INITIAL STUDIES INTO DIRECT DRILLING OF LUCERNE IN MARLBOROUGH

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Summary

Split applications of paraquat gave superior vegetation control, plant establishment, and yields, to a single application of paraquat. Earlier drilling dates showed better results than currently accepted drilling dates in Marlborough. An application of terbutolol/terbutylazine 1.5 kg/ha + amitrole 1.2 kg/ha was a superior pre-drilling treatment to the standard 2,2-DPA treatment for danthonia (*Notodanthonia* spp) control.

INTRODUCTION

Direct drilling of lucerne (*Medicago sativa*) has increased over recent years throughout New Zealand. The standard method adopted in Marlborough for this technique has been to apply 0.44 kg/ha dicamba 6 weeks prior to drilling for the control of clover (*Trifolium* spp) and dicotyledonous weeds. Within 1 week prior to drilling 1.2 kg/ha paraquat is applied to suppress the remaining mainly grass vegetation.

In 1975 and 1976 usage of the techniques in Marlborough declined due to the failure of lucerne to establish under the direct drilling regime. It was considered that the main reason for failure was the inability of a single application of paraquat to suppress vegetation adequately. It was also considered that early droughts in Marlborough were adversely affecting establishment. Split applications of paraquat have previously been shown to provide superior suppression of existing vegetation (Hart and Jacobson 1978). Thus a programme was initiated to investigate the effects of split applications of paraquat to a ryegrass (*Lolium* spp)/clover sward and to measure the subsequent lucerne establishment.

In those areas of Marlborough where pastures contain native grasses such as danthonia the application of 2,2-DPA 5.0 kg/ha 3 months prior to drilling has been widely practised. This treatment has failed to provide adequate suppression of vegetation on a number of commercial applications and resulted in crop establishment failure. With the object of overcoming this deficiency a series of trials was initiated to try and improve the control of danthonia prior to drilling.

METHODS

Trial 1 investigated split applications of paraquat for the control of a ryegrass/clover sward, and two drilling dates were compared. The trial was non-replicated, with a plot size of 10 x 20 m. In trial 2, treatments investigated the control of danthonia and were replicated three times in a randomized block design. Trials were treated with a pressurised knapsack delivering 300 litres/ha at 350 kPa. Both trials were drilled with a Duncan 730 multiseeder fitted with triple disc coulters. Double inoculated lucerne, var 'Wairau', at 7.4 kg/ha was drilled with 200 kg/ha reverted

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superphosphate plus 1.0 kg/ha phorate.

Visual assessments were carried out at frequent intervals for grass and clover suppression. Lucerne vigour was visually assessed and plant numbers counted on ten 1 m lengths of row/plot. Green weights were obtained by cutting three 0.5m² quadrats from trial 1 and one 0.5m² from each plot in trial 2.

Table 1. Effect of treatment on sward suppression, lucerne vigour and yield.

Treatment*	Rate kg/ha	% Sward suppression						Lucerne vigour		Lucerne yield green wt t/ha	
		pre-2nd appl'n			post 2nd appl'n						
		27.9.77		27.9.77		6.12.77		6.12.77		6.12.77	
		grass	clover	grass	clover	grass	clover	ES†	LS†	ES	LS
dicamba (E)	0.44	0	15	75	85	50	50	6.0	1.0	2.2	1.1
+ paraquat (L)	1.22										
dicamba (E)	0.44	40	30	85	90	85	40	8.0	4.0	3.2	1.3
+ paraquat (E)	0.3										
+ paraquat (L)	0.8										
dicamba (E)	0.44	60	40	100	85	90	45	9.5	6.0	3.9	1.3
+ paraquat (E)	0.4										
+ paraquat (L)	0.8										
dicamba (E)	0.88	60	40	95	90	90	50	8.5	5.0	3.5	1.2
+ paraquat (E)	0.4										
+ paraquat (L)	0.8										

* E = Early application applied 30.8.77

* L = Late application applied 27.9.77

† ES = Early sowing 28.9.77

LS = Late sowing 13.10.77

RESULTS

Trial 1.

Results were tabulated and shown in Table 1. The effect from the first application of paraquat was relative to the rate applied. Clover was not showing the full effect of treatment probably due to cool temperatures affecting dicamba activity. An assessment 1 month after drilling (27-10-77) showed superior grass control on the split paraquat treatments, with 0.4 kg/ha early and 0.8 kg/ha late, being the most effective.

All split applied paraquat treatments recorded higher lucerne plant numbers, vigour scores, and yields, than did a single paraquat application. The earlier time of drilling recorded higher lucerne vigour scores and yields than did the later drilling date.

Trial 2.

Results are tabulated and shown in Table 2. The trial site contained a wide range of species, which in order of incidence were ryegrass, danthonia, clover, chickweed (*Stellaria* spp), dandelion (*Taraxacum* spp), storksbill (*Erodium* spp), and poa annua (*Poa annua*). The 3.18.77 assessment date showed 2,2-DPA to have had no effect on dicotyledonous weeds, and caused only leaf tip burn to grasses.

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Table 2. Effect of treatment on sward suppression, lucerne population and yield in trial 2.

Treatment Applied	Rate kg/ha	Percentage suppression					Lucerne	
		31.8.77		8.9.77		6.12.77	plant no. /m row	green wgt t/ha
		grass	dicots	grass	dicots	total weeds	26.10.77	6.12.77
2,2-DPA	5.0	6	0	6	0	30	7.4	1.8
terbumeton	2.0	26	92	55	95	40	1.0	1.6
+ terbuthylazine	2.0							
terbumeton	0.75	13	81	50	90	40	9.0	3.2
+ terbuthylazine	0.75							
terbumeton	0.75	95	96	98	97	80	17.2	17.4
+ terbuthylazine	0.75							
+ amitrole	1.2							
terbumeton	0.75	80	92	90	95	78	10.5	8.6
+ terbuthylazine	0.75							
+ tetrapion	1.76							
tetrapion	1.76	61	0	70	0	30	—	0.6

Terbumeton/terbuthylazine at 1.5 kg/ha and 4.0 kg/ha had removed all dicotyledonous weeds, except dandelion, but had afforded only a limited effect on grasses. Terbumeton/terbuthylazine plus amitrole recorded excellent control of all species except dandelion. 2,2-DPA and terbumeton/terbuthylazine 1.5 kg/ha, were selective to establishing lucerne but other treatments caused degrees of damage varying from mortality to cupping of the leaves, or a general stunting of growth. Plant numbers and yield data clearly indicate that only terbumeton/terbuthylazine 1.5 kg/ha + amitrole 1.2 kg/ha was successful in both controlling vegetation and allowing lucerne to establish without damage.

DISCUSSION

Results from split applications of paraquat clearly show 0.44 kg/ha dicamba + 9.4 kg/ha paraquat applied 4 weeks prior to second application of 0.8 kg/ha paraquat to be the most successful treatment for direct drilling lucerne into a ryegrass/clover sward. There was no evidence of dicamba toxicity to lucerne even at 0.88 kg/ha with an interval before drilling of 4 weeks compared to the 6 weeks that is normally practical. The earlier time of drilling late September showed considerable advantages to drilling in mid-October. This was probably due to the greater availability of moisture during the establishment period. Frosts occurring on the trial area at the time of lucerne emergence did not appear to affect crop establishment seriously.

Progress was made with direct-drilling lucerne into "danthonia" country. The pre-drilling treatment of terbumeton/terbuthylazine 1.5 kg/ha + amitrole 1.2 kg/ha was shown to be superior to that of the standard 2,2-DPA. The very early time of drilling (8.9.77) in this trial provided further evidence of lucerne's ability to withstand frost and thus it appears, from results to date, that moisture may be more critical than temperature in a direct drilling regime in Marlborough.

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Further evidence is required to substantiate the benefits of sowing lucerne in September, a time when frosts can still be severe. Further trial work in 1978 has supported findings in this paper but final results were not available at the time of publication. Split applications of paraquat have also shown a high level of activity on danthonia but this work also requires further substantiation.

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