NBL/cvp
7 January 1991

SOUTH AFRICAN SUGAR INDUSTRY

AGRONOMISTS' ASSOCIATION

Code No : HW 328/87/P
Cat No : 1740
Project No : 3535

Title : Phytotoxicity of post-emergent herbicides in pots

Objectives: To assess the phytotoxicity of new post-emergent herbicide on NCo376.

1. Particulars of the project

This crop : Plant

Site : Experiment Station Mount Edgecombe

Region : North Coast - Coastal

Soil system : Berea/Umzinto

Soil form/series: Hutton/Shorrocks

Variety : NCo376

Age : 111 days

Dates : 9/10/87 - 28/1/88

Irrigation : Daily drip irrigation

Soil analysis Date: 07/09/1987

	pH	OM %	Clay %	Silt %	T Sand %	CEC
Sand	6,55	1,00	8	4	88	2,30
Clay	5,55	5,20	62	13	25	-

ppm

	P	K	S	Ca	Mg	Na	Zn
Sand	26	69	18	312	43	10	1,2
Clay	7	173	-	1650	350	-	4,0

2. Design:

Design : Randomised blocks

Replications : 6 per soil type

Pot size : 27 cm x 30 cm

3. Treatments: See results

4. Details of herbicide used

Trade names	Formulations	Active ingredients
Diuron	800 g/ℓ sc	Diuron
Actril DS	100 + 600 g/ℓ ec	Ioxynil + 2,4-D
MBSA 1997	200/200 g/ℓ ec	Ioxynil + Bromoxynil
Ametryne	500 g/ℓ sc	Ametryne
Fortrol	500 g/ℓ sc	Cyanazine
Classic	250g/Kg df	Chlorimuron - Ethyl
Certrol DS	100 + 600 g/ℓ ec	Ioxynil 1+ 2,4-D
Sinbar	800 g/Kg	Uracil
Velpar	240 g/ℓ ec	Hexazinone
AC499	100g/ℓ	AC263,499
Bladex Plus	500g/ℓ sc	Cyanazine + Atrazine

5. Application details

Date of application : 17/12/1987
Applicator : Gas
Nozzle : 8004
Pressure : ± 2 Bars
Output : 252 ℓ ha^{-1}
Time : 11H45 - 14H15
Method : Over the row

6. Conditions at spray

Temp °C 8 am : 23,2
2 pm : 24,3

Rel Humidity % 8 am : 97
2 pm : 94

Sunshine hours : 0,9
Wind : Slight
Dew : None
General : Overcast and cool
Soil surface : Moist

Rainfall, (mm)

Day of spray : 0
Days to 1st rain : 2
Amount of 1st rain : 5,4
Total in 2 weeks : 11,2

7. Results

Table 1 : Visual phytotoxicity ratings of % leaf scorch (chlorosis + necrosis) and stunting about 20 days after treatment, and stalk measurements and counts at 101 days old

Treatments	Rates Kg or product ha^{-1}	% Scorch		Stunting*		Measurements			
		Clay	Sand	Clay	Sand	Heights		Counts	
						Clay	Sand	Clay	Sand
T 1 Diuron + Actril DS	2,5 + 1,25	5,5	8,8	4,1	3,8	20	19	27	19
T 2 MBSA 1997	1,5	4,3	5,6	4,8	4,6	21	24	26	19
T 3 MBSA 1997	3,0	6,6	9,6	4,7	4,4	21	23	30	20
T 4 MBSA 1997 + Ametryne	2,5 + 6	7,8	11,2	4,1	4,3	21	22	35	21
T 5 Fortrol + S	1,5	2,6	2,2	4,8	4,6	21	23	29	21
T 6 Fortrol + S	3,0	3,6	2,6	4,8	4,5	21	22	31	17
T 7 Fortrol + Diuron + S	3 + 4	19,0	20,0	4,0	3,6	21	20	30	18
T 8 Classic	0,140	8,5	8,5	4,3	4,3	21	22	32	21
T 9 Classic	0,280	7,6	8,0	4,1	4,2	19	22	25	21
T10 Classic + Diuron	0,280 + 4	17,5	11,2	3,1	3,8	21	21	34	20
T11 Classic + Ametryne	0,280 + 10	8,5	12,6	3,7	4,0	20	21	32	22
T12 Bladex Plus + Certrol DS + S	16 + 2	6,0	12,0	3,9	3,8	21	23	31	23
T13 Sinbar	1,5	11,3	56,6	3,7	3,3	20	18	33	16
T14 Sinbar	3	65,8	76,6	2,6	2,8	19	17	18	11
T15 Sinbar + Velpar	3 + 4	92,0	70,0	1,8	3,3	10	21	5	11
T16 AC499	3	15,0	15,5	3,9	4,1	19	22	32	24
T17 AC499	6	17,2	16,3	3,9	4,2	20	22	31	19
T18 Diuron + Actril DS	5 + 2,5	8,8	15,0	3,5	3,3	20	20	26	22
T19 Control	-	3,2	0	4,9	5,0	22	25	30	23

1 = Severe stunting 5 = No stunting

Table 2 : Main shoot length, tiller counts and fresh mass expressed as a percent of unsprayed control values at harvest and primary shoot counts at harvest

Treatments	Rates Kg or produced ha^{-1}	Clay				Sand			
		Length	No Tillers		Fresh Mass	Length	No Tillers		Fresh Mass
T 1 Diuron + Actril DS	2,5 + 1,25	85	7	86	88	84	8	86	66
T 2 MBSA 1997	1,5	92	7	85	97	104	8	90	100
T 3 MBSA 1997	3,0	94	8	95	97	97	8	83	87
T 4 MBSA 1997 + Ametryne	2,5 + 6	92	8	88	90	97	8	87	88
T 5 Fortrol + S	1,5	93	8	89	101	96	8	96	85
T 6 Fortrol + S	3,0	94	8	103	101	99	8	76	8
T 7 Fortrol + Diuron + S	3 + 4	87	8	97	80	68	7	66	48
T 8 Classic	0,140	96	8	101	107	102	8	82	98
T 9 Classic	0,280	73	6	91	82	91	8	104	94
T10 Classic + Diuron	0,280 + 4	91	8	101	92	87	8	76	65
T11 Classic + Ametryne	0,280 + 10	87	8	82	82	91	8	86	76
T12 Bladex Plus + Certrol DS + S	16 + 2	79	7	94	79	75	7	90	55
T13 Sinbar	1,5	88	8	89	81	63	6	47	33
T14 Sinbar	3	59	4	37	30	50	2	8	13
T15 Sinbar + Velpar	3 + 4	33	1	3	8	34	1	35	12
T16 AC499	3	74	8	131	67	68	8	147	67
T17 AC499	6	77	7	98	58	71	8	107	55
T18 Diuron + Actril DS	5 + 2,5	71	7	86	71	68	5	109	52
T19 Control	-	100	8	100	100	100	8	100	100
Actual values (control T19)		25	8	22	435	31	8	14	465
CV %		20,5	15,8	22,1	15,8	14,0	10,3	42,7	18,2
SED ±		11,8	0,63	12,8	9,1	2,04	0,41	2,83	32,9
LSD (0,05)		4,84	1,26	4,89	62,7	4,05	0,82	5,62	65,

6. Comments

All new products were tested at the proposed standard and double the standard rates. Some CV percentages were high.

Diuron + Actril DS (standard treatment)

The standard rate of the treatment was mildly toxic, being more so for cane in the sandy soil. Although fresh mass yield was substantially reduced in the sandy soil, losses did not reach levels of significance. At double the standard rate, yields were further reduced with trends remaining the same as greater damage appeared on the sandy soil.

MBSA 1997 and MBSA 1997 + ametryn

The double rate and this product appeared to reduce tillering and fresh mass more in the sandy soil. Comparisons with the standard and control indicate that this product is less phytotoxic than diuron + Actril DS, including when mixed with ametryn.

Fortrol + surfactant and Fortrol + Diuron + Surfactant

This product with surfactant was only slightly phytotoxic on cane, with the greater damage in sandy soil conditions. At double the rate, tillering of cane in the sand was significantly affected but fresh mass yield was not further reduced. The addition of diuron resulted in more leaf scorch and a further reduction in tillering and fresh mass yield particularly in the sand, being below both control and the standard treatment.

Classic, Classic + diuron and Classic + ametryn

The addition of diuron to this product increased scorch but had little further influence on yield in the clay soil. In the sandy soil the effect was more dramatic as stalk length, tiller numbers and fresh mass yield were reduced. The product on its own at both rates appeared safe for both soil types. The mixture with ametryn had a similar but less damaging effect on the crop in the sandy soil, while the yield for the clay soil was the same as that of the double rate of Classic alone.

Bladex Plus + Certrol DS + surfactant

Although yields were not reduced significantly for this mixture, results for both soil types were below that of the standard diuron + Actril DS treatment.

Sinbar and Sinbar + Velpar

Extreme leaf scorch and stunting resulted from this product particularly at the double rate and where a high rate of Velpar was included. Sinbar was more phytotoxic on the sandy soil where fresh mass yield was significantly reduced for all treatments including the standard rate. The product only appeared to be reasonably safe when applied alone at the standard rate to cane grown in clay soils.

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Despite leaf scorch and reduced stalk length for cane grown in both soil types, tiller formation appears to have been stimulated especially at the standard rate. However, fresh mass yields were still reduced to well below the control for both rates tested.