

SOUTH AFRICAN SUGAR INDUSTRY

AGRONOMISTS' ASSOCIATION

Code: HW230/82
Cat. No. 1349

Title: C. rotundus control (post-emergence)

1. Particulars of the project

This crop : Ratoon cane
Site : Cornubia Natal Estates
Region : N. Coast Coastal
Soil system : Berea
Soil form/series: Fernwood/Fernwood
Design : Random blocks
Variety : N8
Fertilizer : N P K
Top dressing 96 19 96
Nematicide
Temik : 15 kg/ha

<u>Soil analysis:</u> Date: 16.9.82				
pH	O.M.%	Clay%	Silt%	Sand % C.M.F
8,4	0,92	7	2	
ppm				
P	K	Ca	Mg	Na
>80	80	>1800	48	17
<u>Dates</u> Harvested ± 3 July 1982				
(mm)	<u>Rainfall</u>	<u>L.T.M.</u>	<u>% of LTM</u>	
July	6,2	21,7	28	
Aug	3,0	51,1	6	
Sept	30,3	85,4	35	
Oct	170,3	90,4	188	
Nov	53,9	105,8	51	
Dec	75,4	104,7	72	
Jan	81,7	134,6	61	
Feb	53,1	126,0	42	
Mar	53,2	117,9	45	

2. Objective: To test treatments for their effect on C. rotundus when applied post-emergence of the weed.

3. Treatments:

	<u>Chemicals (%ai)</u>	<u>Rate in kg or l prod/ha</u>
1.	Actril DS (70)	1,5
2.	MCPA (40) + S	7
3.	MCPA + S	10
4.	Ametryne (50) + Actril DS	4 + 1,25
5.	Ametryne + MSMA (72)	4 + 4
6.	Ametryne + MSMA	2 + 2
7.	Actril DS + MSMA	1,25 + 4
8.	MSMA	4
9.	MCPA + paraquat (20)	4 + 3

	Chemicals (% ai)	Rate in kg or ℓ prod/ha
10.	Velpar/Velpar (90)	0,75/0,6
11.	Velpar/diuron (80) + Actril DS	0,75/2,5 + 1,25
12.	Diuron + Actril DS/diuron + Actril DS	2,5 + 1,25/2,5 + 1,25
13.	Velpar/Velpar	0,375/0,375
14.	Roundup (side swipe)	10% solution

NB: Treatments 10-13 were split and applied on 16.9.82 or 11.11.82.

Experimental:

The site chosen had ratoon cane of variety N8 growing on a weak sand in which the C. rotundus infestation was very heavy.

Plot size was 4 m x 4 interrows x 1,4 m = 22,4 m² with a 1,5 m unsprayed strip left at the end of each plot.

Application details were:

Spraying dates :		16. 9. 82	25. 10. 82	11. 11. 82
Applicator	:	Gas operated knapsack sprayer		
Nozzle	:	APM Green	APM Green	APM Green (floodjet)
Pressure (bars)	:	2	1,5	1,7
Output (ℓ/ha)	:	284	245	257
Method	:	Directed across cane interrow		
Temperature °C	8 am	20,7	22,8	23,0
	2 pm	20,6	27,2	25,0
Rel. humidity %	8 am	79	67	68
	2 pm	83	55	64
Rainfall (mm):				
On the day of spray	:	3,0	1,6	0
Within 2 weeks of spray	:	3,4	150,8	5,9
Days to first rain	:	0	0	6
Amount of first rain	:	3,0	1,6	1,6
Sunshine hours	:	0,4	10,0	6,8

Regular visual ratings were made of the control of Cyperus rotundus. Grass weeds which occurred in the trial area were removed by hand or hoeing.

Counts of Cyperus rotundus plants (above ground) and tubers and buds (below ground) were made at various intervals. Sample sizes were 20 cm x 20 cm on the surface and 15 cm deep by the same area for subterranean measurements.

Two treatments, which showed better control than most others some seven months after the first treatment application, were sampled and the viability of tubers tested by replanting into pots and watering. Two samples were composited from one plot of each treatment.

Table 1 Mean visual ratings of *Cyperus rotundus* control as percent ground cover on 25th October or infestation as a percent of unsprayed control strips on all other dates

Treatment	Ratings							
	Method of rating	2	1*	2	2	2	2	2
	Date of assessment	21.9	25.10	11.11	30.11	13.12	3.1	4.2
1. Actril DS	-	59	50	39	40	69	90	
2. MCPA + S	-	71	55	50	66	91	100	
3. MCPA + S	-	56	43	35	59	88	90	
4. Ametryne + Actril DS	-	67	48	56	63	80	99	
5. Ametryne + MSMA x1	-	61	60	88	85	96	98	
6. Ametryne + MSMA x 0,5	-	47	88	96	88	99	100	
7. Actril DS + MSMA	-	48	43	54	68	89	100	
8. MSMA	-	67	58	88	83	90	100	
9. MCPA + paraquat	-	63	48	68	71	95	100	
10. Velpar / Velpar	19	56	100	85	50	46	44	
11. Velpar / diuron + Actril DS	17	54	100	55	26	50	79	
12. Diuron + Actril DS/diuron + Actril DS	22	78	100	98	55	54	99	
13. Velpar / Velpar	13	66	100	96	78	79	90	
14. Roundup	-	56	100	-	-	34	39	

* % Ground cover at spraying of treatments 1-9

Comments:

1. Treatment applied in September provided good temporary control which was however, no longer apparent on 25 October when late treatments were applied.
2. Higher than standard rates of hormone chemicals, eg. Actril DS (1,5 l/ha) and MCPA (10 l/ha) provided some control for two to three months but this was not generally acceptable.
3. MSMA treatments were short-lived in their effects which were eventually no better than unsprayed control strips.
4. The second application of treatments 10-13 enhanced control considerably and in particular treatments which had had an initial spray of Velpar at 0,75 kg/ha were superior.
5. Roundup provided an excellent kill where good contact was made with the weed.

Table 2 Mean number of C. rotundus plants or tubers per m² or m³ or as a percent of those in unsprayed control strip samples.

Treatment	C rotundus plants						C.rot:tubers	
	30 Nov A		4 Feb B		10 Mar C		10 Mar C	
	No/ m ²	% of Cont	No/ m ²	% of Cont	No/ m ²	% of Cont	No/ m ²	% of Cont
Actril DS	58	33	120	80	39	72	96	82
MCPA + S	118	65	135	106	43	94	89	66
MCPA + S	85	57	100	74	30	65	84	73
Ametryne + Actril DS	93	45	133	95	40	121	86	83
Ametryne + MSMA	155	83	140	92	31	83	108	101
Ametryne + MSMA	163	77	113	82	44	76	99	78
Actril DS + MSMA	118	68	130	106	38	80	123	115
MSMA	113	83	115	77	55	171	103	127
MCPA + paraquat	83	40	145	105	42	117	118	93
Velpar/Velpar	108	37	45	38	25	55	88	76
Velpar/ciuron + Actril DS	80	40	95	64	22	65	71	75
Diuron+Actril DS/diuron+Actril DS	153	114	148	107	56	149	120	99
Velpar/Velpar	113	73	78	49	43	117	83	83
Roundup	-	-	38	23	8	30	84	73

A = Mean of 2 replicates for % control - 1 treated 1 control sample per plot
or Mean of 4 replicates for No/m² - 1 treated sample per plot

B = Mean of 4 replicates - 1 treated 1 control sample per plot

C = 1 replicate - Mean of 2 samples treated, 2 control per plot.

Comments:

1. Early counts showed some reduction in plant numbers from hormone treatments and Velpar combinations. However, actual plant numbers per m² were very high for all treatments and none could be considered acceptable.
2. Later counts show a persistent effect from Velpar treatments particularly but also Roundup. These counts were made 4,5 months after the second application.
3. Tuber counts show large variations and little pattern of control although hormone treatments and Velpar combinations were generally better than other treatments.
4. Tuber numbers per m³ were high and no treatment could be considered adequate for the control of tuber numbers.

Table 3 Harvest results of planted tuber samples from Roundup and Velpar/Velpar (high rates) treatment plots

Treatment	Number of tubers planted	Yield		
		Number of tubers germinated*	%	New tubers
Roundup control	179	172	96	66
Roundup treated	181	101	56	52
Velpar/Velpar control	303	288	95	70
Velpar/Velpar treated	166	113	68	48

* Attached tubers (ie on chains) assumed to be new tubers as only individual tubers were originally planted

Comments:

1. Tubers taken from Roundup plots and Velpar/Velpar (high rates) plots and planted into pots showed less germination than tubers from control strips alongside these plots.
2. New tuber production was also less from treated plots.

Table 4 Numbers of above ground plants on 16th September (prior to spraying) and on 25th October and 11th November

Treatments (1 sample per plot)	Above ground parts								
	Old			New			Total		
	16.9	25.10	11.11	16.9	25.10	11.11	16.9	25.10	11.11
Velpar/Velpar (low rates)	51	44		4	12		55	56	
Velpar/Velpar (high rates)	46			11			57		
Diuron+Actril/diuron+Actril	26	36		4	17		30	53	
Velpar/Velpar (low rates)	6			9			15		
Velpar/Velpar (low rates)	3	20		0	23		3	43	
Diuron+Actril/diuron+Actril	20		27	1		33	21		60
Velpar/Velpar (low rates)	16			7			23		
Velpar/Velpar (high rates)	11	16		1	12	18	19	17	20

Old = plants which have regrown after old plants on the same tuber or bud have died back.

New = plants from new buds or tubers

Table 5 Numbers of below ground plant parts on 16th September (prior to spraying) and on 25th October and 11th November.

Treatments	Below ground parts											
	Total buds			Total tubers			Germinated buds			Germinated tubers		
	16.9	25.10	11.11	16.9	25.10	11.11	16.9	25.10	11.11	16.9	25.10	11.11
V/V (low)	40	29		93	202		12	19		16	37	
V/V (high)	21			154			9			21		
D+A/D+A	32	17		119	181		13	9		23	25	
V/V (low)	13			45			5			11		
V/V (low)	11	5		98	134		7	4		11	25	
D+A/D+A	20		0	105		210	9		0	18		26
V/V (low)	20			112			11			28		
V/V (high)	30	10	4	101	134	92	14	3	0	20	27	21

Comments:

1. At spraying, tuber numbers and plant numbers varied quite considerably between plots.
2. Sampling on 25th October showed an increase in the number of regrown old plants as well as new plant numbers from plots with low populations and the trend was similar for all treatments sampled.
3. Bud numbers decreased and tuber numbers increased fairly substantially from 16.9 to 25.10 in all treatments sampled. Again no obvious treatment effects were apparent although the sample number is too low for adequate comparisons.

Table 6 Leaf scorch and stunting ratings of cane taken on 21 September (5 days after first treatments), 11 November (17 days after second treatments) and 1 December.

Leaf scorch - %

Stunting 1-5 where 1 = very poor and 5 = very good growth.

Treatments	Ratings					
	Leaf scorch			Stunting		
	21.9	11.11	1.12	21.9	11.11	1.12
1. Actril DS	-	1	5		5	4,8
2. MCPA + S	-	1	9		4	3,8
3. MCPA + S	-	0	8		4	4,5
4. Ametryne + Actril DS	-	20	11		3	3
5. Ametryne + MSMA	-	30	22		3	3
6. Ametryne + MSMA	-	26	22		3	3
7. Actril DS + MSMA	-	15	19		4	4,3
8. MSMA	-	20	16		4	4
9. MCPA + paraquat	-	45	25		4	3,8
10. Velpar/Velpar	16	1	17		4	3,5
11. Velpar/diuron + Actril DS	18	1	14		5	4
12. Diuron+Actril/diuron+Actril	14	6	17		4	3,3
13. Velpar/Velpar	14	1	11		5	4,5
14. Roundup	-	0	0		5	5

Comments:

1. Treatments 10-13 caused chlorosis of cane but cane already showed symptoms of iron chlorosis prior to spraying. However, this effect was enhanced by herbicide treatments.
2. Severe scorch of cane foliage was caused by treatments which included ametryne, MSMA or paraquat but hormone treatments on their own caused little effect.
3. After the follow-up applications of treatments 10-13 more chlorosis was produced.
4. Stunting, although difficult to rate due to somewhat variable growth, showed some trends with ametryne + Actril DS, ametryne + MSMA, and diuron + Actril DS repeated being the worst treatments.

Table 7 Crop measurements taken on 2nd December 1982, 11 January and 22nd April 1983

Treatment	Stalk length (m)			Stalk population(1000/ha)		
	2.12.82	11.1.83	22.4.83	2.12.82	11.1.83	22.4.83
Actril DS	0,26	0,56	1,21	122	126	102
MCPA + S	0,24	0,50	1,23	128	123	92
MCPA + S	0,26	0,53	1,21	121	113	90
Ametryne + Actril DS	0,22	0,50	1,16	116	120	95
Ametryne + MSMA	0,22	0,48	1,17	100	114	96
Ametryne + MSMA	0,23	0,50	1,23	107	120	96
Actril DS + MSMA	0,28	0,55	1,30	113	114	109
MSMA	0,26	0,59	1,24	117	113	92
MCPA + paraquat	0,22	0,55	1,20	103	119	95
Velpar/Velpar	0,26	0,53	1,18	107	114	96
Velpar/diuron + Actril DS	0,25	0,54	1,26	112	124	96
Diu + Act/diu + Act	0,22	0,50	1,19	96	103	93
Velpar/Velpar	0,27	0,60	1,21	130	121	86
Roundup	0,25	0,59	1,29	122	129	102

Comments:

1. Ametryne and paraquat combinations as well as diuron + Actril DS (repeated) tended to reduce stalk length at an early age while repeated high rates of Velpar took longer to show effects.
2. No trend in stalk populations is apparent.
3. After extremely severe visible effects of cane foliar scorch and stunting, relatively little damage is apparent in terms of crop measurements. Treatments used were expected to cause severe damage to this sensitive variety (N8) growing in a weak sandy soil.
4. Roundup applied with a side swipe has not caused any marked effect on the cane growth notwithstanding the contact which did occur with lower leaves of some plants

Conclusions:

1. A fair 'knock down' of *Cyperus rotundus* was achieved for a limited period by hormone treatments alone, hormone combinations with ametryne or diuron and MSMA treatments.
2. The effects of MSMA treatments were shorter-lived than those of the standard recommended hormone mixtures.

3. The longest control and most efficient, was provided by Roundup and Velpar treatments, but only the higher rates of Velpar were superior to hormone treatments.
4. Some measure of long term reduction in plant numbers was achieved by these treatments, particularly from Roundup and Velpar, but tuber numbers were not affected. However, the viability of tubers and the potential for new tuber production was reduced in those plots sampled.
5. The reduction in plant numbers from most treatments in this high Cyperus rotundus population was such that it is unlikely that the competitive effects of the weed were eliminated. Observations of cane growth adjacent to the trial and in control strips would suggest that no benefit had been achieved from any of these treatments.
6. The long term reduction in plant numbers and reproductive capacity of the plants could have an effect on growth of the next ratoon. Observations on C. rotundus regeneration should be made after harvesting the present crop.

PETT/PMO
5. 7. 83