EFFECT OF ISOBUMETON MIXTURES, PRONAMIDE, TERBACIL AND METRIBUZIN ON LUCERNE

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Summary

Four field experiments were conducted on non-irrigated lucerne in Central Otago. One experiment indicated that lucerne was tolerant to terbacil, isobumeton, metribuzin and a terbacil/bromacil mixture providing that terbacil ± bromacil and metribuzin were not applied at rates as high as 2 kg/ha. Isobumeton ± simazine gave the best control of storksbill *(Erodium cicutarium),* but eradication was not achieved although quantities were reduced in the second year after spraying. Pronamide±isobumeton gave the best control of barley grass (*Hordeum* spp) also with control effects persisting into the second year. In terms of either lucerne yield or weed control, June application was more efficient than August, which in turn was better than October.

INTRODUCTION

LUCERNE is an important forage crop in the low rainfall areas of New Zealand. In Central Otago the majority of lucerne is not irrigated. It is typically managed by grazing with sheep and making hay of surplus growth which usually occurs only during the months of October and November.

This management system encourages severe infestations of barley grass (*Hordeum* spp.), and storksbill (*Erodium* spp.) and because both affect wool and pelt quality as well as lucerne yields control measures are necessary.

This paper reports trials carried out in Central Otago to evaluate herbicides that may be of assistance in controlling barley grass and flatweeds such as storksbill in lucerne.

MATERIALS AND METHOD

Experiments A and B were laid down on lucerne severely infested with barley grass (both approx. 50% ground cover) with 1 and 5 to 10% storksbill in Expt. A and B respectively.

Treatments and times of application for experiments A and B are shown in Table 1. Assessments for % weed cover were made prior to cutting for yields in November 1971 and 1972. Total yields in Table 1 include lucerne and weeds. Estimated pure lucerne yields were obtained by adjusting total yields for percentage weed cover assessed prior to cutting in Exps. A and B, and from herbage dissection of bulked treatment samples in Exps. C and D. Experiment C was laid down on weed free lucerne, while Exp. D was infested with 5 to 10% mouse-ear

TABLE 1: EXPTS. A AND B TOTAL AND LUCERNE YIELDS
(DRY MATTER kg/ha)

			Experiment A				*Experiment B*			
			Cut 25/11/71		*Cut 17/11/72*		*Cut 26/11/71*		*Cut 16/11/72*	
Treatment	*kg/ha*	*Applied*	*Total yield*	*Lucerne yield*	*Total*	*Lucerne*	*Total*	*Lucerne*	*Total*	*Lucerne*
control			2920 cdABC	1480	5740 abA	4370	3700 abAB	1660	5690 abAB	4830
isobumeton	2.0	29/6/71	2560 efBCD	2560	5370 bcAB	5050	3060 bcdBC	2710	5540 abcAB	5320
pronamide	0.6	29/6/71	2840 cdeBCD	2840	5720 abA	4750	3220 bcdBC	2850	5410 bcAB	4980
pronamide	0.6+									
isobumeton	1.0	29/6/71	2680 cdefBCD	2680	5360 bcAB	4020	3290 bcdBC	2800	5790 abAB	5330
simazine	1.0+									
isobumeton	1.0	29/6/71	2540 efCD	2540	5450 abcAB	4960	3210 bcdBC	2870	5730 abAB	4810
control			3300 abA	1750	5780 aA	4220	3700 abAB	1500	5710 abAB	4510
isobumeton	2.0	10/8/71	2560 efBCD	2560	5290 cdAB	4820	3190 bcdBC	2840	5240 abcAB	5040
pronamide	0.6	10/8/71	2780 cdeBCD	2780	5830 aA	4720	3560 bcAB	3170	5790 abAB	4810
pronamide	0.6+									
isobumeton	1.0	10/8/71	2580 defBCD	2580	5480 abcAB	5370	3460 bcABC	3090	5410 abcAB	4710
simazine	1.0+									
isobumeton	1.0	10/8/71	2380 fD	2380	5340 bcAB	4060	2970 cdBCD	2660	5730 abAB	4700
control			3370 aA	1680	5820 aA	3030	4290 aA	1670	5900 aA	4660
isobumeton	2.0	18/10/71	1660 gE	1180	4790 eC	4590	1620 fE	1120	5200 cB	4260
pronamide	0.6	18/10/71	3020 bcAB	1630	5660 abcA	3000	2660 deCD	1740	5550abcAB	4660
pronamide	0.6+									
isobumeton	1.0	18/10/71	1660 gE	1390	5380 bcAB	4040	1820 fE	1230	5310 bcAB	4460
simazine	1.0+									
isobumeton	1.0	18/10/71	1740 gE	1270	4950 deBC	3960	2220 efDE	1210	5430 abcAB	3590
C.V.			8.5%		4.5%		13.3%		5.1%	

chickweed (*Cerastium glomeratum*), 10 to 20% storksbill (*Erodium cicutarium*), 5% shepherd's purse (*Capsella bursa-pastoris*) and 1% *Poa pratensis*. Treatments are shown in Table 2 together with lucerne yields; two cuts were obtained from Expt. C but only one from Expt. D.

TABLE 2: EXPERIMENTS C AND D — LUCERNE YIELDS (DRY MATTER kg/ha)

Applied		*Experiment C*		*Experiment D*
5/7/72	*kg/ha*	*Cut 10/11/72*	*16/1/73*	*22/11/72*
terbacil	0.75	3320 ab	5730 a	5050 abAB
terbacil	1.0	3200 ab	5670 a	5030 aAB
terbacil	2.0	3060 b	5340 ab	4130 cB
isobumeton	1.5	3350 ab	5630 ab	5461 aA
isobumeton	2.0	3380 ab	5320 ab	5030 abcAB
isobumeton	4.0	3580 a	5620 ab	5240 aAB
metribuzin	0.75	3340 ab	5630 ab	5520 aA
metribuzin	1.0	3400 ab	5710 a	5080 abAB
metribuzin	2.0	3290 ab	5220 b	4630 abcAB
bromacil 0.6/terbacil 0.4		3400 ab	5530 ab	4870 abcAB
bromacil 1.2/terbacil 0.8		2980 b	5420 ab	4210 bcB
control		3360 ab	5670 a	4810 abcAB
C.V.		8%	4.8%	11.3%

All treatments were applied by a modified Oxford Precision Sprayer in 250 litres water/ha, in good weather conditions.

Rainfall (mm) for the period concerned at the nearest meteorological stations, was as follows:—

		Dec.-Feb.	Mar.-May	June-Aug.	Sept-Nov.
Expts. A and B	1971	103	121	86	104
	1973	110	150	78	139
Expts. C and D	1972			94	150
	1973	86			

Soil organic matter was 3.2% at Site C and 2.6% at Site D.

RESULTS

Effects on lucerne

(a) Yields: total yields as well as lucerne alone are shown in Table 1, the latter are more reliable indicators of lucerne response to treatment because total yields contain varying amounts of weeds, particularly barley grass.

At the first cut in Expts. A and B, lucerne yields were considerably lower in controls through barley grass competition, but there were only minor differences in lucerne response to various treatments. Although October application of herbicides was too late to effect any weed control, yield figures are shown to illustrate the effect of late application. Both trial and lucerne yields were reduced through application at this time, these effects persisted into the second year (Table 3).

In both Expts. A and B in the second year varying amounts of barley grass and shepherd's purse affected yields which were much higher than usual because of increased rainfall in late winter-spring.

Lucerne

Experiments C and D tested isobumeton with other materials at one time of application (see Table 2). Expt. C was weed free and on a site where moisture levels were sufficient to facilitate 2 cuts in the one season. Only the highest rate of terbacil or the bromacil/terbacil mixture caused reductions at the first cut and only metribuzin at the second cut.

Analysis of main effects in Exp. C and D showed that the high rate of herbicides resulted in significantly lower lucerne yields than either medium or low rates, while terbacil caused significantly lower yield than isobumeton in Exp. C.

(b) Population: The effect on lucerne population numbers was examined 10 months after treatment in Exp. C and D. Terbacil 0.75 kg and the untreated control were significantly (5%) lower than the other treatments in Exp. C. However in Exp. D the 2 kg/ha rate of terbacil significantly lowered lucerne numbers below those of isobumeton 1.5 and 2.0 kg/ha. also metribuzin 0.75 kg/ha; 2 kg/ha of bromacil/terbacil reduced numbers below those of 1.5 kg/ha isobumeton.

Barley Grass: Inspections October-November 1971 showed that all treatments in Expt. A and B had given excellent control of barley grass when applied mid to late winter. One year later pronamide ± isobumeton plots had very little reinfestation; slightly larger amounts were present where isobumeton alone had been applied, but where added to simazine reinfestation was greater.

Retarding time of application also reduced barley grass control.

Storksbill: Site D was dry and all weeds were easily controlled by the herbicides used. However in Expt. A and B only isobumeton±simazine gave excellent control of storksbill; control by pronamide was very poor but in mixture with isobumeton gave fair results.

One year later only isobumeton±simazine at site A persisted in good control, but was more variable at site B. However at this latter site sufficient was harvested 16/11/72 (see Table 3) to show that isobumeton 2 kg/ha gave lower yields than 1 kg/ha with added pronamide or simazine. Both pronamide and untreated controls had lower yields but this

TABLE 3: EFFECT OF TREATMENTS AND TIME OF APPLICATION ON STORKSBILL AND BARLEY GRASS YIELDS ONE YEAR AFTER APPLICATION

	Expt. B — Cut 16/11/72 (kg/ha)			
Treatment	*Total*	*Lucerne*	*Storksbill*	*Barley grass*
control	5760 aA	4670 aA	250 eE	600 bB
isobumeton	5390 bB	4880 aA	390 cC	120 cC
pronamide	5580 abAB	4820 aA	320 dD	0 dD
pronamide+ isobumeton	5510 bAB	4830 aA	470 bB	0 dD
simazine+ isobumeton	5630 abAB	4470 bB	610 aA	630 aA
Date treated				
29/6/71	5630 a	5050 aA	280 cC	150 cC
19/8/71	5610 a	4750 bB	380 bB	270 bB
18/10/71	5480 a	4330 cC	560 aA	390 aA

was most probably because of intra-specific competition with other flatweeds such as shepherd's purse. Retarding the time of application also affected storksbill yield.

Other Weed Species: Some poa pratensis was present in Expt. A and there was a tendency for better control by pronamide±isobumeton.

Flatweeds present in Expts. A, B and D included varying quantities of shepherd's purse, whitlow grass *(Erophila verna)* speedwell *(Veronica* spp.) and dandelion *(Taraxacum officinale),* and except for pronamide all treatments gave acceptable control.

DISCUSSION

Effects on yields

Although total yields may not be greatly affected it is clear that lucerne yields may increase through removal of weed competition in the first year following spraying.

Differences in yield of both total and lucerne yields may be much smaller in the second year, however, moisture was less of a limiting factor at this time, thus lucerne was less affected by weed competition.

Generally lucerne tolerance was good, however uracil based herbicides and probably metribuzin may adversely affect both yields, and in the case of the uracils, lucerne population, particularly at the 2 kg/ha rate.

In terms of either lucerne or weed yield, June application is better than August — which in turn is better than October.

Effects on barley grass

In the first year following application barley grass control was good with all treatments: but while some re-infestation occurs with isobumeton ±simazine, only treatments based on pronamide retain their efficiency into the second year.

Effects on storksbill

Pronamide is unsatisfactory; control may be improved by the inclusion of isobumeton, but isobumeton±simazine is necessary for the greatest reduction in the first year.

For control into the second year there were indications that 2 kg/ha isobumeton may be needed, but an important point to note from both yields and observations was that no treatment had eradicated this weed.

CONCLUSIONS

Lucerne appears tolerant to terbacil, isobumeton, metribuzin and a terbacil/bromacil mixture at rates probably sufficient to control barley grass and storksbill.

These compounds together with simazine/isobumeton mixture warrant further testing for storksbill and barley grass control.

Pronamide gives excellent barley grass control, and mixtures with the above materials should be considered for testing against mixed populations of storksbill and barley grass.

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