WEED CONTROL IN SAINFOIN AND SERRADELLA

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SUMMARY

Sainfoin (*Onobrychis viciaefolia*) and serradella (*Ornithopus sativus*) were tested for tolerance to pre-plant incorporated (PPI), pre-emergence (PrE) and post emergence (PoE) herbicides in two experiments. A combination of PPI and PoE herbicides gave the best weed control. Sainfoin was not damaged by EPTC (PPI) at 4.8 kg/ha or dinitramine (PPI) at 0.75 kg/ha in combination with dinoseb-acetate (2.0 kg/ha) or MCPB (2.0 kg/ha). In the autumn experiment 2, 4-DB at 2.0 kg/ha caused some damage. Serradella was not damaged by EPTC (4.8 kg/ha) and dinoseb-acetate (2.0 kg/ha) and this combination gave good weed control. Both 2,4-DB and MCPB severely damaged serradella.

INTRODUCTION

Sainfoin and serradella are forage legumes which may have potential use in certain situations in New Zealand. For example sainfoin has a similar growth pattern to lucerne, is drought resistant, non bloating, but is sensitive to weed competition (Anon 1974), while serradella is a deep-rooted, drought resistant, annual legume with potential for winter growth on coastal sandy soil (Halliwell 1960; Williams *et al* 1975). While there is some New Zealand information on the tolerance of sainfoin to herbicides (Henderson 1977; James and Atkinson 1978) there is none for serradella. This paper describes the screening of a selection of herbicides likely to be suitable for weed control.

METHOD

All experiments were on a Kairanga silt loam at 'Aorangi' research station, DSIR, Palmerston North. Herbicides were applied by gas powered knapsack delivering 160-240 litres/ha at 200 kPa. Pre-plant incorporated herbicides were incorporated to a depth of approximately 70 mm using rotary cultivators. Pre-plant incorporated and PrE herbicides, with rates (kg/ha) in parentheses, were trifluralin (0.8 and 1.6), benfluralin (0.8 and 1.6), EPTC (3.6 and 4.8), dinitramine (0.5 and 0.75), pendimethalin (1.0 and 2.0), buthidazole (0.5 and 0.75), simazine (1.0 and 2.0), atrazine (1.0 and 2.0), cyanazine (1.0 and 2.0), ethofumesate (0.4 and 0.8), EPTC + trifluralin mix (1.5 + 0.5, and 3.0 + 1.0). Post emergence herbicides used were 2,4-DB, MCPB, dinoseb acetate, bentazone, benzoalin (1.12), chlorpropham (5.0), propyzamide (0.6), ioxynil (0.75), asulam (1.5), and mixtures of 2,4-DB + bentazone (2.0 + 2.0), 2,4-DB + dinoseb (2.0 + 2.0) and 2,4-DB + chlorpropham (2.0 + 4.0).

Trial 1

In a spring-summer trial of 3 replications, 5 PPI, and 4 PrE (applied 1.11.78) and 6 PoE herbicides (applied 12.12.78) and all combinations were applied on rows of sainfoin (sown 1.11.78). Crop damage and weed control were scored 10 weeks after sowing.

Trial 2

In an autumn-winter trial of 3 replications, 5 PPI (applied 9.3.79) and 9 PoE herbicides (applied 12.4.79) plus all combinations were applied to rows of sainfoin and serradella (sown 9.3.79). Legume tolerance and weed control were scored 10 and 20 weeks after sowing, and at 28 weeks serradella was harvested and dry matter yield measured. Sainfoin was not large enough to be harvested.

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Seed Production

RESULTS

Table 1 presents the herbicides that controlled weeds well, with acceptable legume tolerance. In other treatments weed control was not as good and/or level of damaged legumes was unacceptable.

TABLE 1: Weed control and tolerance of sainfoin and serradella to several pre- and post-emergence herbicides

Herbicide	Rate (kg/ha)	Growth scores*					
		% Weed control		Sainfoin		Serradella	
		Trial 1	Trial 2	Trial 1	Trial 2	Trial 2 Score	Harvest (g/m row)
EPTC	4.8	17	65	7.7	8.2	9.3	244
EPTC + trifluralin	3 + 1		50		8.5	9.3	242
dinitramine	0.75	2	33	8.0	8.5	7.7	127
2, 4-DB	2.0	38	3	7.7	5	1.3	1
MCPB	2.0	20	3	7.7	5	4.7	18
dinoseb	2.0	27	3	2.7	6.3	6.0	106
ioxyil	0.75		3		5.7	8.5	78
<i>Post emergent combinations</i>							
EPTC + 2,4-DB	4.8 + 2.0	87	90	6.7	4.3	2.7	8
EPTC + MCPB	4.8 + 2.0	68	88	7.3	7.3	5.7	76
EPTC + dinoseb	4.8 + 2.0	62	97	7.0	8.2	9.2	183
EPTC + ioxyil	4.8 + 0.75		93		5	8.7	113
dinitramine + 2,4-DB	0.75 + 2.0	48	88	8.0	7.3	2.3	8
dinitramine + MCPB	0.75 + 2.0	50	88	5.7	8.2	3.7	37
dinitramine + dinoseb	0.75 + 2.0	42	94	5.0	8.7	7.7	117
dinitramine + ioxynil	0.75 + 0.75		79		8.3	6.5	99
untreated		0	0	5.3	5.8	7.0	69
LSD 5%		17	30	NS	4.2	4.0	117

* max growth = 10

Weed control

The effectiveness of the herbicides varied between experiments. For instance in Trial 1 (spring) broadleaved weeds such as black nightshade (*Solanum nigrum*), fathen (*Chenopodium album*) and amaranthus (*Amaranthus powellii*) predominated and the PoE treatments were generally most effective. In Trial 2 (autumn) monocotyledonous weeds such as *Poa annua* and toadrush (*Juncus bufonius*) predominated and the PrE herbicides were more effective.

In Trial 1 EPTC in combination with PoE herbicide controlled weeds better than EPTC alone, and dinitramine combinations with 2,4-DB or MCPB controlled weeds better than dinitramine alone (Table 1). In Trial 2 only the EPTC/dinoseb combination controlled weeds better than EPTC alone, but all dinitramine combinations controlled weeds better than dinitramine alone. In general the combination of PPI and PoE herbicides gave better weed control of a broader range of weeds.

Legume tolerance

Sainfoin scores in Trial 1 were not significantly reduced. In Trial 1 EPTC/2,4-DB scored less than dinitramine/dinoseb, but otherwise there were no significant reductions.

Seed Production

At 20 weeks 2,4-DB reduced serradella growth compared with control in all treatments. The harvests confirmed this result and also showed that MCPB treatments reduced growth compared with the EPTC and EPTC + trifluralin treatments.

DISCUSSION

All herbicide combinations controlled weeds satisfactorily in autumn and reasonable well in spring.

The damage to sainfoin by 2,4-DB could be attributed to application at the incorrect leaf stage in Trial 2. Waddington (1978) suggested that damage with 2,4-DB applications is less at the 1-3 leaf stage than at a later growth stage and James and Atkinson (1978) applied 2 kg/ha at the 2-4 leaf stage and reported no damage. In Trial 2 application of 2,4-DB at the 4-6 leaf stage could be a reason for the damage.

Kurilenko (1972, 1976) suggested that serradella can tolerate EPTC at 2.5 — 3.5 kg/ha. Kozaczenko (1977) found no growth reduction after applying dinoseb acetate at up to 3.0 kg/ha. Hendrysiak (1971) found that 2,4-DB at 2 kg/ha did not reduce fresh weight but MCPB at 2 kg/ha reduced fresh weight up to the flowering stage. These experiments suggest that under New Zealand conditions serradella may be damaged by 2,4-DB and MCPB.

CONCLUSION

For sainfoin acceptable crop tolerance and weed control can be expected from EPTC (4.8 kg/ha) or dinitramine (0.75 kg/ha) in combination with dinoseb (2.0 kg/ha) or MCPB (2.0 kg/ha). 2,4-DB should be used with caution. The best treatment for serradella is EPTC (4.8 kg/ha) with dinoseb (2 kg/ha) as a post-emergence treatment.

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