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SOUTH AFRICAN SUGAR ASSOCIATION
AGRONOMISTS' ASSOCIATION

Code : HW271/84/P
 Cat. No. : 1487

TITLE : PHYTOTOXICITY TO PLANT CANE OF INCORPORATED HERBICIDES

1. PARTICULARS OF PROJECT

This crop : Plant
Site : Shakaskraal Field Station
Region : North Coast Coastal
Soil System : Umzinto Coast Lowlands

Soil Form/series : Westleigh Rietvlei
Design : Randomised Blocks x 6 reps A and 3 Reps B
Variety : NCo376
Fertilizer/Ameliorants : N P K
 kg ha⁻¹ i.f. 21 67 -
 kg ha⁻¹ t/d 118 - 168

Soil Analysis : Date 27/4/84

pH	O.M.%	CLAY%	SILT%	F/SAND	M/SAND	C/SAND	CEC
5,3	1,50	11	11	54	20	4	4,8

ppm

P	K	Ca	Mg	Zn	Al
42	60	523	92	1,1	1

Age : 12.3 months Dates : (27/4/84 - 7/5/85)

Rainfall : 1141 mm L.T.M. : 1008 mm

Irrigation : 279 mm

TOTAL 1420 mm

Soil Description : Grey loamy sand on a porous layer of iron concretions which in turn overlies heavy clay

APPLICATION DETAILS

Date Sprayed : 27/4/84
Applicator : CP3 Lever operated knapsack
Nozzle : APM Green High Pressure Nozzle
Output : 310 l
Incorporation : By tractor-rotavator
Speed : 3 km hr⁻¹ High ratio 2nd gear
Incorporation : <1 minute after application

WEATHER CONDITION

Wind : No wind - satisfactory
Soil Condition : Very good tilth
Seedcane : Good quality
Depth of Furrow : ± 20 cm
Planting method : Laid end to end double chopped stick
Weed Situation : C. Rotundus and few broad leaves in the 'B' block. 'A' block weeds killed with 5 l Roundup x 2 application

2. OBJECTIVES :

To assess the safety and efficiency of a new butylate formulation in plant cane

2.1. MOTIVATION :

A new formulation of butylate is available and should be compared with the currently used Sutan Plus formulation

3. TREATMENTS :

BLOCKS			
A (6 REPS)		B (3 REPS)	
Control	C. rotundus removed	Control	Unweeded
Sutan Plus 12 l ha ⁻¹	C. rotundus removed	Sutan Plus 4 l ha ⁻¹	Unweeded
Genate Plus 12 l ha ⁻¹	C. rotundus removed	Genate Plus 4 l ha ⁻¹	Unweeded

Note on Treatments : C. rotundus was removed from block A by two applications of Roundup (5 l/ha) on 5th April and 18th April 1984. No other weeding was carried out in this trial.

4. EXPERIMENTAL PROCEDURE :

- Land preparation : The previous crop was ploughed out, volunteers removed and then the field was disc harrowed.
- Chemical application : On 5th April 1984 and 18th April 1984 Roundup (5 l/ha) was applied to block A plots only. On 27th April 1984 herbicides were applied and incorporated immediately by a tractor drawn rotary hoe.
- Planting : Furrows were drawn soon after chemical incorporation and cane setts planted.
- Assessment : Regular visual assessments were made of cane and weed growth. In all cases percent ground cover was used as a measure of weed growth.
- Weed control : Atrazine was applied to all plots immediately after planting at a rate of 3 l/ha to control broadleaf weeds.

5. RESULTS

Table 1 Daily Rainfall (mm) 26/4 - 9/5/84 At Planting and Incorporation

APR/MAY 84	26	27	28	29	30	1	2	3	4	5	6	7	8	9
RAINFALL	-	-	-	-	-	-	-	-	1.0	-	-	0.9	-	-

Table 2 Germination % and *C. rotundus* Stand and Broadleaf Assessment on 9/7/84 and 9/8/84

TREATMENTS	9/7/84 (74 DAYS)			9/8/84 (105 DAYS)
	GERMINATION %	C. ROT STAND	OTHER WEEDS	GERMINATION %
T1 Control C.rotundus removed	62	7,0	1,5	77
T2 Sutan Plus 12 l ha ⁻¹ C.rotundus removed	56	0,3	0,2	78
T3 Genate Plus 12l ha ⁻¹ C.rotundus removed	68	0,2	0,3	78
T4 Control Unweeded	53	68,0	1,3	63
T5 Sutan Plus 4 l ha ⁻¹ Unweeded	68	8,0	0,7	83
T6 Genate Plus 4 l ha ⁻¹ Unweeded	67	7,7	0,3	77

Table 3 Growth of Cane, *C. rotundus* Stand, Broadleaf and Grass Assessment on (13/8/84) 3,6 Months and (28/9/84) 5 Months of Age

TREATMENTS	13/8/84 (3,6 MONTHS)				28/9/84 (5MONTHS)			
	CANE	C. ROT	BROAD LEAF	GRASS	CANE	C. ROT	BROAD LEAF	GRAS
T1 Control C.rotundus removed	3,9	5,7	3,0	2,7	3,7	19,0	2,7	12,
T2 Sutan Plus 12 l ha ⁻¹ C.rotundus removed	3,8	0,3	1,0	0	3,5	1,3	1,3	0,
T3 Genate Plus 12l ha ⁻¹ C.rotundus removed	4,0	0,5	1,0	0	4,3	2,0	0,3	0,
T4 Control Unweeded	3,8	63,0	1,3	1,7	3,2	78	4,0	15,
T5 Sutan Plus 4 l ha ⁻¹ Unweeded	4,2	10,7	3,0	1,7	4,5	23	5,0	12,
T6 Genate Plus 4l ha ⁻¹ Unweeded	3,8	11,0	1,7	1,0	4,3	23	5,0	7,

Table 4 Weed Competition and Its Effect on Cane Growth, Stunting and Weed Stand Assessment

TREATMENTS	30/11/84		GROWTH MEASUREMENTS					
	CANE STUNT	GENERAL WEED STAND	HEIGHTS (cm)			COUNTS x 10 ⁻³ ha ⁻¹		
			6,1m	8,9m	9,8m	6,1m	8,9m	9,8m
T1 Control C.rot. removed	3,7	74,0	29	88	141	149	155	127
T2 Sutan Plus 12 l C.rot. removed	4,3	5,3	30	91	142	148	157	136
T3 Genate Plus 12l C.rot. removed	4,2	6,8	30	91	143	145	164	131
T4 Control Unweeded	3,2	75,0	30	81	118	81	98	99
T5 Sutan Plus 4 l Unweeded	5,0	38,0	35	94	139	144	138	115
T6 Genate Plus 4 l Unweeded	4,5	45,0	35	94	139	126	127	120

Table 5 Yield

TREATMENTS	t ha ⁻¹ CANE		SUCROSE % CANE		t ha ⁻¹ SUCROSE	
	C. ROT REMOVED	UNWEEDED	C. ROT REMOVED	UNWEEDED	C. ROT REMOVED	UNWEEDED
T1 Control	74	-	10,90	-	7,9	-
T2 Sutan Plus 12 ℓ ha ⁻¹	79	-	9,62	-	7,5	-
T3 Genate Plus 12 ℓ ha ⁻¹	83	-	9,59	-	7,9	-
T4 Control	-	40	-	13,18	-	5,3
T5 Sutan Plus 4 ℓ ha ⁻¹	-	76	-	11,71	-	8,8
T6 Genate Plus 4 ℓ ha ⁻¹	-	73	-	12,00	-	8,6
C.V. %	9,6	4,1	6,3	12,8	8,8	11,3
S.E. of Treatment Mean ±	3,07	1,49	0,26	0,91	0,28	0,49
L.S.D. (0.05)	9,67	5,85	0,81	3,58	0,88	1,93
(0.01)	13,76	9,71	1,16	5,94	1,26	3,20

Table 6. Crop characteristics at harvest and weed assessment

TREATMENTS	Stalk length (cm)	Stalk counts $\times 10^{-3} \text{ha}^{-1}$	% Ground Cover			Cane growth vigour
			Other grasses	Broad leaves	Cyperus rotundus	
T1 Control	187	109	64,3	3,3	-	4,2
T2 Sutan Plus 12 $\ell \text{ ha}^{-1}$	187	131	12,0	0,8	-	4,3
T3 Genate Plus 12 $\ell \text{ ha}^{-1}$	187	135	15,8	0,8	-	4,8
T4 Control	152	83	60,0	-	36,7	2,3
T5 Sutan Plus 4 $\ell \text{ ha}^{-1}$	183	123	18,3	-	31,7	4,3
T6 Genate Plus 4 $\ell \text{ ha}^{-1}$	181	118	25,0	-	18,3	4,7

Table 7. Third leaf % dm analysis sampled on 22/1/85 age at 8,9 months

Treatments	% dm						Zinc ppm	N/S Ratio
	N	P	K	S	Ca	Mg		
T1 Control (C.rot.removed)	1,58	0,19	0,99	0,15	0,21	0,21	23	10,3
T2 Sutan Plus 12 $\ell \text{ ha}^{-1}$ (" ")	1,53	0,18	0,92	0,15	0,19	0,21	18	10,4
T3 Genate Plus 12 $\ell \text{ ha}^{-1}$ (" ")	1,67	0,20	0,99	0,16	0,23	0,22	21	10,6
T4 Control (unweeded)	1,84	0,22	1,05	0,16	0,26	0,23	25	11,5
T5 Sutan Plus 4 $\ell \text{ ha}^{-1}$ (" ")	1,81	0,22	1,15	0,17	0,24	0,22	25	10,9
T6 Genate Plus 4 $\ell \text{ ha}^{-1}$ (" ")	1,75	0,22	1,03	0,16	0,25	0,23	25	11,1

Comments

1. Weed control

Weeds were slow to germinate in most plots at this time of the year. However, Cyperus rotundus populations did build up to 68% ground cover in untreated plots within 11 weeks while plots treated with the standard rates of butylate of both formulations built up to only 8% ground cover.

Effective weed control from these standard rates persisted throughout the crop growth period when compared with the untreated plots. Grass populations which were fairly well controlled by butylate treatments eventually became the dominant weeds in untreated plots.

Cyperus rotundus populations in plots treated with two applications of Roundup (but without butylate) were only slightly lower than in butylate treated plots which had no Roundup treatment.

2. Crop measurements

No negative effects were noticed from butylate treatments of either formulation on cane germination and early growth.

Later crop growth was affected markedly by weed competition in untreated plots particularly where no Roundup had been applied to control C. rotundus but also to a slight extent where it had been applied.

Some competition is also likely to have occurred in plots treated with standard rates of butylate but this was much less than occurred in untreated plots.

3. Yield

Cane

Highest yields of cane were produced by plots in which Roundup had been used to control C. rotundus initially and which had subsequently had double rates of butylate applied. This is likely to have been due primarily to the good weed control provided by these treatments and thus lack of weed competition.

Where Roundup only had been applied yields were similar to those plots which receive standard rates of butylate only.

The yield reduction due to no weed control in comparison to a single treatment of butylate was in the order of 45%.

Sucrose

Sucrose % cane was lower in all Roundup treated plots and this difference resulted in higher sucrose t/ha yields from plots treated with standard rates of butylate without previous Roundup applications.

Leaf analysis: Cane in all Roundup treated plots showed lower third leaf values for all nutrients than did cane in plots not treated with Roundup.

6. Conclusions

1. The new butylate formulation is similar in weed control efficacy and crop safety to the currently used formulation.
2. Remarkably effective and long term control of Cyperus rotundus and other weeds was achieved by standard application rates of butylate at this time of year.
3. The benefits in terms of C. rotundus control and crop yields which could have been expected from two treatments of Roundup did not materialise and a single application of butylate appeared to be as effective.