SOUTH AFRICAN SUGAR INDUSTRY

AGRONOMISTS' ASSOCIATION

9400/2 RATOON DECLINE TRIAL

Cat. No.1687

Object: To study the effects of inter-row cultivation and stool pruning on ratoon yield decline.

This crop: 10th ratoon (trial started 8R) **Age:** 11,6 months (23.5.88 to 10.5.89)

Location: ZSA Experiment Station, A1-A3.

Soil type: Sandy clay loam (PE.1) derived from paragneiss.

Design: Randomised blocks with split plots, 4 replications.

Variety/Spacing: NCo376 in 1,5m rows.

Fertiliser (kg/ha):

	N	P_2O_5	K_2O
8R	160	60	0
9R	160	60	0
10R	160	60	0

Irrigation and Rainfall:

	Irrigation (mm)	Rainfall (mm)	Total (mm)
8R	1 363	398	1 761
9R	1 488	692	2 180
10R	1 523	311	1 834

Treatments:

(a) Main plot treatments
1. Control - no tillage
2. Ripping between rows
3. Rotovating between rows

(b) Sub-plot treatments
1. No stool pruning
2. Cane rows pruned to 0,40m
3. Cane rows pruned to 0,25m

Conduct:

1. Main plot tillage treatments were done soon after harvest when half the nitrogen and all the phosphate had been applied, but before the first irrigation.
2. Row pruning was carefully measured and done by hand.

PROGRESS REPORT

Relevant harvest data are presented in the attached table.

(a) Cane yields: None of the treatments had any significant effect on cane yields in any of the 3 crop cycles, although there was evidence of inter-row tillage causing small yield losses which were more pronounced following rotovation.

(b) ERCZ cane: Neither the tillage nor the pruning treatments had any significant effects on cane quality.

(c) ERC yields: In the absence of ERCZ cane responses, ERC yield results did not reveal any treatment effects, although stool pruning appeared to cause marginal yield losses.

(d) Stalk populations: The only significant effects recorded during the 3 crop cycles were population responses, but differences between treatments were small in spite of significance in the 9th and 10th ratoons.

Ripping caused a small but significant population response in the second crop cycle but not in the other two. There was a linear trend for population to decline with decrease in row width, as would be expected, and this effect was significant (P = 0,05) in the second and third crop cycles (9R and 10R). Differences were small, however, with severe pruning (0,25m rows) reducing populations on average from 162 000 to 151 000 stalks/ha without any significant effect on cane or ERC yields.

(e) Stalk measurements: Stalk lengths and stalk diameters were not significantly effected by any of the imposed treatments.

CONCLUSIONS

Three years of results from 1987 to 1989 have not revealed any major treatment effects, and the cultivation and pruning treatments have not served to enhance yields and/or to reduce yield decline.

Yields were low in 1987 when the trial averaged 104 t/ha cane, but they improved in 1988 (114 t/ha) before dropping markedly in 1989 to 83 t/ha. These yield differences were largely seasonal effects, and the low yield in 1989 was associated with prolonged spells of hot dry weather which induced stress patterns on the trial site caused by uneven sprinkler distribution.

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9400/2 : RATOON DECLINE TRIAL

HARVEST DATA 8R (1987), 9R (1988), 10R (1989)

Treatments	CANE YIELD t/ha				ERC % CANE				ERC YIELD t/ha			
	8R	9R	10R	Means	8R	9R	10R	Means	8R	9R	10R	Means
Main plots												
1. Control	108,6	115,4	85,6	103,2	12,59	12,50	13,22	12,77	13,66	14,43	11,28	13,12
2. Ripped	102,9	117,0	83,0	101,0	12,88	12,52	13,16	12,86	13,20	14,62	10,91	12,91
3. Rotovated	99,6	110,2	80,8	96,9	12,77	12,58	13,15	12,83	12,71	13,87	10,62	12,40
LSD P = 0,05	N.S.	N.S.	N.S.	-	N.S.	N.S.	N.S.	-	N.S.	N.S.	N.S.	-
P = 0,01	N.S.	N.S.	N.S.	-	N.S.	N.S.	N.S.	-	N.S.	N.S.	N.S.	-
S.E. treat mean ±	3,7	3,5	2,0	-	0,14	0,20	0,06	-	0,52	0,36	0,28	-
C.V.%	12,4	10,5	8,2	-	3,84	5,53	1,70	-	13,60	8,77	8,97	-
Sub-plots												
1. No pruning	105,0	115,8	82,9	101,3	12,65	12,76	13,26	12,89	13,25	14,77	10,97	13,00
2. Rows pruned to 0,4m	104,5	112,3	83,6	100,1	12,93	12,45	13,17	12,85	13,46	13,97	10,97	12,80
3. Rows pruned to 0,25m	101,7	114,5	82,9	99,7	12,66	12,39	13,10	12,72	12,86	14,18	10,86	12,64
LSD P = 0,05	N.S.	N.S.	N.S.	-	N.S.	N.S.	N.S.	-	N.S.	N.S.	N.S.	-
P = 0,01	N.S.	N.S	N.S.	-	N.S.	N.S.	N.S.	-	N.S.	N.S.	N.S.	-
S.E. treat mean ±	3,5	3,2	4,0	-	0,18	0,19	0,11	-	0,36	0,45	0,46	-
C.V.%	11,6	9,7	16,8	-	4,90	5,21	2,87	-	9,38	10,81	14,60	-
Interaction	N.S.	N.S.	N.S.	-	N.S.	N.S.	N.S.	-	N.S.	N.S.	N.S.	-
Trial mean	103,7	114,2	83,1	100,4	12,75	12,53	13,18	12,82	13,19	14,31	10,93	12,81

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STALK DATA 8R (1987), 9R (1988), 10R (1989)

Treatments	STALKS/HA x 10^{-3}				STALK LENGTH (m)				STALK DIAMETER (cm)			
	8R	9R	10R	Means	8R	9R	10R	Means	8R	9R	10R	Means
Main plots												
1. Control	160,4	153,8	155,9	156,7	2,09	2,63	1,75	2,15	2,17	2,11	2,10	2,13
2. Ripped	158,5	158,2	156,8	157,4	2,02	2,65	1,74	2,14	2,19	2,04	2,12	2,12
3. Rotovated	155,6	153,6	152,7	153,9	1,87	2,56	1,71	2,04	2,15	2,06	2,15	2,12
LSD P = 0,05	N.S.	2,2	N.S.	-	N.S.	N.S.	N.S.	-	N.S.	N.S.	N.S.	-
P = 0,01	N.S.	3,1	N.S.	-	N.S.	N.S.	N.S.	-	N.S.	N.S.	N.S.	-
S.E. treat mean ±	2,1	0,7	2,8	-	0,06	0,05	0,04	-	0,03	0,05	0,02	-
C.V.%	4,5	1,6	6,3	-	10,35	6,87	8,96	-	5,34	8,54	3,98	-
Sub-plots												
1. No pruning	166,3	161,9	160,3	162,9	1,99	2,65	1,69	2,11	2,17	2,11	2,12	2,13
2. Rows pruned to 0,4m	157,2	153,8	154,6	155,2	1,98	2,57	1,72	2,09	2,16	2,08	2,11	2,12
3. Rows pruned to 0,25m	151,0	149,8	150,6	150,5	2,01	2,62	1,78	2,14	2,18	2,03	2,14	2,12
LSD P = 0,05	N.S.	7,4	6,9	-	N.S.	N.S.	N.S.	-	N.S.	N.S.	N.S.	-
P = 0,01	N.S.	N.S.	N.S.	-	N.S.	N.S.	N.S.	-	N.S.	N.S.	N.S.	-
S.E. treat mean ±	1,6	2,4	2,2	-	0,05	0,06	0,03	-	0,02	0,05	0,03	-
C.V.%	3,6	5,3	5,0	-	8,07	7,58	5,77	-	3,28	8,22	4,48	-
Interaction	N.S.	N.S.	N.S.	-	N.S.	N.S.	N.S.	-	N.S.	N.S.	N.S.	-
Trial mean	158,2	155,2	155,1	156,2	1,99	2,61	1,73	2,11	2,17	2,07	2,12	2,12