SOUTH AFRICAN SUGAR INDUSTRY

AGRONOMISTS' ASSOCIATION

Cat. No.: ~~1129~~ 1197

Title: The effect of moisture stress on the ratooning ability of NCo 376.

Particulars of the project

Crop	:	Plant and two ratoons
Site	:	Glasshouse, Mount Edgecombe.
Region	:	Coast Lowlands
Soil series	:	Shortlands
Design	:	Randomised blocks x 3 replications
Variety	:	NCo 376
Fertilizer	:	Single supers - 20 g/ drum before planting 0,9 g N and 1,25 g K applied in sol ution twice a week to each drum.

Soil analysis: Date: 13. 5.1976.

pH	O.M.%	Clay %	P.D.I.
7,4	-	60	-

ppm

P	K	Ca	Mg	Zn	Al
33	134	5 900	>250	-	-

Age: Plant crop: 15 m (20.5.76-2.9.77)
R1: 9,3 m (2.9.77-12.6.78)
R2: 10,3 m (12.6.78-2.5.79)

Irrigation: See treatments.

Objectives

To measure the effect of moisture stress before and after harvest of the plant crop on the regeneration of the following ratoons of NCo 376.

Treatments

Treatment	Pre-harvest stress		Post-harvest stress	
	2 weeks	4 weeks	2 weeks	4 weeks
1. Standard	Watered daily		Watered daily	
2. Moderate moisture stress	*			
3. Moderate moisture stress	*		*	
4. Severe moisture stress		*		
5. Severe moisture stress		*		*

Note on treatments

1. One pre-germinated single-eyed sett was planted in each 80 litre drum and allowed to develop into a single stool. The drums were placed on the concrete apron outside the glasshouse. The soil moisture content of all drums was monitored with cylindrical gypsum resistance blocks installed 150 mm in from the perimeter of the drum at depths of 150 mm and 300 mm. Water was applied daily at 3 litres per drum when the cane was young increasing to 7,5 litres per drum for mature cane unless there was adequate rainfall.

2. A month before harvest all the drums were moved into the glasshouse and the moisture stress treatments were imposed. Four weeks after harvest when the final stress period ended the pots were again placed outside the glasshouse and watering re-commenced.

Results

Visual effects of moisture stress on the plant cane

After three days of moisture stress the available soil moisture readings dropped to less than 10%, the older cane leaves became yellow while the top leaves wilted. After two weeks of moisture stress the older leaves became desiccated but the tops remained green. Pithiness developed in the stalks and the top two internodes became flaccid. Four weeks of moisture stress was imposed all leaves and tops became desiccated, the stalks became very pithy and the top three to four internodes were flaccid. At harvest the moisture content of the soil in the moderately and severely stressed drums was below wilting point.

Table 1. Effect of pre-harvest moisture stress on yield and crop characteristics of the plant crop.

	Treatment		
	Standard	Moderate drought (two weeks)	Severe drought (four weeks)
Cane yield gms/drum (fresh) DM%	9 373 29	7 260 27	5 896 28
Ers%	13,9	11,7	10,1
Ers% gms/drum	1 300	847	594
Tops gms/drum (d.m) DM%	523 38	494 52	297 61
Trash gms/drum (d.m) DM%	1 155 91	1 068 94	963 94
3rd Leaf sheath gms/drum (d.m) DM%	46 36	36 89	29 100
Stalk population/drum Stalk length cm	13 182	11 182	11 177
Stalk diameter mm bottom Middle centre top	25 24 22	24 24 21	23 23 18

Table 2. Moisture determinations on disturbed core samples at harvest of the plant crop.

Treatment	% Moisture
Standard	38
Moderate moisture stress	21
Severe moisture stress	20

Table 3. See page 4.

Comments on results

1. Severe drought before harvest followed by a moderate drought stimulates tillering in the following ratoon and has no detrimental effect on subsequent crops. Severe drought before and after harvest however reduced tillering and stalk elongation in the next ratoon but with adequate watering the following ratoon recovered fully. The increased tillering in the following crop after moisture stress has been reported in field irrigation experiments and the phenomenon is presumably triggered by a reduction in the effect of a mechanism such as apical dominance.

2. The dry matter content of the 3rd leaf sheath may be used to differentiate between moderate and severely stressed cane and the probability of regeneration of the following ratoon.

3. This experiment has been terminated.

END/VSJ
31 March 1980.

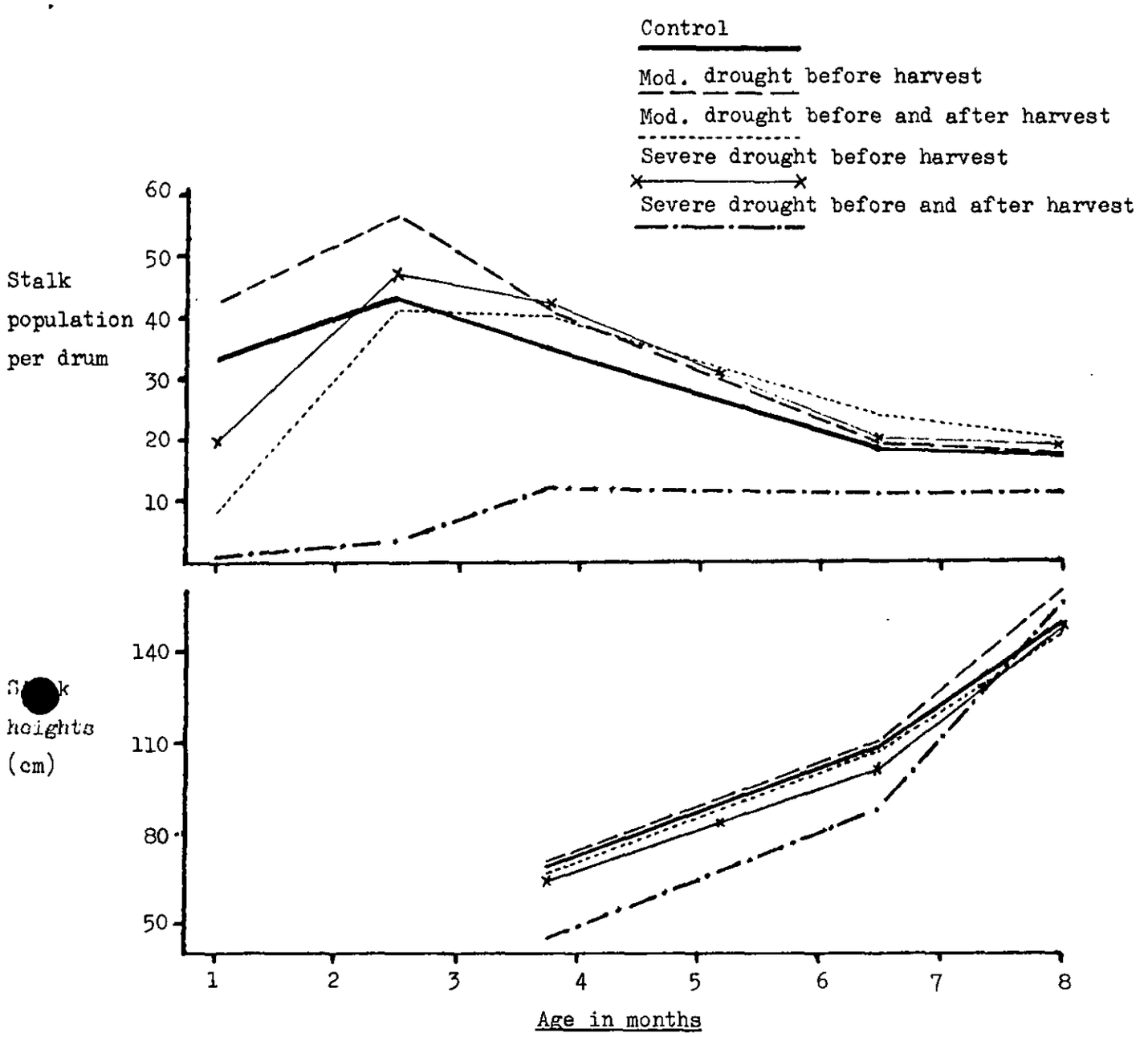

Fig. 1 The effect of drought before and after harvest on stalk population and heights in the following ratoon.

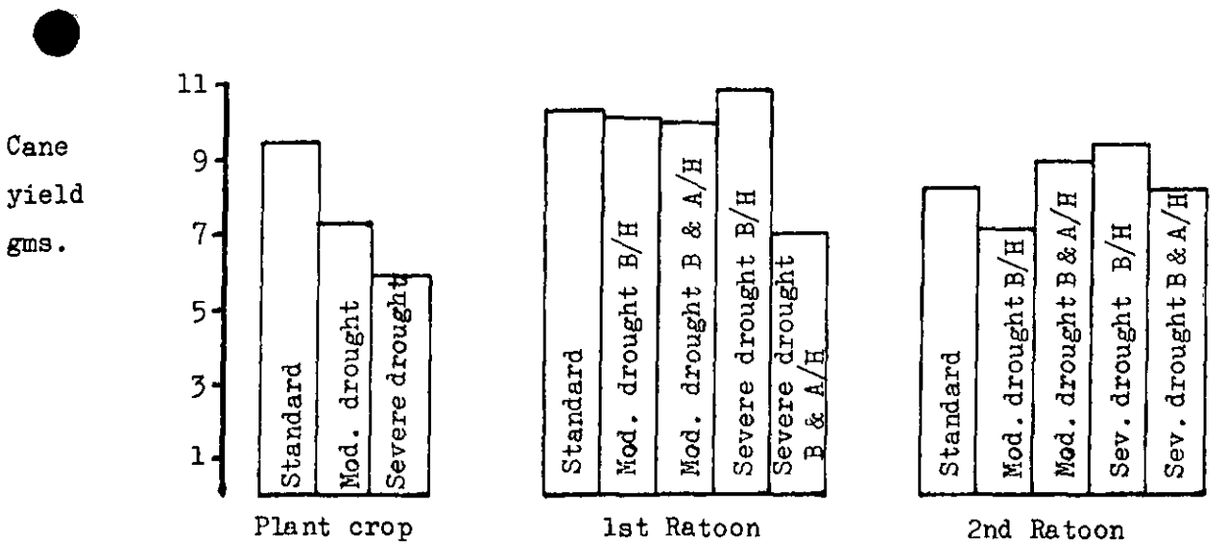

Fig 2. Effect of moisture stress on cane yield of the plant and following two ratoon crops.

Table 3. The effect of moisture stress before and after cutting the plant crop on yield and crop characteristics of the 1st and 2nd crop. (Expressed as a percentage of the standard treatment in the 1st ratoon).

	Standard		Moderate stress before harvest		Moderate stress before & after harvest		Severe stress before harvest		Severe stress before and after harvest	
	R1	R2	R1	R2	R1	R2	R1	R2	R1	R2
Cane yield g/drum	100	72	98	62	99	78	105	81	68	72
Ers %	100	76	107	73	107	73	106	71	86	69
Ers g/drum	100	55	105	46	106	58	111	58	59	50
Stalk population/drum	100	94	100	100	129	117	112	112	65	82
Stalk length (cm)	100	62	98	49	92	59	99	78	103	67
Stalk diameter. Bottom	100	100	100	100	92	100	100	104	92	104
(mm) Middle	100	100	96	96	96	96	96	96	96	100
Top	100	100	100	95	95	100	100	95	100	100