EFFECT OF ANNUAL LOW RATES OF 2,4,5-T ON SMALL GORSE BUSHES

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SUMMARY

Low rates of 2,4,5-T (0.5, 1.0, 1.5 kg ai/ha) were applied annually to small gorse bushes in December, February or March over a four year period. In general, earlier applications and higher rates of herbicide killed most bushes. Most treatments maintained bushes at smaller sizes than untreated bushes with, again, earlier treatment and higher rates being most effective. The technique could be useful for farmers who are trying to slow the growth of small gorse plants until they can be killed using other methods, but the effects in slowing pasture improvement by repeated damage to clovers should be noted.

INTRODUCTION

The use of repeated light rates of 2,4,5-T to contain the spread of gorse on farms where grazing control of seedling regrowth has failed was developed in the Wanganui district in the late 1970's. The objectives were to kill any new seedlings which may appear, and to suppress the growth of small, established bushes until they could be killed by other means such as application of 2,4,5-T with motorised knapsack sprayer or gorse gun. Several farmers use the technique, with some apparent success, and the experiment described here was designed to give further guidance on rates of 2,4,5-T and dates of application.

MATERIALS AND METHODS

The experiment was conducted on Hauorongo Research Area, near Palmerston North. Small gorse seedlings which had germinated in autumn 1980 and been grown in a shade house were transplanted in October 1980 into pasture treated by paraquat, at a spacing of 1.5 x 1.75 m. In December 1981, when the experiment started, average bush height was 44 cm.

Between 22 and 25 bushes were allocated at random to each of 10 treatments so that each treatment contained a range of sizes. One set of bushes was untreated. In the other nine treatments, individual bushes were treated with 2,4,5-T (IWD Hi-ester 2,4,5-T 72% ai) at 0.5, 1.0 or 1.5 kg ai/ha in December 1981, February or March 1982. Herbicide was applied with a precision sprayer and boom fitted with Teejet 730077 nozzles, delivering 110 litres/ha at 200 kPa. Two passes, in opposite directions, were made over each bush so that the total water rate was 220 litres/ha.

Repeat applications at the same rates of herbicide were made on the same bushes in the same months in 1982-83, 1983-84 and 1984-85, except that the 0.5 and 1.0 kg ai/ha rates in March were discontinued after the 1982-83 season.

Regular assessments were made of the degree of desiccation of individual bushes. Bush heights were measured at the dates shown in Fig. 1 and bush diameters were also measured at the dates shown in Fig. 2.

Data on numbers of bushes killed by each treatment were analysed by a logit model where the dependent variable was $\ln(p/1-p)$ where p was the proportion of bushes killed. The independent variables were herbicide rate, application date and bush size.

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Fig. 1: (left). Mean height of surviving gorse bushes as affected by herbicide treatments. Effects of different rates of 2,4,5-T are only shown where differences were significant. For December treatments, effects of 2,4,5-T at 1.0 and 1.5 kg ai/ha are combined. Average LSDs ($P=0.05$) are shown by vertical bars.

Fig. 2: Mean ground area covered by surviving bushes, as affected by herbicide treatments. For December treatments effects of 2,4,5-T at 1.0 and 1.5 kg ai/ha are combined. Average LSDs ($P=0.05$) are shown by vertical bars.

Fig. 3: Percentage of ground area covered by all bushes treated.

RESULTS

None of the untreated bushes died. Bush mortality was significantly affected by initial bush size (Table 1A), with no interaction between bush size and either herbicide rate or application date. Herbicide rates, application dates and interactions between them all, significantly affected bush mortality (Table 1B). December applications and highest herbicide rates had the greatest effect. Of the bushes killed, 69% died after the first herbicide application in 1981-82 and 30% after the second application in 1982-83.

There were no significant differences in subsequent bush size between plants treated in February and those treated in March, so results for these two application dates have been combined. Mean height of surviving bushes was significantly reduced by herbicide treatment (Fig. 1), with treatments in December being more effective than those in February/March. There were no significant effects of rate of herbicide until February 1985 (Fig. 1). Mean area occupied by surviving bushes was affected by both date and rate of application (Fig. 2) with December treatments having the greatest effect and high herbicide rate being most effective.

TABLE 1: Effect of different factors on the percentage of bushes killed after four* annual applications of 2,4,5-T.

A. Effect of initial bush size				
Initial bush ht (cm)	40	41-50	51 +	
% killed	52	30	20	
B. Effect of herbicide rates and application dates on % kill				
	Rate of 2,4,5-T (kg ai/ha)			
Application date	0.5	1.0	1.5	mean
December	48	44	88	60
February	36	13	42	30
March	4	24	50	27
mean	29	27	61	

*Two annual applications for 0.5 and 1.0 kg ai/ha treatments in March.

The overall effect of treatments on mean ground cover of all treated gorse bushes (whether dead or alive) is shown in Fig. 3. Again, December application treatments were most effective. The highest rate of herbicide in December maintained very low ground cover.

DISCUSSION

The technique of repeated annual sprays of 2,4,5-T to limit gorse growth appears to be effective and may be useful to farmers who are struggling to prevent gorse re-invasion. The rates of herbicide used in this experiment are likely to give good control of any new gorse seedlings (Hartley and Popay 1982) and small, established bushes will have their growth restricted until other measures can be taken. December, when the bushes have new, soft growth, was a much better time to spray than in February or March, when the new growth was hardening off.

2,4,5-T is very damaging to clovers (Maclean 1957) and repeated annual applications will seriously reduce clover content of pastures. Since the presence of clover helps build vigorous pastures and can itself help to reduce the re-invasion of gorse seedlings (Thompson 1974), this clover damage may mean that the effect of annual applications of 2,4,5-T is detrimental to long-term gorse control. This *must* be taken into account by anyone considering using the technique.

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