER PLANTING

OBJECT: To determine the effects of nitrogen topdressings on eight month old sugarcane in March, i.e. after the termination of the main rains.

THIS CROP: 3rd ratoon **Age:** 12,0 months (28.7.81-27.7.82)

LOCATION: ZSA Experiment Station, Impala Block A2-A4.

SOIL TYPE: P.E.1 sandy clay loam derived from gneiss.

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

VARIETY/ SPACING: NCo 376 in 1,5m rows

FERTILIZERS: Levels of nitrogen. See treatments - source ammonium nitrate.
Levels of phosphate. 60 kg P_2O_5/ha - source single superphosphate.

RAINFALL: 448mm

IRRIGATION: 1 027mm

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 eight months after ratooning in March - subplots

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

2/..Results...

RESULTS

Relevant data are summarised in tables 1 and 2

(a) Cane yields: There was a highly significant linear response to initial applications and topdressings of nitrogen. The significant interaction showed that in the absence of initial nitrogen there was a curvilinear response to nitrogen topdressings; when 90 kg N/ha was applied initially there was a response to nitrogen topdressings up to 60 kg N/ha; and there was no response to nitrogen topdressings after 180 kg N/ha had been applied.

(b) ERC % cane: There were no significant responses to either initial or topdressings of nitrogen.

(c) TERC/ha: Cane yield responses largely accounted for the similar and significant TERC/ha responses and interaction to initial and topdressings of nitrogen. This was because nitrogen had little effect on quality.

(d) Stalk counts, stalk lengths and diameters: Greater cane yields from greater initial levels of nitrogen were associated with greater stalk populations and stalk lengths, whereas responses to nitrogen topdressings were associated with greater stalk lengths. Nitrogen treatments had no effect on stalk diameters.

PROGRESS REPORT

PLANTED: 26th July, 1978

HARVESTED:		Harvested	Age
	P	23.7.79	12,0 months
	1R	21.7.80	12,0 months
	2R	28.7.81	12,3 months
	3R	27.7.82	12.0 months

FERTILISER:		Kg/ha	Source
	Nitrogen	See treatments	Ammonium nitrate
	Phosphate	60 kg P_2O_5/ha	Single superphosphate

RESULTS

Relevant data are summarised in tables 3-7.

(a) Cane yields: In all crops there was a highly significant linear response to greater initial levels of nitrogen. Although there was a trend to greater cane yields from topdressings in all crops, differences were only significant in the first and third ratoons.

3/The....

The significant initial x topdressing nitrogen interactions in all crops except the 2nd ratoon showed that when no nitrogen was applied there was an increase in cane yields with greater nitrogen topdressings. When 90 kg N/ha was initially applied, topdressing nitrogen increased cane yields up to 60 kg N/ha, but topdressings had no effect on cane yields when 180 kg N/ha was initially applied.

(b) ERC % cane: Although there ware significant quality differences due to treatments, mean results from ratoons suggest that slightly better quality was obtained from an initial application of 90 kg N/ha and there was a marginal decline in quality with greater levels of nitrogen topdressings. The only significant interaction between initial nitrogen levels and nitrogen topdressings occurred in the 1st ratoon. This interaction showed that topdressing after an initial application of 180 kg N/ha depressed cane quality, whereas topdressing after initial applications of 0 and 90 kg N/ha had no effect on quality.

(c) TERC/ha: TERC/ha differences between treatments closely followed cane yield differences since quality differences were small and seldom significant i.e. TERC/ha increased with greater initial and topdressings of nitrogen. The interaction tables showed that there was no response to late topdressings of nitrogen when 180 kg N/ha had been applied initially whereas at sub-optimal initial nitrogen levels there was a TERC/ha response to nitrogen topdressings.

(d) Stalk counts, stalk lengths and diameters: These results showed that greater cane yields from greater initial levels of nitrogen were associated with greater stalk populations and stalk lengths, whereas late nitrogen topdressings had no effect on stalk populations but increased stalk lengths. There was no association in the experiment between nitrogen levels and stalk diameters.

CONCLUSIONS

These results clearly showed that when plants are nitrogen starved by 8 months after planting or ratooning they responded to late nitrogen topdressings. It was also clear that once plants had become nitrogen-starved there was a marked loss in cane yields and TERC/ha which was not compensated by nitrogen topdressings of up to 90 kg/ha.

Although a consistent cane yield and TERC/ha response pattern from initial and topdressings of nitrogen has emerged, it has been observed elsewhere that older ratoons can benefit from greater nitrogen applications. Hence it is important to test this observation for at least another ratoon.

RJH/Sept.'82
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6400/20 a NITROGEN TOPDRESSING TRIAL, EIGHT MONTHS AFTER RATOONING - 3rd RATOON

Table 1.

Treatments	Cane t/ha	ERC % Cane	TERC/ha	Stalk Counts x 10^{-3}	Stalk lengths(m)	Stalk diam(cm)
Initial nitrogen						
0 kg N/ha	52,5	13,68	7,16	127,3	1,48	2,0
90 kg N/ha	102,2	13,91	14,20	141,5	,02	2,1
180 kg N/ha	127,3	13,69	17,42	151,6	2,27	2,1
Linear effects	P=0,001	N.S.	P=0,01	-		-
Quadralic effects	P=0,05	N.S.	P=0,05	-		-
L.S.D. P=0,05	10,0	N.S.	2,01	-		-
P=0,01	16,6	N.S.	3,34	-		-
S.E. main plots ±	8,8	0,70	1,78	-		-
S.E. means ±	2,5	0,20	0,51	-		-
C.V. %		5,11	13,74	-		-
Topdressing nitrogen						
0 kg N/ha	87,6	13,94	12,16	139,1	1,82	2,0
30 kg N/ha	88,5	13,77	12,22	139,3	1,85	2,1
60 kg N/ha	98,9	13,91	13,74	140,2	1,89	2,0
90 kg N/ha	101,0	13,42	13,60	141,9	2,15	2,0
Linear effects	P=0,001	N.S.	P=0,001	-	-	-
Quadratic effect	N.S.	N.S.	N.S.	-	-	-
Cubic effects	N.S.	N.S.	P=0,05	-	-	-
L.S.D. P=0,05	7,6	N.S.	0,94	-	-	-
L.S.D. P=0,01	10,4	N.S.	1,29	-	-	-
S.E. sub plots ±	7,7	0,35	0,95	-	-	-
S.E. means ±	2,6	2,53	0,32	-	-	-
C.V. %	8,2	0,12	7,37	-	-	-
Significant interactions	M'S'*M"S"*	N.S.	M'S'*M"S"*			
Trial mean	94,0	13,76	12,93	140,1	1,93	2,0

6400/20 (a) NITROGEN TOPDRESSING TRIAL EIGHT MONTHS AFTER PLANTING

INTERACTION TABLES - 3rd RATOON

Table 2a - Cane yields t/ha

Initial levels of nitrogen	Nitrogen levels at topdressing(kg/ha) 0	30	60	90	Means
0 kg N/ha	43,4	45,5	53,7	67,3	52,5
90 kg N/ha	91,2	98,4	114,2	105,1	102,2
180 kg N/ha	128,1	121,5	128,9	130,6	127,3
Means	87,6	88,5	98,9	101,0	94,0

Table 2b - TERC/ha

Initial levels of nitrogen	Nitrogen levels at topdressing(kg/ha) 0	30	60	90	Mean
0 kg N/ha	6,06	6,19	7,49	8,93	7,16
90 kg N/ha	12,88	13,62	16,14	14,17	14,20
180 kg N/ha	17,54	16,86	17,59	17,69	17,42
Means	12,16	12,22	13,74	13,60	12,93

6400/20 (a) NITROGEN TOPDRESSING TRIAL EIGHT MONTHS AFTER PLANTING/RATOONING

PLANT - 3rd RATOON

Table 3a

Treatments	Cane t/ha				Mean
	P	1R	2R	3R	1R-3R
Initial nitrogen					
0 kg N/ha	73,0	61,0	57,9	52,5	57,1
90 kg N/ha	135,5	124,5	112,7	102,2	113,1
180 kg N/ha	153,0	157,0	139,3	127,3	141,2
Linear effects	P=0,001	P=0,001	P=0,001	P=0,001	---
Quadratic effects	P=0,01	P=0,01	P=0,001	P=0,05	---
L.S.D. P=0,05	13,5	8,1	3,3	10,0	---
P=0,01	22,4	13,4	5,4	16,6	---
S.E. main plots ±	11,9	7,2	2,9	8,8	---
S.E. Means ±	3,4	2,1	0,8	2,5	---
C.V. %	9,9	6,3	2,8	9,4	---
Topdressing nitrogen					
0 kg N/ha	117,6	110,2	99,9	87,6	99,2
30 kg N/ha	118,8	107,9	100,6	88,5	99,0
60 kg N/ha	123,5	118,3	105,6	98,9	107,6
90 kg N/ha	122,2	120,2	107,1	101,0	109,4
Linear effects	N.S.	P=0,001	N.S.	P=0,001	---
Quadratic effects	N.S.	N.S.	N.S.	N.S.	---
Cubic effects	N.S.	N.S.	N.S.	N.S.	---
L.S.D. P=0,05	N.S.	7,8	N.S.	7,6	
P=0,01	N.S.	10,7	N.S.	10,4	---
S.E. sub plots ±	6,9	7,9	8,6	7,7	---
S.E. means ±	2,3	2,6	2,9	2,6	---
C.V.%	5,8	6,9	8,3	8,2	---
Significant interactions	M*S**	M*S**	N.S.	MS**MS**	---
Trial Mean	120,5	114,1	103,3	94,0	103,8

6400/20 (a) NITROGEN TOPDRESSING TRIAL EIGHT MONTHS AFTER PLANTING/RATOONING

PLANT - 3rd RATOON

Table 3b.

Treatments	ERC % cane				Mean
	P	1R	2R	3R	1R-3R
Initial nitrogen					
0 kg N/ha	12,92	14,56	13,27	13,68	13,84
90 kg N/ha	13,23	14,42	14,21	13,91	14,18
180 kg N/ha	12,76	14,00	13,75	13,69	13,81
Linear effects	N.S.	P=0,05	N.S.	N.S.	-
Quadratic effects	N.S.	N.S.	P=0,05	N.S.	-
L.S.D. P=0,05	N.S.	0,42	0,62	N.S.	-
P=0,01	N.S.	N.S.	N.S.	N.S.	-
S.E. main plots ±	0,55	0,37	0,55	0,70	-
S.E. means ±	0,16	0,11	0,16	0,20	-
C.V. %	4,25	2,57	4,00	5,11	-
Topdressing nitrogen					
0 kg N/ha	13,20	14,45	13,76	13,94	14,05
30 kg N/ha	13,27	14,41	13,86	13,77	14,01
60 kg N/ha	12,67	14,09	13,74	13,91	13,91
90 kg N/ha	12,73	14,37	13,64	13,42	13,81
Linear effects	P=0,01	N.S.	N.S.	N.S.	-
Quadratic effects	N.S.	N.S.	N.S.	N.S.	-
Cubic effects	N.S.	N.S.	N.S.	N.S.	-
L.S.D. P=0,05	0,46	N.S.	N.S.	N.S.	-
P=0,01	0,62	N.S.	N.S.	N.S.	-
S.E. sub plots ±	0,46	0,31	0,26	0,35	-
S.E. Means	0,15	0,10	0,09	2,53	-
C.V. %	3,54	2,14	1,89	0,12	-
Significant interactions	N.S.	M*S**	N.S.	N.S.	
Trial Mean	12,97	14,33	13,75	13,76	13,94

6400/20 (a) NITROGEN TOPDRESSING TRIAL EIGHT MONTHS AFTER PLANTING/RATOONING - PLANT - 3rd RATOON

Table 4

Treatments	TERC/ha				Mean
	P	1R	2R	3R	1R-3R
Initial nitrogen					
0 kg N/ha	9,42	8,88	7,68	7,16	7,91
90 kg N/ha	17,89	17,94	16,02	14,20	16,05
180 kg N/ha	19,51	21,98	19,16	17,42	19,52
Linear effects	P=0,001	P=0,001	P=0,001	P=0,01	-
Quadratic effects	P=0,01	P=0,01	P=0,001	P=0,05	-
L.S.D. P= 0,05	2,25	1,55	0,32	2,01	—
P=0,01	3,72	2,56	0,53	3,34	—
S.E. main plots ±	1,98	1,36	0,28	1,78	—
S.E. means ±	0,57	0,39	0,82	0,51	—
C.V.%	12,70	8,38	1,96	13,74	—
Topdressing nitrogen					
0 kg N/ha	15,48	15,89	13,83	12,16	13,96
30 kg N/ha	15,80	15,50	14,01	12,22	13,91
60 kg N/ha	15,51	16,56	14,64	13,74	14,98
90 kg N/ha	15,62	17,12	14,64	13,60	15,12
Linear effects	N.S.	P=0,05	N.S.	P=0,001	—
Quadratic effects	N.S.	N.S.	N.S.	P=0,05	—
Cubic effects	N.S.	N.S.	N.S.	P=0,05	—
L.S.D. P=0,05	N.S.	1,19	N.S.	0,94	—
P=0,01	N.S.	N.S.	N.S.	1,29	—
S.E. subplots ±	0,89	1,20	1,27	0,95	—
S.E. means ±	0,30	0,40	0,42	0,32	—
C.V. %	5,72	7,40	8,89	7,37	—
Significant interactions	M"S"*	M'S'**	N.S.	M'S'*M"S"*	—
Trial mean	15,60	16,27	14,28	12,93	14,49

6400/20 a NITROGEN AND TOPDRESSING TRIAL EIGHT MONTHS AFTER RATOONING PLANT - 3rd RATOON DATA

Table 5.

Treatments	Stalk counts x 10^{-3}				Mean	Stalk lengths(m)				Mean
	P	IR	2R	3R	1-3R	P	IR	2R	3R	1-3R
Initial nitrogen										
0 kg N/ha	101,8	103,4	106,4	127,3	112,4	1,85	1,81	1,82	1,48	1,70
90 kg N/ha	129,5	131,1	130,3	141,5	134,3	2,49	2,46	2,46	2,02	2,31
180 kg N/ha	144,9	144,5	141,2	151,6	145,7	2,66	2,86	2,82	2,27	2,65
Topdressing nitrogen										
0 kg N/ha	124,6	126,2	127,6	139,1	131,0	2,37	2,28	2,28	1,82	2,13
30 kg N/ha	125,2	125,4	124,2	139,3	129,6	2,35	2,29	2,34	1,85	2,16
60 kg N/ha	126,3	126,2	126,7	140,2	131,1	2,29	2,44	2,39	1,89	2,24
90 kg N/ha	125,4	127,5	125,3	141,9	131,6	2,32	2,51	2,45	2,15	2,37
Trial Mean	125,4	126,3	126,0	140,1	130,8	2,33	2,38	2,36	1,93	2,22

Table 6

Treatments	Stalk diameters(cm)				Mean
	P	IR	2R	3R	1-3R
Initial nitrogen					
0 kg N/ha	2,0	2,1	2,0	2,0	2,0
90 kg N/ha	2,0	2,2	2,0	2,1	2,1
180 kg N/ha	2,1	2,2	2,0	2,1	2,1
Topdressing nitrogen					
0 kg N/ha	2,1	2,2	2,0	2,0	2,1
30 kg N/ha	2,0	2,2	2,0	2,1	2,1
60 kg N/ha	2,0	2,2	2,0	2,0	2,1
90 kg N/ha	2,1	2,2	2,1	2,0	2,1
Trial mean	2,0	2	2,0	2,0	2,1

6400/20 (a) NITROGEN TOPDRESSING TRIAL EIGHT MONTHS AFTER PLANTING - INTERACTION

Table 7a Cane yields plant crop

Initial levels of nitrogen	Nitrogen levels at topdressing (kg/ha)				Means
	0	30	60	90	
0 kg N/ha	66,9	70,3	74,3	80,6	73,0
90 kg N/ha	125,6	134,2	139,3	130,0	135,5
180 kg N/ha	146,3	151,8	156,8	157,1	153,0
Means	117,6	118,8	123,5	122,2	122,0

Table 7b Cane yields-1st Ratoon

Initial levels of nitrogen	Nitrogen levels at topdressing (kg/ha)				Means
	0	30	60	90	
0 kg N/ha	52,8	56,2	61,9	73,0	61,0
90 kg N/ha	118,3	114,8	136,1	128,8	124,5
180 kg N/ha	159,5	152,7	156,9	158,7	157,0
Means	110,2	107,9	118,3	120,2	114,1

Table 7c Cane yields - 3rd Ratoon

Initial levels of nitrogen	Nitrogen levels at topdressing (kg/ha)				Means
	0	30	60	90	
0 kg N/ha	43,4	45,5	53,7	67,3	52,5
90 kg N/ha	91,2	98,4	114,2	105,1	102,2
180 kg N/ha	128,0	121,5	128,9	130,6	127,3
Means	87,6	88,5	98,9	101,-	94,0

Table 7d ERC % cane - 1st Ratoon

Initial levels of nitrogen	Nitrogen levels at topdressing (kg/ha)				Means
	0	30	60	90	
0 kg N/ha	14,53	14,45	14,48	14,79	14,56
90 kg N/ha	14,50	14,67	13,97	14,55	14,42
180 kg N/ha	14,32	14,11	13,81	13,77	14,00
Means	14,45	14,41	14,09	14,37	14,33

6400/20 (a) NITROGEN TOPDRESSING TRIAL EIGHT MONTHS AFTER PLANTING -INTERACTION

Table 7e TERC/ha plant crop

Initial levels of nitrogen	Nitrogen levels at topdressing (kg/ha)				Means
	0	30	60	90	
0 kg N/ha	8,89	9,14	9,68	9,94	9,42
90 kg N/ha	18,69	18,41	17,50	16,94	17,89
180 kg N/ha	18,86	19,85	19,35	19,98	19,51
Means	15,48	15,80	15,51	15,62	15,60

Table 7f TERC/ha - 1st ratoon

Initial levels of nitrogen	Nitrogen levels at topdressing (kg/ha)				Means
	0	30	60	90	
0 kg N/ha	7,89	8,11	8,98	10,78	8,88
90 kg N/ha	17,15	16,85	19,01	18,74	17,94
180 kg N/ha	22,84	21,54	21,70	21,84	21,98
Means	15,89	15,50	15,56	17,12	16,27

Table 7g TERC/ha - 3rd Ratoon

Initial levels of nitrogen	Nitrogen levels at topdressing (kg/ha)				Means
	0	30	60	90	
0 kg N/ha	6,06	6,19	7,49	8,93	7,16
90 kg N/ha	12,88	13,62	16,14	14,17	14,20
180 kg N/ha	17,54	16,86	17,59	17,69	17,42
Means	12,16	12,22	13,74	13,60	12,93

9400/1 INTERPLANTING WITH BEANS

TERMINAL REPORT — CAT. NO. : 1531 and 1182

Object: To investigate the feasibility of interplanting with seed beans in cane cut early in the season (overhead irrigation).

Planted: 6th ratoon cane harvest (ex 6400/20a) : 3rd May, 1985.
Seedbeans planted : 10th May, 1985.

Terminated: Beans harvested : During 1st week of September, 1985.
Cane harvest (7th ratoon) : 9th May, 1986.

Location: ZSA Experiment Station, Blocks A1 to A3.

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

Design: Randomised blocks with split plots, 4 replications.

Fertiliser: Phosphate : 100 kg/ha P_2O_5 to all plots, spread uniformly in the inter-row before rotovation.
Nitrogen : as per treatments.

Irrigation and Rainfall:

	Irrigation (mm)	Rainfall (mm)
Beans	347	35
Cane	1513	653

Treatments: (main plots)

	Nitrogen kg/ha 0	4	6	8	12 weeks
Cane not cut back					
C. Control - no beans		80		80	
N1. Beans, with standard N for cane		80		80	
N2. Beans, with standard N for beans	160				
N3. Beans, with extra N for beans	160		100		
N4. Beans, with extra N for cane	160				100
Cane cut back					
N1. As for N1. above		80		80	
N2. As for N2. above	160				
N3. As for N3. above	160		100		
N4. As for N4. above	160				100

Treatments: (sub plots) During November 1985 it became apparent that most of the treatments were suffering from a shortage of nitrogen, and it was decided to split the plots in two and apply an extra top-dressing to half plots as follows:-

a) Top-dressing of 60 kg/ha N
b) Control, no top-dressing

The extra N was applied on 5th December, 1985, when the cane was 7 months old.

Conduct: After harvest of the 6th ratoon crop on 3rd May, 1985, a seedbed for the beans was prepared by rotovating the inter-rows. The machine was set to till a 1,0m swath, which effectively pruned the cane row from a width of about 0,8m to 0,5m. In each interrow twin rows of beans were planted 30cm apart, using variety Red Canadian Wonder. The beans were harvested in September by hand-picking the pods, and all crop residues

2/were.....

were subsequently removed from the plots. No adjustments to the normal irrigation schedule for the cane were made to accomodate seed bean requirements.

RESULTS

I SEEDBEAN YIELDS

Yields in kg/ha of dry beans were as follows:

Treatments	Yield kg/ha
N1	1 764
N2	2 089
N3	2 345
N4	2 322
L.S.D. P = 0,05	210
P = 0,01	285
Cane not cut back	2 124
Cane cut back	2 136
Significance	N.S.
Interaction	N.S.
Trial mean	2 130
S.E. plot ±	202
C.V.%	9,47

Bean yields were exceptionally high, particularly in view of the fact that the bean crop occupied only 40% of the land area. The cut-back treatment was included to evaluate the competitive effect of the growing cane, but results showed that seedbean yields were dependent on a satisfactory nitrogen supply and were not directly influenced by competition from the cane crop.

The high nitrogen requirement of the seedbean crop, in spite of it being a legume, has been well established from the results of extensive field trials in the lowveld. Normally responses to nitrogen levels in excess of 160 kg/ha would be relatively small and uneconomic, so the significant responses obtained in this trial to the 100 kg/ha N top-dressings (treatments N3 and N4) are a reflection of the competition for nitrogen provided by the cane.

II SUGARCANE RESPONSES

Results from the 7th ratoon harvest in May 1986 are presented in the attached tables.

(a) Effect of cut-back. The effect of cutting back the cane at 8 weeks of age in order to reduce competition with the beans was to cause a considerable reduction in both the yield and quality of the cane. This yield loss may be attributed to the slow re-growth after cutback, associated with both cold weather and bean competition, and the fact that the cane in the cutback plots was harvested at the same time as the rest and was thus 8 weeks younger.

3/(b) Effect.....

(b) Effect of nitrogen. Yield differences induced by the original nitrogen treatments were highly significant, with the greatest benefit being derived from the top-dressing of 100kg/ha N applied at 12 weeks on 2nd August when day temperatures were rising. When a similar top-dressing was applied in mid-winter at 6 weeks of age (21st June), the actively growing bean crop benefitted but not the cane.

It was clearly evident that there was a strong competitive demand for nitrogen between the two crops, and that the yields of both were suppressed if inadequate N was available when it was needed.

(c) Effect of late top-dressing the cane. The yield response to the late top-dressing of 60 kg/ha N applied at 7 ~~weeks~~ months of age was highly significant, but it was also associated with a significant drop in ERC% cane.

In the case of cane yields, there were significant interactions between top-dressing and the original nitrogen and cutback treatments. The response to the late top-dressing was considerably greater in plots that had been cut back, and in those plots which had received most of their original nitrogen immediately after harvest (i.e. the treatments which gave the highest bean yields).

(d) Effect on cane of interplanting. The main effect of interplanting showed a highly significant depression in cane yield caused by the bean crop, i.e. 139,65 t/ha (control) and 93,85 t/ha (mean of all bean treatments), but this did not provide a truly valid comparison beacuse the latter value was biased downwards by the drastic effect of the cutback treatment, and by the less favourable nitrogen treatments.

Thus a comparison of the treatments which were not cut back, and all of which received the late top-dressing at 7 months of age, provides a more realistic evaluation of the interplanting effect as follows:

Treatment	CANE t/ha	ERC% CANE	ERC t/ha
Control, no interplanting	145,70	11,95	17,37
Interplanting with beans : N1	119,96	11,95	14,08
Interplanting with beans : N2	100,59	11,66	11,73
Interplanting with beans : N3	100,94	11,32	11,42
Interplanting with beans : N4	147,73	10,68	15,84
L.S.D. P = 0,05	10,88	0,60	1,29
P = 0,01	14,69	0,81	1,74

From the above table it can be seen that the N4 treatment, which comprised 160 kg/ha after cutting plus a top-dressing of 100 kg/ha N at 12 weeks, effectively restored the yield of the interplanted cane to the same level as the control treatment. The drop in ERC% cane was caused primarily by excessive lodging in this treatment following the late top-dressing in November, and thus the significant reduction in ERC yield could probably have been avoided if this extra nitrogen had been applied earlier.

(e) Stalk characteristics. There was a strong relationship between yield and millable stalk populations in the case of the nitrogen treatments, with even the late top-dressing at 7 months causing an increase in stalk numbers. The yield depression associated with the cut-back treatment, however, was accompanied by an increase in stalk numbers but a considerable reduction in stalk length. In general, nitrogen responses were due to improved stalk lengths rather than to increased stalk diameters.

4/CONCLUSIONS.....

CONCLUSIONS

Results indicated that when seedbeans were grown between the cane rows during the winter months, the yields of both crops were dependent on an adequate supply of nitrogen and there was no apparent competition for light or water.

Responses to nitrogen treatments showed that the full requirements of both crops need to be met if each are to produce high yields. The high nitrogen requirement of the bean crop needs to be satisfied during the early growth stages when the nitrogen demand of the cane is relatively low, but adequate additional nitrogen needs to be supplied to the cane after the beans have senesced to ensure normal growth after the onset of stalk elongation in early spring.

Seedbeans are normally grown in the lowveld as a short-season winter crop, planted mid-April to mid-May and harvested in early September, and thus they could only be used for interplanting in cane cut early in the season. The twin-crop system is also best suited to overhead irrigation, as beans react unfavourably to excessive moisture and would be unlikely to yield well in inter-row irrigation furrows on heavy soils.

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9400/1 INTERPLANTING WITH BEANS

SUGARCANE YIELD DATA

Treatments	CANE t/ha	ERC% CANE	ERC t/ha
I Main plot treatments			
Control - no interplanting	139,65	12,33	17,16
Interplanting with beans	93,85	11,69	10,90
Significance	***	*	***
(N)N treatment to beans:			
N1	99,94	11,92	11,80
N2	79,76	11,92	9,49
N3	83,99	11,60	9,74
N4	111,80	11,30	12,57
L.S.D. P = 0,05	12,72	N.S.	1,29
P = 0,01	17,24	N.S.	1,74
(C)Cut-back effect:			
No cut-back	107,85	11,89	12,73
Cut-back	79,85	11,48	9,06
Significance	***	*	***
Interaction NC	N.S.	N.S.	N.S.
S.E. main plot ±	17,43	0,68	1,76
C.V. main plot %	17,62	5,82	15,20
II Sub-plot treatments			
(T)Late top-dressing:			
Top-dressing 60 kg/ha N	105,41	11,25	11,82
No top-dressing	82,28	12,12	9,98
Significance	***	***	**
Interaction NT	*	N.S.	N.S.
Interaction CT	*	N.S.	**
Trial mean	98,94	11,76	11,59
S.E. sub-plot ±	7,50	0,41	0,89
C.V. sub-plot %	7,58	3,52	7,67

9400/1 INTERPLANTING WITH BEANS

SUGARCANE HARVEST DATA

Treatments	Stalks/ha $x10^{-3}$	Stalk length (m)	Stalk diameter (cm)	Lodging %
Control - no interplanting	154,6	2,36	2,3	23
Interplanted with beans	145,2	1,91	2,2	18
N treatment to beans				
N1	151,6	1,97	2,2	18
N2	143,7	1,75	2,1	11
N3	140,2	1,92	2,2	11
N4	145,4	2,12	2,3	33
No cut-back	139,9	2,10	2,2	22
Cut-back	150,6	1,73	2,2	15
Late top-dressing	150,3	2,06	2,2	22
No top-dressing	142,2	1,86	2,2	15
Trial mean	146,3	1,96	2,2	19

INTERACTION NT (cane yield t/ha)

	N treatment to beans				Means
	N1	N2	N3	N4	
Late TD	109,95	90,17	93,94	128,59	105,41
No TD	90,74	69,35	74,03	95,01	82,28
Means	99,84	79,76	83,99	111,80	93,85

INTERACTION CT (cane and ERC yields)

	CANE t/ha			ERC t/ha		
	No cutback	Cutback	Means	No cutback	Cutback	Means
Late TD	117,30	93,52	105,41	13,27	10,38	11,82
No TD	98,39	66,18	82,28	12,20	7,75	9,98
Means	107,85	79,85	93,85	12,73	9,06	10,90