SILVER GRASS (*VULPIA* SPP.) CONTROL IN CLOVER AND LUCERNE

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Summary. Field trials were established in South Australia in 1989 to assess various herbicide treatments for the control of silver grasses, *Vulpia bromoides*, *V. myuros* and *V. fasiculata*, in legume pastures. The results supported earlier work in New South Wales and Western Australia where early post-emergence applications of simazine ± paraquat gave good silver grass control in subterranean clover. The most effective treatment was 500 g.a.i. simazine + 25 g.a.i. paraquat/ha which gave an average of 90% silver grass control in five trials. The highest rate of simazine tested, 750 g.a.i./ha, was satisfactorily tolerated by subterranean clover, *Trifolium subterraneum*, balansa clover, *T. balansae*, and lucerne, *Medicago sativa*.

INTRODUCTION

Silver grasses, *Vulpia* spp., are common weeds of pastures in South Australia. Squirrel tail fescue, *V. bromoides*, and rat's tail fescue, *V. myuros*, occur throughout the settled areas of the State, particularly in the higher rainfall areas (3). Sand fescue, *V. fasiculata*, is a serious problem in crops and pastures in the Southern Mallee and Upper South-East (3,4).

Silver grasses compete with desirable pasture species. When green they are palatable to stock but have little feed value. The sharp-pointed mature seeds are a major cause of stock injury and vegetable fault in wool (3,4). Based on estimates in a report commissioned by the Australian Wool Corporation (7) losses to the sheep industry caused by silver grasses would be of the order of $40 million per annum.

There is a need for cheap selective herbicide treatments to control silver grasses in legume pastures. Post-emergence applications of relatively low rates of simazine have given good silver grass control in subterranean clover in Western Australia and New South Wales (1,2,5,6). Promising treatments from this interstate work were examined in field trials in South Australia in 1989 to assess silver grass control under local conditions and across a range of pasture legumes. Two experimental herbicides, Select® (240g/L clethodim) and Pursuit® (200 g/L imazethapyr) were also included in the trials.

METHODS

Six field trials were established in South Australia in 1989 but one was sprayed too late (17 August 1989) to demonstrate significant differences between treatments and will not be reported in this paper. Details for the remaining five trials are given in Table 1.

Table 1. Site and application details for silver grass trials - South Australia, 1989.

Location:	Parawa	Delamere	Mintaro	Marrabel	Meningie
Spray date:	24.5.89	24.5.89	6.6.89	26.6.89	12.7.89
Soil type:	loam	clay loam	clay loam	clay loam	sand
Soil pH:	5.5	5.3	5.5	6.2	6.5
Silver grass and growth stage:	*V.bromoides* 3-4 leaves	*V.bromoides* 3-4 leaves	*V.myuros* tillering	*V.bromoides* tillering	*V.fasiculata* tillering
Pasture legume and growth stage:	sub-clover 3 true leaves	sub-clover 3 true leaves	balansa clover 0-6 true leaves	sub-clover 5 cm rosettes	lucerne grazed crowns

Herbicide treatments were applied with a hand-held, 2 m wide spray-boom delivering 150 L water/ha. Experimental design was a randomised complete block with four replicates and plot lengths of 10 m. The soil surface was moist at spraying in all five trials.

Silver grass control was assessed by visual estimates and by measurements of percentage ground cover or seed head density. Legume tolerance was assessed by visual estimates, percentage ground cover and, at Mintaro, by seed yields collected with a Hege small-plot harvester. Results were subjected to analyses of variance.

RESULTS AND DISCUSSION

Silver grass control. Data on silver grass control are given in Table 2. On average, simazine + paraquat at 500+25g/ha gave the best control, followed by clethodim at 24 g/ha, paraquat at 150 g/ha, simazine at 750 g/ha and simazine + paraquat at 250+25 g/ha. The addition of 25 g/ha paraquat to simazine markedly improved silver grass control compared to the equivalent rate of simazine alone. There were significant differences amongst the sites. Propham was effective only at Parawa and Delamere where it was applied to young silver grass plants. Simazine and imazethapyr appeared to be more active on the sandy soil at Meningie.

Table 2. Silver grass control in South Australia field trials, 1989.

Herbicide	Rate (g.a.i./ha)	Silver grass control (%)[a] Parawa	Delamere	Mintaro	Marrabel	Meningie	All sites
simazine	250	7	13	24	8	34	17
simazine	500	62	2	34	47	89	47
simazine	750	62	44	97	68	98	74
paraquat	75	99	69	77	18	71	67
paraquat	150	97	75	87	46	84	78
simazine + paraquat	250+25	91	47	81	61	85	73
simazine + paraquat	500+25	98	73	93	87	98	90
simazine + fluazifop	500+53	40	11	71[b]	5	68[c]	39
diuron	375	0	0	15	20	13	10
paraquat + diuron	150+250	95	51	89	64	77	75
clethodim	120	94	13	68	6	44	45
clethodim	240	99	67	98	43	90	79
imazethapyr	100	19	0	24	2	71	23
imazethapyr	200	65	13	21	54	88	48
propham	3375	81	95	64	31	49	64
untreated		0	0	0	0	0	0
LSD(5%)		64	42	29	34	18	16
untreated (heads/m^2)		191		1072	1474	651	
untreated (% ground cover)			55				

a % silver grass control at Delamere is estimated from reduction in ground cover. At all other sites it is estimated from reduction in density of silver grass seed heads.
b. This treatment applied on 26.6.89. All other Mintaro treatments applied on 6.6.89.
c. This treatment not applied at Meningie. % control, and therefore mean of all sites, are estimated values.

Pasture legume tolerance. The first assessment of each field trial was not made until at least six weeks after spraying, so any transient damage to pasture legumes following herbicide application would have passed undetected. No significant subterranean clover or lucerne damage was observed once assessments commenced but simazine at 500 and 750 g/ha may have caused slight damage to balansa clover.

Pasture composition was estimated by percentage ground cover at Delamere, Marrabel and Meningie. The legume ground cover increased significantly in some treatments at Delamere and Meningie where silver grass was effectively controlled. In no case was the legume proportion significantly reduced compared to the untreated pasture.

At Mintaro all herbicide treatments produced balansa clover seed yields equal to or better than the untreated pasture but, because of high variability amongst plots, only four treatments gave statistically significant increases. These were the two mixtures of simazine + paraquat, simazine at 750 g/ha and clethodim at 240 g/ha which gave seed yields of 262-272 kg/ha compared to 92 kg/ha from the untreated pasture.

Other effects

Grasses. Clethodim controlled all other grasses at every site except Delamere. Paraquat at 75 g/ha damaged annual ryegrass, *Lolium rigidum*, at Parawa and controlled it at 150 g/ha. The higher rate of paraquat suppressed grasses at the other four sites but the lower rate had little effect, except at Delamere. Imazethapyr suppressed annual ryegrass at Parawa and Mintaro, and suppressed perennial veldt grass, *Ehrharta calycina*, at Meningie. Simazine appeared to have little effect on grasses other than silver grass.

Capeweed, Arctotheca calendula. Capeweed was a major component of the pasture at all sites except Mintaro and was the only broad-leaved weed for which reliable control data were obtained. Diuron suppressed or controlled capeweed at the four sites and imazethapyr suppressed it at Parawa and Meningie. The percentage ground cover of capeweed at Meningie and Delamere significantly increased in several treatments that successfully controlled silver grass.

Bare ground. All treatments except diuron and 250 g/ha simazine significantly increased the amount of bare ground at Meningie. The lucerne population was 15 plants/m^2 which occupied 7% of the ground area in the untreated pasture along with 69% silver grass and 8% bare ground. Bare ground ranged up to 70% where silver grass was controlled. Marrabel had 6% clover and 65% silver grass ground cover in the untreated pasture. All treatments except diuron and 250 g/ha simazine raised the amount of bare ground and eight produced significant increases. Paraquat at 375 g/ha, and 750 g/ha $\pm$ diuron, significantly increased the bare ground at Delamere.

Conclusions. Simazine at 750 g/ha gave good silver grass control in some field trials in South Australia in 1989. Simazine at 500g/ha gave commercially acceptable control at only one site. Further work should examine the variables that influence simazine activity. Simazine appeared to control silver grass only and was tolerated by subterranean clover, lucerne and balansa clover, although there were signs that balansa clover may have a lower safety margin. The addition of 25 g/ha paraquat to simazine markedly improved silver grass control with little or no damage to other species.

Paraquat at 75 and 150 g/ha gave good silver grass control in most cases but has the potential to damage other species and reduce pasture production in the period immediately following spraying, although the pasture may recover. Clethodim at 240 g/ha showed good prospects for silver grass control. Young plants may be controlled by 120 g/ha. These rates are 2 to 4 times the proposed commercial rates that control other grass species and will therefore be relatively expensive. Diuron had no effect on silver grass but controlled broad-leaved weeds, particularly capeweed, and may be suitable for tank-mixes where broad-spectrum weed control is desired.

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