

SOUTH AFRICAN SUGAR INDUSTRY

AGRONOMISTS' ASSOCIATION

9500/4(a) SPACING TRIAL

Cat. No.: 1359

Object: To study the effects of different row spacings, and their interactions with stalk populations, on sugarcane planted and harvested early in the season.

This crop: First ratoon Age: 12,0 months(18.5.82 to 17.5.83)

Location: ZSA Experiment Station, Field G 12 to 14.

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

Design: Randomised blocks with split plots and three replications. Two separate trials planted and harvested annually in May 9500/4(a), or November 9500/4(b).

Fertiliser:

	<u>N</u>	<u>P</u>	<u>K</u>
P	140	60	0
1R	180	60	0

Rainfall: 448 mm Irrigation: 1 116 mm

Treatments: Varieties (main plots):

1. NCo 376 - high population, mid-season.
2. CP 61-37 - medium population, early-season.
3. B 51129 - low population, late-season.

Spacing between rows (sub-plots):

1. 0,5m
2. 1,0m
3. 1,5m
4. 2,0m

RESULTS

Relevant data for the plant and first ratoon crops are summarised in the attached tables.

The high variability for main plots (varieties) in the plant crop was due to erratic germination of B 51129, followed by extensive refilling of gaps before good stands were obtained. The success of this operation is reflected by the improved C.V.s recorded in the ratoon crop.

2/(a) Variety.....

(a) Variety effects: CP 61-37 yielded well in the plant crop but dropped considerably in the ratoon, when NCo 376 produced significantly better yields than the other two varieties.

(b) Spacing effects: Spacing did not produce significant cane yield effects in either of the two crops, although there was evidence of a quadratic response in both seasons. However, there was a strongly linear depression in ERC % cane with increase in row spacing in the first ratoon, and this caused a significantly linear ERC yield response in favour of close spacing. When meaned over both seasons it was clearly apparent that yields were depressed at 2.0m spacing.

(c) Interactions: None of the variety x spacing interaction components was significant in either of the two crops, indicating that responses to spacings were independent of stalk populations.

(d) Stalk characteristics: Increasing the row spacing caused a decrease in millable stalk populations; a small increase in stalk lengths; and a marginal increase in stalk diameters

(e) Lodging: Moderate lodging of all three varieties was recorded in the plant crop, with a slight decrease in lodging associated with increase in row spacing. In the ratoon crop only B 51129 lodged to any extent, when there was a linear decrease in lodging with increased row spacing.

CONCLUSIONS

Additional ratoon results are required before any firm conclusions can be drawn on variety, population, and spacing interactions.

KEC/June'83
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9500/4(a)m SPACING TRIAL

YIELD AND QUALITY DATA - PLANT AND FIRST RATOON CROPS

Treatments	CANE YIELD t/ha			ERC % CANE			ERC t/ha		
	P	1R	Mean	P	1R	Mean	P	1R	Mean
<u>Varieties</u>									
NCo 376	149,18	146,12	147,65	11,30	13,41	12,36	16,91	19,54	18,23
CP 61-37	143,24	114,69	128,97	13,21	14,55	13,88	18,83	16,64	17,74
B 51129	127,43	117,44	122,44	12,77	13,37	13,07	16,28	15,72	16,00
L.S.D. P = 0,05	N.S.	17,37	-	N.S.	0,74	-	N.S.	1,75	-
P = 0,01	N.S.	N.S.	-	N.S.	N.S.	-	N.S.	2,90	-
S.E. main plot \pm	55,06	15,33	-	1,44	0,65	-	6,35	1,54	-
S.E. var.mean \pm	18,35	4,42	-	0,41	0,19	-	1,83	0,45	-
C.V.%	39,34	12,16	-	11,56	4,75	-	36,64	8,93	-
<u>Spacings</u>									
0,5m between rows	136,87	126,95	131,91	12,68	14,22	13,45	17,27	17,93	17,60
1,0m " "	143,47	129,20	136,34	12,23	13,82	13,03	17,42	17,77	17,60
1,5m " "	147,07	127,14	137,11	12,39	13,72	13,06	18,11	17,44	17,78
2,0m " "	132,41	121,04	126,73	12,39	13,36	12,88	16,55	16,05	16,30
L.S.D P = 0,05	N.S.	N.S.	-	N.S.	0,54	-	N.S.	1,47	-
P = 0,01	N.S.	N.S.	-	N.S.	0,74	-	N.S.	N.S.	-
Linear effect	N.S.	N.S.	-	N.S.	**	-	N.S.	*	-
Quadratic effect	N.S.	N.S.	-	N.S.	N.S.	-	N.S.	N.S.	-
S.E. sub-plot \pm	18,47	11,41	-	0,71	0,55	-	2,42	1,49	-
S.E. spacing mean \pm	6,16	3,80	-	0,24	0,18	-	0,81	0,50	-
C.V.%	13,20	9,05	-	5,70	3,96	-	13,98	8,59	-
Interactions	N.S.	N.S.	-	N.S.	N.S.	-	N.S.	N.S.	-
Trial mean	139,96	126,08	133,02	12,42	13,78	13,10	17,34	17,30	17,32

9500/4(a)

SPACING TRIALHARVEST DATA - PLANT AND FIRST RATOON CROPS

Treatments	STALKS/HA x 10 ⁻³			STALK LENGTHS(m)			STALK DIAMETERS(cm)			LODGING %		
	P	1R	Mean	P	1R	Mean	P	1R	Mean	P	1R	Mean
<u>Varieties</u>												
NCo 376	151,9	150,9	151,4	2,62	2,49	2,56	2,2	2,3	2,3	59	1	30
CP 61-37	97,5	101,9	99,7	2,43	2,45	2,44	2,3	2,4	2,4	62	5	34
B 51129	83,0	102,7	92,9	2,48	2,46	2,47	2,6	2,6	2,6	51	61	56
<u>Spacings</u>												
0,5m between rows	128,5	134,8	131,7	2,61	2,33	2,47	2,3	2,4	2,4	63	32	48
1,0m " "	114,5	123,7	119,1	2,49	2,44	2,47	2,4	2,4	2,4	68	24	46
1,5m " "	103,8	112,9	108,4	2,42	2,58	2,50	2,4	2,5	2,5	50	19	35
2,0m " "	96,3	102,7	99,5	2,53	2,52	2,53	2,4	2,5	2,5	49	13	31
Trial mean	110,8	118,5	114,7	2,51	2,47	2,49	2,4	2,4	2,4	57	22	40

SOUTH AFRICAN SUGAR INDUSTRY
AGRONOMISTS' ASSOCIATION

9500/4a SPACING TRIAL

TERMINAL REPORT

Cat. No: 1359

Object: To study the effects of different row spacings, and their interactions with stalk populations, on sugarcane planted and harvested early in the season.

Planted: 22nd May 1981

Terminated: 17th May 1985, after the third ratoon crop.

<u>Harvest dates and ages:</u>	<u>Harvest</u>	<u>Age</u>
P	18.5.82	12.0 months
IR	17.5.83	12.0 months
2R	17.5.84	12.0 months
3R	17.5.85	12.0 months

Location: ZSA Experiment Station, Field G12 to G14

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

Design: Randomised blocks with split plots and three replications. Two separate trials planted and harvested annually in May (9500/4a) in November (9500/4b).

<u>Fertiliser:</u>	<u>N</u>	<u>P₂O₅</u>	<u>K₂O</u>
P	140	60	0
IR	180	60	0
2R	180	60	0
3R	180	60	0

<u>Irrigation and Rainfall:</u>	<u>Irrigation (mm)</u>	<u>Rainfall (mm)</u>
P	1162	448
IR	1253	378
2R	1428	399
3R	1228	699

- Treatments: Varieties (main plots)
1. NCo 376 - high population, mid season
 2. CP 61-37 - medium population, early season
 3. B 51129 - low population, late season

- Spacing between rows (sub-plots)
1. 0.5m between rows
 2. 1.0m between rows
 3. 1.5m between rows
 4. 2.0m between rows

RESULTS

Relevant data for the four crops from plant to third ratoon inclusive are summarised in the attached tables.

The high variability for main plots (varieties) in the plant crop was caused by erratic germination of B 51129, followed by extensive refilling of gaps before good stands were obtained. The success of this operation was reflected by the improved C.V.'s in the ratoon crops.

(a) Variety effects: NCo 376 gave higher cane yields than the other varieties in all four crops but quality was poorer, particularly in the third ratoon when the quality of all three varieties was adversely effected by 20mm of rainfall which fell a week before harvest. CP 61-37 gave lower cane yields than NCo 376 but these were enhanced by consistently high quality and it gave higher ERC yields in two of the four crop cycles and an overall average yield very similar to that of NCo 376.

(b) Spacing effects: Spacings did not produce significant cane yield effects in any of the four crops in spite of a consistent yield drop in 2.0m rows. In the first ratoon there was a depression in ERC % cane with increase in row spacing, and this caused a significantly linear ERC yield response in favour of close spacing. Quality and ERC yield differences were not significant in any of the other crops, and overall means showed ERC yields to be best at 1.5m spacing with only small reductions at close spacings but a drop of 1.5 t/ha in 2.0m rows.

(c) Interactions: The variety x spacing interaction was only significant in the third ratoon, when varieties responded differently to the spacing treatments. In the case of cane yields the 2.0m rows caused a marked yield depression in NCo 376 and B 51129, but with CP 61-37 the lowest yields were recorded at close spacings. The ERC% cane interaction was also significant, with NCo 176 and CP 61-37 showing linear increases in quality as row spacing increased, and with B 51129 showing reverse effect. The ERC yield interactions were not significant in any of the crop cycles.

(d) Stalk characteristics: Increasing the row spacing caused a consistent decrease in millable stalk populations; a small increase in stalk lengths; and a marginal increase in stalk diameters.

(e) Lodging: Moderate lodging of all three varieties was recorded in the plant crop, with a slight decrease in lodging associated with increase in row spacing. In the ratoons there was a tendency for B 51129 to be more prone to lodging than the other two varieties and for NCo 376 to be more resistant. Spacings did not have a very marked effect on lodging, although there was a fairly consistent trend towards a linear decrease in lodging with increase in row spacing.

CONCLUSIONS

The consistent depression in cane yield and quality at wide (2.0m) spacing has served to confirm results from other spacing studies. Results have clearly indicated that there is no reason to change from the standard row spacing of 1.5m.

9500/L2

SPACING TRIAL

YIELD AND QUALITY DATA - PLANT TO THIRD RATOON

Treatments	CANE YIELDS t/ha					ERC % CANE				
	P	IR	2R	3R	Mean	P	IR	2R	3R	Mean
<u>Varieties</u>										
NC 376	149.18	146.12	157.74	162.67	153.93	11.30	13.41	13.13	10.02	11.94
CP 61-37	143.24	114.69	132.44	135.97	131.59	13.21	14.55	14.21	13.46	13.86
B 51129	127.43	117.44	117.79	127.21	122.47	12.77	13.37	13.88	11.96	13.00
L.S.D. P = 0.05	N.S.	17.37	14.68	8.19	-	N.S.	0.74	N.S.	1.12	-
P = 0.01	N.S.	N.S.	21.35	13.58	-	N.S.	N.S.	N.S.	1.87	-
S.E. main plot \pm	55.06	15.33	12.95	7.23	-	1.44	0.65	0.80	0.99	-
S.E. var. mean \pm	18.35	4.42	3.74	2.09	-	0.41	0.19	0.23	0.29	-
C.V. %	39.34	12.16	9.53	5.09	-	11.56	4.75	5.79	8.40	-
<u>Spacings (metres)</u>										
0.5 between rows	136.87	126.95	135.66	149.32	137.20	12.68	14.22	13.98	11.90	13.18
1.0 between rows	143.47	129.20	138.45	138.00	137.28	12.23	13.82	13.76	11.74	12.89
1.5 between rows	147.07	127.14	140.24	145.76	140.05	12.39	13.72	13.78	11.87	12.94
2.0 between rows	132.41	121.04	129.59	134.72	129.44	12.39	13.36	13.46	11.75	12.72
L.S.D. P=0.05	N.S.	N.S.	N.S.	N.S.	-	N.S.	0.54	N.S.	N.S.	-
P=0.01	N.S.	N.S.	N.S.	N.S.	-	N.S.	0.74	N.S.	N.S.	-
Linear effect	N.S.	N.S.	N.S.	N.S.	-	N.S.	**	N.S.	N.S.	-
Quadratic effect	N.S.	N.S.	N.S.	N.S.	-	N.S.	N.S.	N.S.	N.S.	-
S.E. subplot \pm	18.47	11.41	11.22	15.69	-	0.71	0.55	0.61	0.60	-
S.E. spac.mean \pm	6.16	3.80	3.74	5.23	-	0.24	0.18	0.20	0.20	-
C.V. %	13.20	9.05	8.25	11.05	-	5.70	3.96	4.44	5.05	-
Interactions	N.S.	N.S.	N.S.	VS*	-	N.S.	N.S.	N.S.	VS*	-
Trial mean	139.96	126.08	135.99	141.95	136.00	12.42	13.78	13.74	11.81	12.94

9500/4a

SPACING TRAILERC YIELDS t/ha

TREATMENTS	ERC YIELDS t/ha				
	P	1R	2R	3R	Means
<u>Varieties</u>					
WCo 376	16.91	19.54	20.73	16.26	18.36
CP 61-37	18.33	16.64	18.82	18.31	18.15
B 51129	16.28	15.72	16.34	15.23	15.89
L.S.D. P = 0.05	N.S.	1.75	2.39	1.78	-
P = 0.01	N.S.	2.90	N.S.	N.S.	-
S.E. main plot \pm	6.35	1.54	2.11	1.57	-
S.E. vat. mean \pm	1.83	0.45	0.61	0.45	-
C.V. %	36.64	8.93	11.31	9.45	-
<u>Spacings</u>					
0.5m between rows	17.27	17.93	18.84	17.39	17.86
1.0m between rows	17.42	17.77	19.02	15.96	17.54
1.5m between rows	18.11	17.44	19.28	17.15	18.00
2.0m between rows	16.55	16.05	17.38	15.89	16.47
L.S.D. P = 0.05	N.S.	1.47	N.S.	N.S.	-
P = 0.01	N.S.	N.S.	N.S.	N.S.	-
Linear effect	N.S.	*	N.S.	N.S.	-
Quadratic effect	N.S.	N.S.	N.S.	N.S.	-
S.E. subplot \pm	2.42	1.49	1.82	2.23	-
S.E. spac. mean	0.81	0.50	0.61	0.74	-
C.V. %	13.98	8.59	9.79	13.46	-
<u>Interactions</u>					
Trial mean	N.S.	N.S.	N.S.	N.S.	-
	17.34	17.30	18.63	16.60	17.47

9500/4a SPACING TRIAL

HARVEST DATA - PLANT TO THIRD RATOON

Treatments	STALK/HA x 10 ⁻³					LODGING %				
	P	1R	2R	3R	Means	P	1R	2R	3R	Means
<u>Varieties</u>										
NCo 376	151.9	150.9	168.2	170.0	160.3	59	1	2	42	26
CP 61-37	97.5	101.9	116.2	117.6	108.3	62	5	11	31	27
B 51129	83.0	102.7	112.9	112.8	102.9	51	61	60	11	46
<u>Spacings</u>										
0.5m between rows	128.5	134.8	149.7	151.2	141.1	63	32	27	36	40
1.0m between rows	114.5	123.7	136.8	136.2	127.8	68	24	23	30	36
1.5m between rows	103.8	112.9	127.4	126.6	117.7	50	19	21	20	28
2.0m between rows	96.3	102.7	115.8	119.8	108.7	49	13	27	26	29
Trial mean	110.8	118.5	132.4	133.5	123.8	57	22	24	28	33

Treatments	STALK LENGTHS (m)					STALK DIAMETERS (cm)				
	P	1R	2R	3R	Means	P	1R	2R	3R	Means
<u>Varieties</u>										
NCo 376	2.62	2.49	2.72	3.08	2.73	2.2	2.3	2.2	2.2	2.2
CP 61-37	2.43	2.45	2.61	2.76	2.56	2.3	2.4	2.4	2.3	2.4
B 51129	2.48	2.46	2.78	2.81	2.63	2.6	2.5	2.5	2.4	2.5
<u>Spacings</u>										
0.5 m between rows	2.61	2.33	2.61	2.82	2.59	2.3	2.4	2.3	2.3	2.3
1.0 m between rows	2.49	2.44	2.66	2.81	2.60	2.4	2.4	2.3	2.3	2.4
1.5 m between rows	2.42	2.58	2.73	2.95	2.67	2.4	2.5	2.3	2.3	2.4
2.0 m between rows	2.53	2.52	2.81	2.94	2.70	2.4	2.5	2.5	2.3	2.4
Trial mean	2.51	2.47	2.70	2.88	2.64	2.4	2.4	2.4	2.3	2.4