

SOUTH AFRICAN SUGAR INDUSTRY  
AGRONOMISTS' ASSOCIATION

Code: HW203/80

Cat. No.: 1282

TITLE: Seasonal phytotoxicity trial

1. Particulars of the project

This crop : Ratoon cane                      Soil analysis:      Clay % + 24  
Site : Pongola Field Stn  
Region : Northern area  
Soil system : Komatipoort  
Soil form/series : Hutton/Shorrocks  
Design : Randomised blocks  
Variety : NCo 376  
Fertilizer :    N      P      K  
                         138    22,6    100

2. Objectives

To assess the variation in phytotoxic effects of applying post-emergence herbicides onto cane at different times of the year.

3. Treatments

<u>Chemical</u>	Rate in kg or l prod/ha	
1. Control (unsprayed)	-	} Applied at six different times of the year
2. Diuron + Actril DS	2,5 + 1,25	
3. Diuron + paraquat	2,0 + 2,5	
4. Diuron + Velpar	1,25 + 0,75	

4. Experimental

Treatments were applied directly over the sugarcane foliage by means of a lever operated knapsack sprayer fitted with a TK5 floodjet.

Plots consisted of six rows eight metres long from which one row each side and one metre each end were discarded at harvest.

Details of condition at spraying and afterwards, and of dates at harvest and spraying are included in Table 1 and 2.

## 5. Results

- 5.1 Crop measurements taken 1,5 and 7,5 months after spraying each section are presented in Table 3.
- 5.2 Yield results and crop characteristics at harvest are presented in Table 4.
- 5.3 Yield in tons cane/ha of unsprayed control plots from each section and of treated plots expressed as a percent of unsprayed control plots are indicated in a histogram (Figure 1).

Table 1 Conditions and spray details

Spray date	Temp. °C		Rel. hum. %		Sun-shine hours	Rain-fall (mm)	Days to 1st rain, or irrig. after spray (amount) (mm)		Cane growth at spray /leaf canopy height (mm)	Output ℓ/ha	Efficiency %		
	8 am	2 pm	8 am	2 pm			D + Act	D + par			D + Vel		
8.01.80	19,3	23,6	76	61	1,7	0,3	3	(26,6)	550-600	276	97	78	83
6.03.80	23,8	30,0	80	37	10,5	0	5	(61,0)	350-450	307	99	93	91
24.04.80	18,3	26,1	84	43	8,9	0	8	(61,0)	430	214	96	96	98
26.06.80	11,2	25,6	61	25	8,6	0* <sup>1</sup>	14	(61,0)	500	319	98	116	103
23.09.80	14,6	15,3	96	69	0,0	6,6	2	( 0,6)	500	296	114	108	100
12.11.80	21,5	37,5	70	23	7.0	0	1	( 4,7)	400	232	101	97	99

\*<sup>1</sup> 61,0 mm of effective irrigation was applied before treatments were applied on the 26.06.80

Table 2 Harvest dates, spray dates, age, rainfall and irrigation

Previous crop harvest date	Spray date	Age at spray (days)	Harvest date	Age at harvest (m)	Time after spray (m)	Rainfall (mm)	Irrigation (mm)	Total moisture (mm)
3.12.79	8.01.80	36	11.11.80	12,2	10	516	610	1 126
7.02.80	6.03.80	27	19.02.81	12.3	11,5	654	854	1 508
20.03.80	28.04.80	39	17.03.81	11,9	10,6	600	854	1 454
14.05.80	26.06.80	43	13.06.81	11,4	11,2	627	854	1 481
8.07.80	23.09.80	46	18.08.81	13.3	10.8	647	793	1 440
23.10.80	12.11.80	19	13.10.81	11.7	11.0	679	732	1 411

Table 3 Crop measurements taken 1,5 and 7,5 months after spraying

Treatments	Spray date	Stalk heights				Stalk population			
		1,5 months		7,5 months		1,5 m		7,5 m	
		(m)	As % of control	(m)	As % of control	('000/ha)	As % of control	('000/ha)	As % of control
Control	8.01.80	1,17		2,67		204		139	
	6.03.80	0,67*1		1,54		419*1		195	
	28.04.80	0,54		1,90		524		149	
	26.06.80	0,19		2,49		580		121	
	23.09.80	0,68		2,71*2		444		146*2	
	12.11.80	1,08		2,60		308		140	
Diuron + Acril DS	8.01.80	0,94	80	2,45	92	221	108	139	100
	6.03.80	0,52*1	78	1,38	90	439*1	105	213	109
	28.04.80	0,38	70	1,63	86	496	95	163	109
	26.06.80	1,19	100	2,41	97	554	96	132	109
	23.09.80	0,54	79	2,47*2	91	467	105	154	105
	12.11.80	0,81	81	2,53	97	302	98	129	92
Diuron + paraquat	8.01.80	0,87	74	2,40	90	232	113	141	101
	6.03.80	0,51	76	1,37	89	507	121	214	110
	28.04.80	0,29	54	1,64	86	460	88	152	102
	26.06.80	0,15	79	2,15	86	437	75	129	107
	23.09.80	0,44	65	2,44*2	90	493	111	123*2	84
	12.11.80	0,81	75	2,49	96	331	107	133	95
Diuron+ Velpar	8.01.80	1,19	102	2,53	95	205	100	148	106
	6.03.80	0,48*1	72	1,38	90	443*1	106	198	102
	23.04.80	0,38	70	1,73	91	505	96	154	103
	26.06.80	0,19	100	2,24	90	558	96	132	109
	23.09.80	0,65	96	2,49*2	92	467	105	141*2	97
	12.11.80	0,93	86	2,55	98	304	99	121	86

\*1 Measurement taken one month after spray

\*2 Measurement taken six months after spray

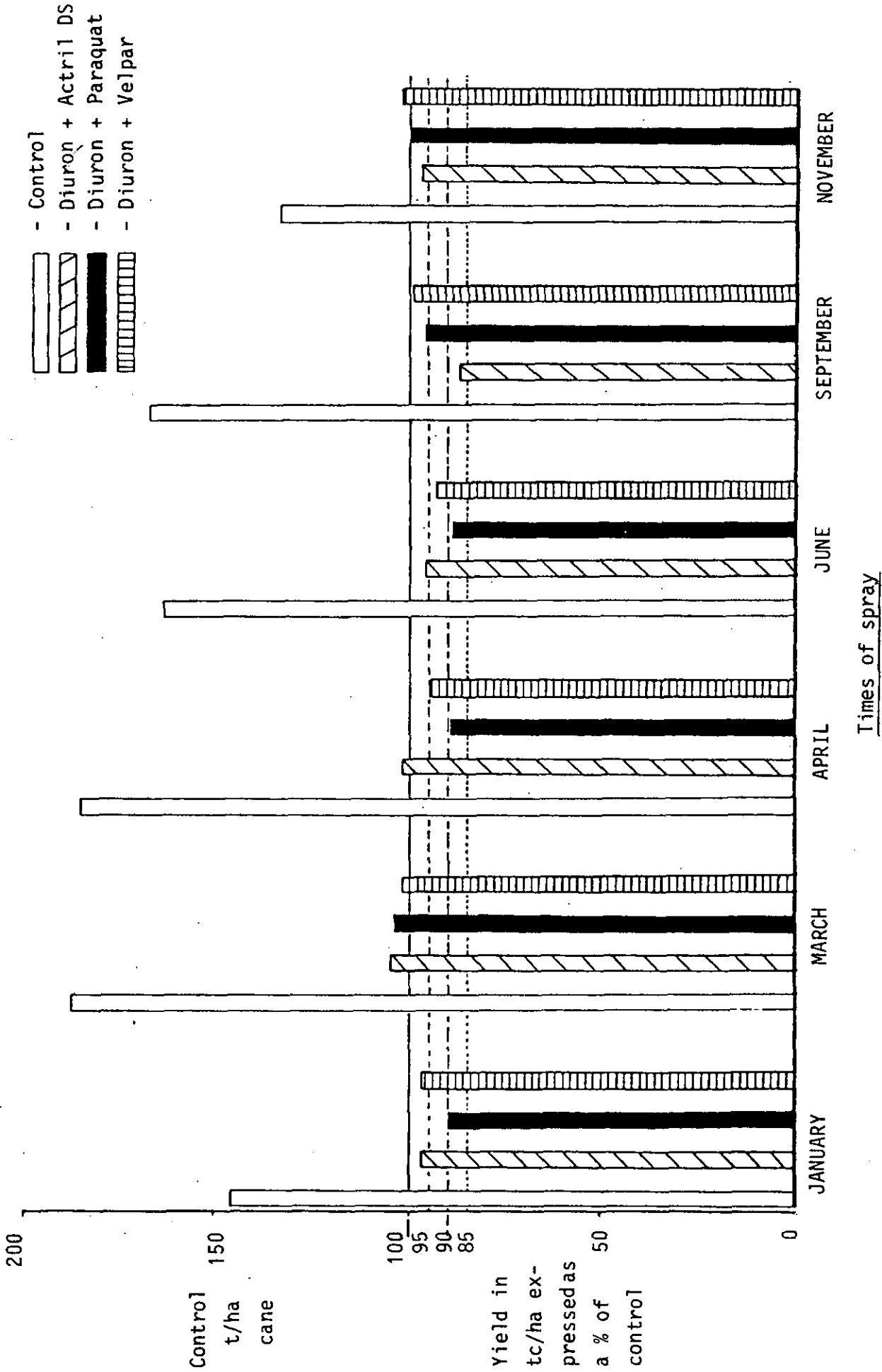
Table 4 Yield and crop characteristics at harvest

Treatment	Spray date	Efficacy	Yield						Stalk measurements			
			Cane		Ers		Sucrose		Heihgt		Population	
			t/ha	% cont	t/ha	% cont	t/ha	% cont	(m)	% cont	1000 /ha	% cont
Control	8.01.80	-	146		16,6		19,6		2,83		157	
	6.03.80	-	188		15,7		-		*1 2,79		154	
	28.04.80	-	185		11,6		16,0					
	26.06.80	-	163		17,0		19,9		2,90		134	
	23.09.80	-	167		19,6		22,5		3,18		155	
	12.11.80	-	133		15,8		18,4		2,78		194	
Diuron + Actril DS 2,5 kg + 1,25 l/ha	8.01.80	97	142	97	15,7	95	18,6	95	2,59	92	176	112
	6.03.80	99	197	105	15,5	99	-	-	2,74	98	144	94
	28.04.80	96	188	102	12,9	111	17,3	*108	-	-	-	-
	26.06.80	98	157	96	16,5	97	19,3	97	2,85	98	147	110
	23.09.80	114	146	**87	16,8	** 86	19,5	* 87	2,96	93	173	*112
	12.11.80	101	129	97	15,6	99	18,2	99	2,62	94	203	105
Diuron + paraquat 1,5 kg + 2,5 l/ha	8.01.80	78	132	90	14,9	90	17,5	89	2,50	**88	156	99
	6.03.80	93	196	104	14,9	95	-	-	2,77	99	150	97
	28.04.80	96	165	**89	9,5	** 82	13,5	**84	-	-	-	-
	26.06.80	116	145	*89	15,2	* 89	17,8	*89	2,72	*94	136	108
	23.09.80	108	160	96	18,9	96	21,7	96	2,94	92	183	**118
	12.11.80	97	133	100	15,5	98	17,8	97	2,57	**92	203	105
Diuron + Velpar 1,25 kg + 0,75 kg/ha	8.01.80	83	141	97	16,6	100	19,4	90	2,71	*96	147	94
	6.03.80	91	192	102	15,4	98	-	-	2,72	97	151	98
	28.04.80	98	175	95	11,1	96	15,3	96	-	-	-	-
	26.06.80	103	152	93	16,4	96	17,8	96	2,82	97	135	101
	23.09.80	100	165	99	18,9	96	21,7	96	3,10	97	164	106
	12.11.80	99	135	102	16,0	101	18,5	101	2,69	*97	191	98

\*1 Crop measurements in this trial taken before harvest

\* Statistically significant at the 5% level

\*\* Statistically significant at the 1% level



## 6. Comments

### Early crop measurements

Stalk heights and populations 1,5 months after spraying dates varied considerably at different times of the year. (See unsprayed control measurements). Stalk heights were lower in winter while populations were greater. This may be explained to some extent by the fact that each new section was cut back prior to spraying at each new date and this may have stimulated tillering.

Generally, treatments had little effect on stalk populations at any date with the exception of the September and November sprays in which populations at 7,5 months were reduced by most treatments.

Stalk heights were severely affected soon after spraying, the diuron + paraquat treatment being the most severe. Cane sprayed in April was affected more than that sprayed at other times by all treatments. However little difference occurred at other times of the year although a slight trend (ns) was present towards greater reductions (at 7,5 months) in winter sprayed cane.

### Yield results

Cane yields (t/ha) were greatest from unsprayed control plots in the March and April sprayed sections.

Statistically significant reductions in sucrose, ers and cane yields were produced by diuron + Actril DS on September sprayed cane and by diuron + paraquat on April and June sprayed cane. The reduction from diuron + Actril DS is associated with a high application rate (114% of intended rate), and fairly large cane (500 mm height, 46 days age). These conditions are expected to increase the phytotoxic effects. Weather conditions on the day of spray however, were expected to decrease the likelihood of herbicide phytotoxicity. They were: the lowest temperatures of any spray date, no sunshine hours and 6,6 mm of rain after application.

Statistically significant yield reductions in June sprayed cane after treatments with diuron + paraquat was associated with high rates of application (116% of intended rates. The reduction in April sprayed cane was not associated with any obvious factor except time of year.

It can be seen from the histogram that no yield reductions occurred from treatments sprayed in March while reductions occurred in both January and April sprayed cane. The cane growth at the time of spray was smallest in March sprayed cane and largest in January sprayed cane. Past results have shown a greater yield reduction in cane sprayed at a later growth stage. Thus this factor appears to have affected yields more than others in this experiment.

The effects of diuron + paraquat and diuron + Velpar appear to be relative to one another with diuron + paraquat being the most severe. Diuron + Actril DS caused less yield reduction than the other two treatments at all spray dates except September and November.

## 7. Conclusions

- 7.1 Standard rates of commonly used herbicide treatments can cause severe early stalk height reductions at any time of the year after application to the foliage of NCo 376 grown at Pongola.
- 7.2 In general, no statistically significant yield reductions can be expected in cane sprayed with standard herbicide rates although a trend is apparent towards lower yields on average from treated cane (treated cane: 158,3 t/ha, untreated: 163,7 t/ha).
- 7.3 Diuron + paraquat was the most severe treatment of the three tested.
- 7.4 Cane growth stage at the time of spraying is possibly the most important factor in determining the ultimate damage from foliar applied herbicide treatments.
- 7.5 A slight trend indicates that winter sprayed cane is more sensitive to yield reductions and phytotoxicity than summer sprayed cane.