SCREENING SUBTERRANEAN CLOVER CULTIVARS FOR THEIR TOLERANCE TO SIMAZINE

D.J. Conlan[A], B.S. Dear[A], B. Milne[B], R.Gammie[B] and G.A. Sandral[A]
NSW Agriculture and Fisheries
[A] Agricultural Research Institute, PMB, Wagga Wagga 2650
[B] Agricultural Research & Veterinary Centre, Forest Road, Orange 2800

Summary. The tolerances of six cultivars of subterranean clover to the herbicide simazine, were evaluated at Wagga Wagga and Manildra NSW in 1989. Cultivars were found to vary significantly in their tolerance to simazine with 0.63 kg/ha reducing herbage yields by 37% (Trikkala) to 73% (Karridale) at Wagga Wagga. Yield depressions at Manildra were less than those observed at Wagga Wagga. Karridale was the most sensitive cultivar at both sites and Trikkala amongst the most tolerant.

INTRODUCTION

The increasing dominance of annual grasses particularly *Vulpia* spp.in pastures and crops on the slopes and tablelands of New South Wales(1) has led to interest in herbicides for their control. This is desirable to improve the proportion of legume in the pasture and to restrict the carry over of diseases which can affect subsequent cereal crops. Use of simazine has considerable promise for the control of *Vulpia* spp.(A. Leys, personal communication). Applied at relatively low rates, preliminary information suggests that this chemical can be used to suppress *Vulpia* spp. while allowing the subterranean clover component to increase (2).

If the proportion of subterranean clover in annual pastures is to be encouraged through the use of herbicides, it is important to determine if there is any difference in the response of subterranean clover cultivars to simazine so that recommendations can be made accordingly. Experiments conducted at two sites in 1989 evaluated the sensitivity of six cultivars of subterranean clover to simazine.

METHODS

Dalkeith (85) Seaton Park (109), Trikkala (114), Junee (127), Woogenellup (130) and Karridale (140) were selected as representative of the major cultivars grown in New South Wales. The maturity ranking, expressed as days to 5% flower at Perth, is given in brackets. They were sown in a split plot design with four replicates at two locations. The first site was a red earth soil (7% sand, 74% silt, 19% clay) at the Agricultural Research Institute at Wagga, while the second was on a granite derived soil at the Manildra Field Station west of Orange. Main plots were 0.63 and 1.25kg simazine/ha. The six subterranean clover cultivars were the sub plots (2x6m). The Wagga Wagga site was sown on 8th June 1989 with a cone seeder with the seed placed at 1 to 2 cm. The Manildra site was sown on 25th May 1989 by hand and gently raked to cover the seed. At both sites the clover was sown at 40 kg/ha with 200 kg/ha of molybdenum superphosphate.

The number of seedlings established was counted prior to herbicide application. Simazine was applied at the 4-5 trifoliate leaf stage at Wagga Wagga. At the Manildra site the leaf number at spraying for each cultivar was; Junee 3-8, Seaton Park 3-5, Trikala 4-6, Dalkeith 3-6, Karridale 4-5 and Woogenellup 6-8. The herbicide was applied in 100 L water/ha using a hand held gas pressured boom spray on 3rd August at both Wagga Wagga and Manildra sites.

Herbage yield was measured at both sites by cutting 0.25 m^2 quadrats and drying the material in a dehydrator for 48 hours at 80^0C.

The data was statistically analysed using analysis of variance and the Genstat 5 program.

RESULTS

In the six day period following the simazine application at the Wagga site 25 mm of rain was received while at Manildra 28 mm of rain fell within 8 days of spraying. The 0.63 kg/ha rate caused no obvious leaf scorching on any of the cultivars but marginal leaf scorching was apparent on all cultivars at the 1.25kg/ha rate at both sites and was more severe at the Wagga Wagga site.

Six weeks after spraying subterranean clover leaves were a brighter green in the treated plots than the untreated plots, the difference being most noticeable in cultivars such as Junee which characteristically in winter have a heavy anthrocyanin pigmentation.

Measurements on October 5 at Wagga Wagga showed there were significant differences between cultivars in the extent of herbage dry matter yield reductions (table 1). Herbage yield of all cultivars was significantly depressed by 0.63 kg simazine/ha and the 1.25 rate caused a further significant decrease in herbage in all cultivars.

Table 1. Herbage yields (kg dm/ha) of six cultivars of subterranean clover at Wagga Wagga on October 5, sprayed with 0, 0.63 and 1.25 kg simazine on August 3.

Simazine Rate	Cultivar					
	Dalkeith	Seaton Park	Trikkala	Junee	Woogenellup	Karridale
Kg ai/ha						
0	4910	5420	3765	4692	4459	4628
0.63	2479	2277	2366	2178	2063	1254
1.25	697	918	1100	963	1256	456

LSD 5% within varieties 514
LSD 5% within simazine rates 534

The degree of herbage yield suppression at the Manildra site was much less than at the Wagga Wagga site and ranged from 21% to 56% at the 0.63 kg/ha rate and from 15% to 34% at the 1.25 kg/ha rate.

The cultivar sensitivity rankings followed a similar pattern at both sites with Karridale being the most sensitive and Trikkala and Dalkeith the most tolerant. The only exception was Dalkeith which went from relatively tolerant at the low herbicide rate to highly susceptible at the high simazine rate, but only at the Wagga Wagga site.

DISCUSSION

The results of these experiments demonstrated significant differences between subterranean clover cultivars in their tolerance to simazine. These results support those of Evans et al. (1989) who observed variable tolerance to a range of broadleaf herbicides between subterranean clover cultivars (3).

The results to date are based on only one years data and need to be repeated. At both sites Karridale was the most sensitive cultivar and Trikkala amongst the most tolerant. The relative ranking of the other cultivars varied depending on site although were consistent between herbicide rates at a particular site.

Cultivar sensitivity did not appear to be related to its maturity ranking.

The magnitude of the herbage yield suppression with 0.63 kg/ha of simazine, which averaged 54% at the Wagga Site and 22% at the Manildra site, was larger than expected based on field observations on other experiments (A. Leys, personal communication).

While we demonstrated large yield depressions at relatively low rates of herbicide when applied to pure legume swards, these results should not be extrapolated to grassy swards. It is possible that the absence of weed species increased the uptake of the herbicide by the clover. Alternatively, the fact that the trial was sown in the year of spraying may have resulted in increased uptake of the herbicide. Further work is required to determine the reason for the variation in the magnitude of the yield suppression between the two sites and why the effects generally were more severe than normally observed in the field.

ACKNOWLEDGMENTS

The project was financially supported by the Australian Wool Research Development Fund. Mr. B Cullis conducted the statistical analysis.

REFERENCES

1.Leys, A.R. and Dellow, J.J. (1986). Working papers Annual Grassweeds in Winter Crops, Workshop 147-52.
2.Leys, A.R. and Plater, B. (1989). Australian Weeds Research Newsletter No. 38. 19-20.
3.Evans, P.M., Smith, R.S., Carpenter, J.A. and Koen, T.B. (1989). Aust. J. Exp. Agric. 29 785-9.