WEED CONTROL IN LEGUMES

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Summary

Several herbicides were tested for weed control in sown rows of sainfoin (*Onobrychis viciifolia*), red clover (*Trifolium pratense*), and white clover (*T. repens*). Buthidazole at 0.5 kg/ha gave acceptable weed control with a minimum of damage to red clover. Methabenzthiazuron, simazine, and trifluralin gave reasonable weed control with some legume damage at the heavier rates. Atrazine and cynazine gave good weed control but legume damage resulted at the heavier rates (1 and 2 kg/ha).

INTRODUCTION

The maintenance of pure swards of legumes for multiplication and certification purposes, and animal feeding trials, has created problems at Grasslands Division. Legumes are usually sown in rows and the areas are too large for adequate hand or mechanical weed control measures to be effective. Although the recommended chemicals such as 2,4-DB and MCPB (Matthews 1975) have been used, the spectrum of weed control obtained has not been satisfactory. In an effort to improve weed control, it was decided to test a range of herbicides.

METHOD

The experiment was conducted at Grasslands Division's 'Aorangi' research area on a Kairanga silt loam. Herbicides used are shown in Table 1. Test legumes sown were white clover, red clover and sainfoin. All herbicides except trifluralin were applied at two rates (Table 1) with the three legumes randomized within each plot as sown rows. Spray plots were 1.2 x 4 m and there were two replicates of all treatments. Trifluralin was applied before sowing (22 October 1976) and incorporated to 5 cm depth. Six pre-emergent herbicides were applied on 27 October 1976 and the post-emergent herbicides MCPB and 2,4-DB were applied on 29 November 1976.

Scores were taken on a percentage ground cover basis for weed control on 6 December 1976, 13 December 1976 and 20 January 1977 and data transformed to square root arcsine per cent for analysis. Sown legume growth scores were taken on the last two dates. Data presented are the means of all scores taken.

The major weeds present were fathen (*Chenopodium album* agg), black nightshade (*Solanum nigrum*), willow weed (*Polygonum persicaria*) with some twin cress (*Coronopus didymus*), sow thistle (*Sonchus oleraceus*), chickweed (*Stellaria media*), and redroot (*Amaranthus powellii*). Volunteer white clover from buried seed was also present.

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Pasture Weeds

RESULTS

Growth of sainfoin was not significantly reduced by any herbicide, but treatments giving effective weed control damaged both clover species in most cases (Table 1). Although not significantly reducing sainfoin growth, atrazine and cynazine did show some short-term reduction soon after emergence. Red clover growth was reduced by the heavier rates of atrazine, cynazine, simazine, buthidazole (formerly Vel 5026) and methabenzthiazuron. All chemicals except MCPB, dinoseb acetate, and the lighter rate of 2,4-DB reduced white clover growth.

TABLE 1: Weed control scores and growth scores of legumes treated with herbicides (relative to control = 100)

Herbicide	Rate kg/ha	Weed score	Growth scores		
			sain- foin	red clover	white clover
Control	0	100 a	100 a	100 a	100 a
MCPB	0.8	81 ab	92 a	76 abcd	84 ab
	1.6	78 ab	96 a	85 abc	77 abc
2,4-DB	0.8	93 a	96 a	93 ab	88 ab
	1.6	80 ab	84 a	83 abcd	60 bcd
dinoseb acetate	2.0	76 ab	105 a	101 a	76 abc
	3.0	77 ab	85 a	87 abc	76 abc
trifluralin	0.75	44 cd	92 a	87 abc	41 cdef
methabenzthiazuron	1.5	57 bc	95 a	75 abcd	60 bcd
	3.0	25 ef	91 a	39 cde	10 fg
buthidazole	0.5	38 cde	102 a	76 ab	42 cdef
	1.0	17 f	86 a	33 de	16 efg
simazine	1.0	52 cd	85 a	76 abcd	49 bcde
	2.0	46 cd	81 a	54 bcde	46 cdef
atrazine	0.5	33 de	91 a	55 abcde	35 def
	1.0	33 de	84 a	33 de	4 g
cynazine	1.0	36 f	96 a	57 abcde	0 g
	2.0	24 ef	73 a	24 e	0 g

MCPB, 2,4-DB, and dinoseb acetate at both rates reduced broad-leaf weeds, but by the time of the last score surviving weeds almost completely covered the ground, a large percentage (75%) being volunteer white clover. The remaining herbicides gave more effective weed control. Buthidazole achieved reasonable long-term weed control with volunteer white clover again making up a large proportion of weeds. In the trifluralin treatments the chief surviving weeds were black nightshade and white clover while willow weed and black nightshade survived in the simazine treatments. The other herbicides, with the exception of methabenzthiazuron at the lighter rate, achieved satisfactory weed control.

Pasture Weeds

DISCUSSION

Sainfoin showed resistance to all rates of the herbicides tested while white clover was damaged by both rates of cynazine. While it should be noted that this was a spring trial of only two replications it would still appear that chemical weed control in sainfoin can readily be obtained and that where white clover is present as a competitor or contaminant, cynazine could be used to remove it. This may be necessary where sainfoin is used for bloat control (Reid, Ulyatt and Wilson 1974). Previous weed control methods in sainfoin have been a winter application of paraquat/simazine (A. May, pers comm), plus ethofumesate at 1 kg/ha (Henderson unpublished data) to control white clover.

Buthidazole is normally used for total vegetative control at rates up to 16 kg/ha (MacDiarmid 1975) but some resistance had been shown by legumes to lighter rates (B.N. MacDiarmid, pers comm). The results of this trial suggest that buthidazole at around 0.5 kg/ha could be used as an effective weed control measure in legumes. At this rate the control achieved was longer lasting than with simazine, the weed control spectrum was broader, and no significant damage occurred to sainfoin and red clover. The January weed score of 80 for buthidazole was mainly white clover with some black nightshade, whereas the 98 score for simazine was willow weed, black nightshade, and twin cress.

Ivens (1975) found that atrazine and cynazine damaged 'Grasslands Maku' lotus major (*Lotus pedunculatus*) very severely and although the damage to red and white clovers in this experiment was not as severe, it suggests that use of these two chemicals at the seedling stage is not advisable.

Methabenzthiazuron at the lighter rate gave reasonable weed control initially with less damage to white clover paralleling previous results (Henderson and Brock 1976). The other chemicals gave reasonable short-term control of weeds with 2,4-DB controlling broadleaf weeds more effectively.

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