

**SOUTH AFRICAN SUGAR INDUSTRY
AGRONOMISTS' ASSOCIATION**

Cat No. : 1617
Project No: 2914
Code No. : HW 255/86/R3

Title: Phytotoxicity Trial with Varieties

Objectives: To test a range of sugarcane varieties for their sensitivity to a number of herbicides.

1. Particulars of the project:

		<u>Soil analysis</u>			
This crop	: 3rd ratoon	pH (water)	Clay %		
Site	: Pongola Field Station	6,60	> 30		
Region	: Northern Area	=====			
Soil System	: Komatipoort	P ppm	K ppm	Ca ppm	Mg ppm
Soil form/series:	Hutton/Shorrocks	32	182	762	>220
Variety	: NCo376, J59/3, N12, N13, N14,N15	=====			
Age	: 12,7 months	=====			
Dates	: 30/09/86-20/10/87	Fertiliser: (kg/ha) N P K			
Rainfall (mm)	: 747	750 kg/ha 5:1:5 (38)		126	25 126
Irrigation (mm)	: 732				
Total (mm)	: 1479				
LTM (mm)	: 650				

2. Design

Design : Split plot
Replication : 4
Whole plot size : 8 m x 6 rows x 1,4 m = 67,2m²
Net plot size : 6 m x 4 rows x 1,4 m = 33,6m²

3. Treatments

Treatments	Rates l or kg product /ha
a) Herbicide Treatments	
Control	Handweeded
Diuron + Actril DS	2,5 + 1,25
Diuron + Gramoxone	2,0 + 2,5
Diuron + MSMA	3 + 3
b) Varieties	
J59/3	
NCo376	
N12	
N13	
N14	
N15	

4. Chemical Formulations Used

Product	Formulation	Active ingredient
P1 Diuron	800 g/l sc	diuron
P2 Actril DS	600/100g/l ec	2,4-D / ioxynil
P3 Gramoxone	200 g/l soln	paraquat
P4 MSMAon	720 g/l soln	MSMA

5. Application detail

Treatment dates	11/11/86
Time of application	11h00
Applicator	CP3
Nozzle	APM Green
Pressure	100 kpa
Leaf Height	30-50cm depending on variety
Method	Over the row
Output	230 l/ha

6. Weather Conditions at time of spraying

Treatment dates	11/11/86
General	Cloudy & Warm
Dew	Nil
Soil surface	Moist
Wind	Slight
Sunshine hours	8,4
Temperature (°C)	
08h00	19,7
14h00	25,4
Relative humidity (%)	
08h00	70
14h00	48
Rainfall	
mm On day of spray	0
No of days to 1st rain	3
mm At 1st rain	0,4
mm In 1st 14 days	6,0

7. Results

Table 1 : Visual phytotoxicity ratings of 6 cane varieties

Treatment	% Scorch		Stunting *	
	Days after treatment			
	12	36	12	36
NCo376 Control	4	1,5	5	5
Diuron + Actril	9	6	4,8	4
Diuron + Gramoxone	23	6	4,2	4
Diuron + MSMA	14	6,5	5	4,5
N12 Control	4	2,2	5	5
Diuron + Actril	7	3,5	5	5
Diuron + Gramoxone	20	6,5	4	3,7
Diuron + MSMA	14	7,5	4	4
N13 Control	4	1,4	5	5
Diuron + Actril	10	4	4,8	4,8
Diuron + Gramoxone	20	5,5	4	3,8
Diuron + MSMA	13	5	4,5	4,5
N14 Control	4	2	5	5
Diuron + Actril	12	7	4,8	4
Diuron + Gramoxone	23	6,5	4	4
Diuron + MSMA	17	7,5	4,2	4
N15 Control	4	3	5	5
Diuron + Actril	6	4,2	5	4
Diuron + Gramoxone	22	6,5	3,8	4
Diuron + MSMA	15	8,5	4,8	4,8
J59/3 Control	3	2	5	5
Diuron + Actril	12	6	4,2	4,5
Diuron + Gramoxone	21	6,5	3,5	3,7
Diuron + MSMA	17	7	4	3,7

* 1-5 : 1 = Very poor. 5 = No effect

Comment

The diuron + Gramoxone treatment caused severe scorch and the diuron + MSMA treatment moderate to severe scorch when rated 12 days after spraying. Diuron + Actril caused slight to moderate scorch. At 36 days after treatment there was not much difference between the herbicide treatments and all showed slight to moderate scorch.

Diuron + Gramoxone had a depressive effect on growth. The stunt rating at 36 days after treatment indicated that the earlier scorching effect had inhibited growth for all varieties. All treatments appeared to be stunted by the effect of herbicide with the Diuron + Actril DS being the least damaging.

Table 2 : The effect of herbicide on stalk height of 6 cane varieties

Treatment	Stalk Height (cm)		
	Days after treatment		
	28	96	Harvest
NCo376 Control	40	177	288
	35	173	286
	32	164	286
	35	172	285
N12	32	156	288
	32	154	288
	25	147	284
	29	152	288
N13	40	176	286
	38	176	283
	30	171	282
	36	175	281
N14	38	163	283
	32	151	286
	29	150	287
	32	154	283
N15	40	172	288
	35	161	286
	30	156	285
	35	163	276
J59/3	35	170	291
	30	160	287
	27	153	284
	31	163	286

Comment

The physical stalk height measurements confirmed the trend observed by the visual stunt ratings that herbicide reduced stalk height at 28 and 96 days after treatment. The stalk heights for diuron + Gramoxone were generally lower than for the other herbicides between which there was no real difference.

At harvest there were no real differences between treatments and the unsprayed control.

Table 3 : Yield data at harvest for 6 cane varieties sprayed with 4 treatments

Treatment	Cane t ha ⁻¹	Sucrose t ha ⁻¹	Pol % cane
NCo376 Control	130	16,8	12,90
Diuron + Actril	133	17,1	12,90
Diuron + Gramoxone	129	16,2	12,57
Diuron + MSMA	132	17,7	13,44
N12 Control	126	16,4	13,02
Diuron + Actril	120	15,9	13,22
Diuron + Gramoxone	122	15,8	12,95
Diuron + MSMA	124	16,4	13,27
N13 Control	120	15,1	12,59
Diuron + Actril	127	15,8	12,51
Diuron + Gramoxone	122	15,8	12,99
Diuron + MSMA	129	17,0	13,10
N14 Control	122	16,0	13,13
Diuron + Actril	123	16,1	13,11
Diuron + Gramoxone	128	16,9	13,17
Diuron + MSMA	121	16,0	13,20
N15 Control	122	16,5	13,57
Diuron + Actril	121	16,8	13,86
Diuron + Gramoxone	117	15,8	13,46
Diuron + MSMA	112	15,2	13,62
J59/3 Control	120	17,8	14,89
Diuron + Actril	124	18,3	14,71
Diuron + Gramoxone	132	19,2	14,59
Diuron + MSMA	120	17,6	14,59
CV % (variety ; herbicide)	3,9;6,6	3,9; 7,8	2,4;4,1
SE mean in diff whole plot	4,3	0,6	0,3
LSD (0,05)	13	2,0	0,9
LSD (0,01)	18	2,7	1,2
SE mean in same whole plot	4,1	0,6	0,3
LSD (0,05)	12	1,8	0,8
LSD (0,01)	15	2,5	1,0

Comment

Cane yield was not significantly affected by the herbicide treatments although the J59/3 treated with diuron + Gramoxone produced yields just significantly greater (5%) than the untreated control plots.

There was a yield difference of 20,2 t cane ha⁻¹ between NCo376 and N15 for the diuron + MSMA treatment which is highly significant while there was a yield difference of 14,3 t cane ha⁻¹ between J59/3 and N15 which is significant at the 5% level.

N15 was the only variety to show an overall reduced yield (ave -4 t/ha) from treated plots compared with the control plot. J59/3 and N13 recorded the biggest yield differences of +5,7 t cane ha⁻¹ over the control.

There was no significant differences in the sucrose content (Pol % cane) for the different herbicide treatments.

8. Discussion and Conclusion

The severe scorching caused by diuron + Gramoxone and diuron + MSMA soon after spraying had no effect on the final harvest yields and heights. N15 appeared to be the most sensitive of the varieties tested to the Gramoxone and MSMA treatments. N13 and J59/3 were the least sensitive.

The severe scorching did however reduce heights at 28 and 96 days after treatment but at harvest treated and untreated plots were similar. Compensatory growth in the form of increased tillering soon after spraying was noted in some cultivars especially J59/3 but not NCo376. At harvest lodging prevented accurate population counts and therefore it could not be confirmed if treated plots had higher plant populations. However the fact that both treated and untreated plots had lodged may indicate that conditions for good growth were excellent and that the treated plots could have compensated for the earlier stress.

MW/dlz
28 April 1988