SOUTH AFRICAN SUGAR INDUSTRY

AGRONOMISTS' ASSOCIATION

CODE: HERB 1/90/SW/SIM 'S'

EXPERIMENT RESULT CAT. NO.: 1766

TITLE: PRE-EMERGENCE CONTROL OF SORGHUM VERTICILLIFLORUM AND BROADLEAF WEEDS

1. PARTICULARS OF PROJECT

This crop: Sorghum verticilliflorum	Soil Analysis: Date 23.08.90
Site : Simunye, Section 1 garden	
Region : Northern Irrigated (Swaziland)	pH 6.7 / OM% 3.9 / CEC* 22.41 / Clay% 41 / Silt% 13 / Sand% 47
Design : Randomised Blocks with Split plots and 6 replications	* me/100g soil
	ppm: P 31 / K 396 / Ca 3900 / Mg 807 / Zn -
Soil Set/ Series : 'S' Somerling	Dates : 18.07.90 - 25.09.90
Fertilizer (Kg/ha) : N 80 / P 30 / K 150	Rainfall : - Irrigation : 205 mm Total : 205 mm

2. OBJECTIVES

To test the effects of varying rates of Acetochlor and Metolachlor and combinations of these herbicides with Atrazine on the control of Sorghum verticilliflorum and broadleaf weeds.

3. TREATMENTS

3.1 Whole plots

1. Metolachlor A @ 1.35 l ha^{-1}
2. " A @ 1.80 l ha^{-1}
3. " A @ 2.25 l ha^{-1}
4. " A @ 2.70 l ha^{-1}
5. Acetochlor @ 1.35 l ha^{-1}
6. " @ 1.80 l ha^{-1}
7. " @ 2.25 l ha^{-1}
8. " @ 2.70 l ha^{-1}
9. Metolachlor B @ 1.80 l ha^{-1}

3.2 Sub plots

1. No Atrazine
2. Atrazine @ 3.00 l ha^{-1}

Note on Metolachlor

Metolachlor A and B refer to the same chemical under two different trade names (i.e. Falcon and Dual respectively).

4. EXPERIMENTAL

4.1 Seed Sowing

Seed of Sorghum Verticilliflorum were sown over the trial site on 18.07.90 then raked and rolled in.

4.2 Spraying Details

Spray date	:26.07.90	
Treatments	:Acetochlor & Metolachlor A	Atrazine & Metolachlor B
Applicator	:CO_2 knapsack and boom	CP3 knapsack + boom
Nozzle	:6 x 9505 Tee jets	5 x TK 2
Pressure	:2.40 bars	1,0 bar
Output	:220 l/ha	161 l/ha
Soil Moisture	: Dry at spraying	Dry at spraying
Time	: 07.00 a.m. - 10.00 a.m.	7.00 a.m. - 8.00 a.m.
Soil Temp. (Surface)	:07.00 a.m. 11° C	-
	09.00 a.m. 20° C	-
	10.00 a.m. 28° C	-
Max. Temp.	: 27.4° C	26.3° C
Min. Temp.	: 10.0° C	9.0° C
Relative R. Humidity	: 08.00 a.m. 85%	77%
	02.00 p.m. 33%	63%

Rainfall & Irrigation: 1 day after spraying - 8 mm
7 " " " - 25 mm
14 " " " - 25 mm
Irrigation at ± weekly intervals thereafter.

4.3 Assessment Methods

4.3.1 Visual ratings

Visual assessments were carried out 4 weeks after spraying by two independent assessors. Ratings were based on a 1-9 scale where:

1 = complete control
4 = just acceptable
5 = just unacceptable
9 = no control

Results of these assessments appear in Appendix 1

4.3.2 Plant Counts

Assessments were carried out at 4 and 9 weeks after spraying and consisted of counting the number of plants in a 0.5 m^2 frame at three randomly chosen positions in each plot and its adjacent control strip. Percent control was calculated for Sorghum and Broadleaf weeds as follows:

$$\% \text{ Control} = 100 - \left[\frac{\text{No. plants in treated plot}}{\text{No. plants in adjacent control}} \times 100 \right]$$

5. RESULTS

5.1 Control of Sorghum verticilliflorum

Table 1. Effect treatments on % control of Sorghum verticilliflorum at 4 and 9 wks after spraying

Main Treatments (l/ha)	4 Wks after spraying			9 Wks after spraying		
	No. Atraz.	+ Atraz.	Mean	No. Atraz.	+ Atraz.	Mean
Met. A @ 1.35	54	61	58	29	40	35
" 1.80	70	69	69	45	35	40
" 2.25	57	60	58	44	40	42
" 2.70	71	79	75	66	79	73
Acet. @ 1.35	79	77	78	59	64	62
" 1.80	78	69	74	66	56	61
" 2.25	89	83	86	75	74	74
" 2.70	87	87	87	71	71	71
Met. B @ 1.80	62	61	62	35	38	36
Means	71	73	72	54	56	55
Interaction	NS			NS		
LSD Main (0.05)	17.6			15.9		
Treatments (0.01)	23.6			21.2		
Significance	**			**		
LSD (0.05)	5.6			4.5		
Atrazine (0.01)	7.5			6.1		
Significance	NS			NS		
LSD Subplot (0.05)	17			14		
Same wholeplot (0.01)	22			18		
LSD Subplot (0.05)	21			19		
Diff. wholeplot (0.01)	28			25		
S.E. Trial	14.5			11.8		
CV%	20.2			21.5		

5.2 Control of Broadleaf weeds

Table 2. Effect treatments on % control of Broadleaf weeds at 4 and 9 wks after spraying

Main Treatments (l/ha)	4 Wks after spraying			9 Wks after spraying		
	No. Atraz.	+ Atraz.	Mean	No. Atraz.	+ Atraz.	Mean
Met. A @ 1.35	26	79	52	23	83	53
" 1.80	41	83	62	28	82	55
" 2.25	25	77	51	26	74	50
" 2.70	45	92	69	28	88	58
Acet. @ 1.35	68	94	81	57	90	73
" 1.80	55	94	75	55	85	70
" 2.25	83	88	86	79	81	80
" 2.70	77	97	87	75	95	85
Met. B @ 1.80	28	86	57	24	66	45
Means	50	88	69	44	83	63
Interaction	*			*		
LSD Main (0.05)	18.9			18.9		
Treatments (0.01)	25.2			25.2		
Significance	**			**		
LSD (0.05)	7.5			7.8		
Atrazine (0.01)	10.1			10.5		
Significance	**			**		
LSD Subplot (0.05)	23			24		
Same wholeplot (0.01)	30			31		
LSD Subplot (0.05)	25			25		
Diff. wholeplot (0.01)	33			34		
S.E. Trial	19.5			20.2		
CV%	28.3			32.0		

6. COMMENTS

6.1 General

Weed germination was characterstically variable over the trial site and CV's were relatively high for plant counts (but not for visual ratings). Despite the variability, treatment differences were large and consistent enough to be measured statistically.

6.2 Control of Sorghum verticilliflorum

Acetochlor provided significantly better pre-emergence control of Sorghum than Metolachlor at both assessment dates and at all rates examined. The degree of control tended to increase with increasing rates of both chemicals. The lowest rate of Acetochlor appeared to provide comparable control to the highest rate of Metolachlor.

The residual activity of Acetochlor was superior to that of Metolachlor at all but the highest rates where there were apparently no differences.

Control of Sorghum was unaffected by the addition of Atrazine to each herbicide.

6.3 Control of Broadleaf Weeds

The interaction between the main treatments and the addition of Atrazine was significant at both 4 and 9 weeks after spraying. The efficacy of both Metolachlor and Acetochlor was enhanced by the addition of Atrazine. Acetochlor provided better control of broadleaf weeds than Metolachlor when used alone. Mixtures of Acetochlor and Atrazine were superior to mixtures of Metolachlor and Atrazine at all rates tested.

The control of broadleaf weeds appeared to be rate dependent when Acetochlor was used alone but this trend was not evident with Metolachlor or when used with Atrazine.

The residual effects of the 'mixtures' was good in this trial. Weeds control was still acceptable 8 weeks after spraying and was only ± 6% worse than at 4 weeks after spraying on average.

7. CONCLUSIONS

* Results of this trial showed that Acetochlor controlled Sorghum verticilliflorum more effectively than Metolachlor both at 4 weeks and at 9 weeks after spraying.

* Acetochlor provided better control of broadleaf weeds than Metolachlor when used alone but weed control was still unacceptable. Broadleaf weed control was enhanced by the use of Atrazine and combination with Acetochlor tended to be more effective than combination with Metolachlor although the differences were not large.

AGK/PCH/vnm
06.05.91

APPENDIX 1

Mean Visual Rating of Grass and Broadleaf control 4 weeks after spraying

Main Treatments (l/ha)	1st Assessment			2nd Assessment		
	No. Atraz.	+ Atraz.	Mean	No. Atraz.	+ Atraz.	Mean
Met. A @ 1.35	7.2	6.3	6.7	7.2	5.8	6.5
" 1.80	6.3	5.7	6.0	6.8	5.8	6.3
" 2.25	6.5	5.7	6.1	6.0	5.3	5.7
" 2.70	5.2	4.8	5.0	4.8	3.8	4.3
Acet. @ 1.35	4.8	4.8	4.8	4.5	3.7	4.1
" 1.80	5.5	4.5	5.0	4.2	2.8	3.5
" 2.25	4.3	4.0	4.2	3.0	2.5	2.7
" 2.70	4.8	4.2	4.5	4.2	2.8	3.5
Met. B @ 1.80	7.2	6.0	6.6	7.2	6.5	6.8
Means	5.8	5.1	5.4	5.3	4.3	4.8
Interaction	NS			NS		
LSD Main (0.05)	0.7			0.9		
Treatments (0.01)	1.0			1.2		
Significance	**			**		
LSD (0.05)	0.2			0.2		
Atrazine (0.01)	0.3			0.3		
Significance	**			**		
LSD Subplot (0.05)	0.7			0.7		
Same wholeplot (0.01)	0.9			1.0		
LSD Subplot (0.05)	0.9			1.1		
Diff. wholeplot (0.01)	1.2			1.4		
S.E. Trial	0.6			0.6		
CV%	10.9			12.9		

Key 1 = complete control, 5 = just unacceptable, 9 = no control