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EFFECT OF MSMA ON GROWTH OF RHODES GRASS AND CREEPING BLUE GRASS IN THE GLASSHOUSE

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SUMMARY

MSMA (monosodium methanearsonate) was applied at four rates (0, 2, 4 and 8 kg ha^{-1}) to Rhodes grass (*Chloris gayana* cv. Pioneer) and creeping blue grass (*Bothriochloa insculpta*) grown in pots in a glasshouse. The treatments were made to the three-leaf and tillering growth stages.

MSMA was highly phytotoxic to creeping blue grass at all rates at both growth stages. With Rhodes grass dry matter yield was significantly reduced only at the 8 kg ha^{-1} rate applied at the three-leaf stage. Plant survival and tiller number of Rhodes grass were not affected by rate of application of MSMA at either growth stage.

I. INTRODUCTION

Johnson grass (*Sorghum halepense*) is increasing as a major weed of roadsides on the eastern Darling Downs. Millhollon (1969) obtained post-emergence control of established and seedling Johnson grass on ditchbanks with repeated applications of MSMA (monosodium methanearsonate) at 4 kg ha^{-1}. Couch grass (*Cynodon dactylon*) tolerated the herbicide applications and rapidly dominated the treated areas.

The pot work reported here preceded field trials aimed at replacing roadside Johnson grass by chemical suppression of the weed, followed by the introduction and establishment of a non-offensive perennial grass species. One requirement of the introduced species was that it be relatively tolerant of MSMA so that the herbicide could be applied for selective control of Johnson grass seedlings during its establishment phase. Two species that could be successful as introduced replacement species for suppressed Johnson grass were Rhodes grass (*Chloris gayana*) and creeping blue grass (*Bothriochloa insculpta*).

The aim of this experiment was to investigate the tolerance of Rhodes grass and creeping blue grass to single applications of MSMA at two growth stages, in the glasshouse.

II. MATERIALS AND METHODS

Rhodes grass and creeping blue grass were grown in 10·5-cm-diameter pots in a glasshouse. The treatments were all combinations of the two grasses by four rates of application of MSMA (0, 2, 4 and 8 kg ha^{-1}) by two growth stages (3-leaf and tillering). The herbicide formulation used was 'Daconate 8' (80% w/v MSMA). Each treatment was replicated four times in a randomized block design.

Herbicide applications to both growth stages were made concurrently to avoid the complication of different environmental variables (before, during and after spraying) affecting phytotoxicity of MSMA. This necessitated planting the pots of the tillering treatments approximately one month before the pots of the three-leaf treatments. Harvest dates also differed so that all treatments were grown for an equal period. Planting, spraying and harvest dates are shown in table 1.

TABLE 1

PLANT, SPRAYING AND HARVEST DATES

Growth Stage at Spraying	Date of Planting	Date of Spraying	Date of Harvest	Days from Spraying to Harvest
Three-leaf	1 Sep 75	17 Sep 75	11 Nov 75	55
Tillering	29 Jul 75	17 Sep 75	10 Oct 75	23

The pots contained equal weights of air-dried, alluvial clay soil. Eight pre-germinated one-leaf seedlings were transplanted into each pot. The pots had been watered to field capacity. Each pot was later thinned to four seedlings of apparently uniform vigour. Several pots had only three plants at spraying and adjustment was made at analysis for the number of plants per pot. The pots were re-randomized weekly through the experiment. Optimum conditions of soil moisture and nutrition were maintained through regular watering and periodic additions of a complete nutrient solution.

The nominated three-leaf applications were made when both species had developed three to four expanded leaves. The tillering applications were made when Rhodes grass had developed a mean of 5·4 tillers per plant and creeping blue grass 4·4 tillers per plant. The herbicide treatments were applied outside the glasshouse using an Oxford Precision Sprayer. Volume rate was 225 l ha^{-1}, delivered at a pressure of 210 kPa. Air temperature was 28°C.

Observations of phytotoxicity symptoms were made 2 and 8 days after spraying. About 10 weeks after planting the number of live plants per pot and number of live tillers per plant were determined. The above-ground portions of live plants were then cut at ground level, combined for each pot, oven-dried and weighed.

III. RESULTS AND DISCUSSION

Visual ratings of phytotoxicity 8 days after herbicide application are shown in table 2. MSMA, at all rates, had caused extensive leaf necrosis to both growth stages of creeping blue grass. Leaf necrosis in Rhodes grass was slight, even at the highest rate of application.

Harvest results of percentage plant survival, plant tiller number of dry matter yield are shown in table 2. With Rhodes grass, MSMA did not significantly affect percentage plant survival or tiller number per plant, irrespective of growth stage treated or rate of application. Dry matter yield of Rhodes grass was significantly reduced at 8 kg ha^{-1} applied at the three-leaf stage, but not affected at the lower rates of application at that stage. Dry matter yield of Rhodes grass treated at the tillering stage was not significantly affected by rate of MSMA.

MSMA eliminated creeping blue grass at all rates of application at the three-leaf stage and at 4 and 8 kg ha^{-1} at the tillering stage. With 2 kg ha^{-1} at the tillering stage there was a 16% reduction in plant number. However dry matter yield was reduced by 84% compared with the yield of untreated controls.

TABLE 2

INFLUENCE OF MSMA ON LEAF NECROSIS AND ON PLANT GROWTH AT HARVEST

Grass Species, Growth Stage, and Rate of MSMA (kg ha^{-1})	Necrosis Rating*	Harvest Measures			
		Plant Survival Percentage†		Live Tillers Per Plant	Dry Matter Yield†‡ per Pot (gm)
		Trans. Means (Inverse Sine)	Equiv. Means		
Rhodes grass 3-leaf					
0	0	1·57	100	9·52	19·82 (100)
2	0	1·57	100	10·88	20·05 (101)
4	0	1·57	100	8·50	18·45 (93)
8	16	1·37	96	11·00	15·95 (80)
Rhodes grass tillering					
0	0	1·57	100	10·13	12·13 (100)
2	3	1·57	100	10·19	11·13 (92)
4	4	1·57	100	9·88	11·30 (93)
8	11	1·57	100	9·38	10·33 (85)
Creeping blue grass 3-leaf					
0	0	1·57	100	10·06	8·78 (100)
2	65	0·00	0	0·00	0·00 (0)
4	98	0·00	0	0·00	0·00 (0)
8	98	0·00	0	0·00	0·00 (0)
Creeping blue grass tillering					
0	0	1·57	100	9·92	2·80 (100)
2	48	1·16	84	4·67	0·44 (16)
4	63	0·26	7	0·00	0·00 (0)
8	75	0·15	2	0·00	0·00 (0)
L.S.D. (5%)	N.A.	0·23		2·29	1·84
(1%)		0·31		3·08	2·48

* Mean percentage of leaf area necrotic. (Visual rating 8 days after spraying).

† Adjusted for number of plants per pot at time of spraying.

‡ As a percentage of untreated control in brackets.

N.A. Not analysed.

The greater dry-matter yields of the three-leaf controls, compared with the tillering controls of both grass species, reflect the higher temperatures during the later growth period of the later-harvested three-leaf treatments.

The results indicate that MSMA could be used for selective control of Johnson grass seedlings and re-growth from rhizomes during the establishment phase of introduced Rhodes grass on roadsides. Creeping blue grass is not tolerant to MSMA and therefore field evaluation of that grass for replacement of Johnson grass on roadsides is not warranted.

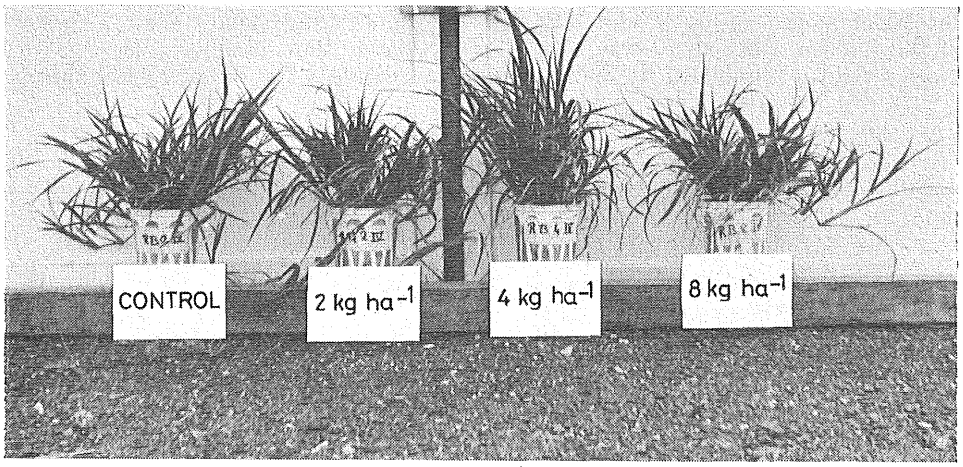

Figure 1. Tolerance of Rhode's grass to MSMA Five tiller stage.

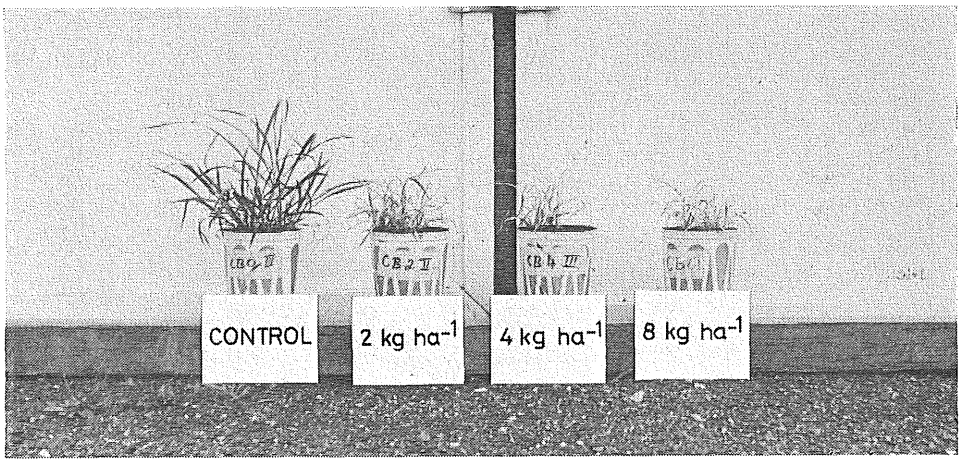

Figure 2. Tolerance of creeping blue grass to MSMA Four tiller stage.

REFERENCE

MILHOLLON, R. W. (1969).—Control of Johnson grass on drainage ditchbanks in sugarcane. *Weed Science* 17:370-73.

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