CONTROL OF GORSE

By J. E. BELL, Department of Agriculture, Auckland

SUMMARY

GORSE, one of the worst of our scrub weeds, can be controlled by burning when in full growth during a dry autumn, sowing seed and adequate fertiliser on the ash and stocking heavily with dry sheep. It can also be controlled on rolling and flat land by rotary mower and other types of mowing machinery. Some of the more persistent gorse has to be dealt with by spot spraying. Early and recent trials indicate that butoxy ethanol ester of 2,4,5-T is superior to butyl ester of 2,4,5-T. Recent trials show that the mixed isomers of trichlorophenoxyacetic acid is only half as effective as the butyl ester and that, invert emulsion of 2,4,5-T shows considerable promise and superiority over all other forms of 2,4,5-T. It can be used most efficiently by the addition of up to 2 gallons of dieselene per acre when using invert emulsion at 4 lb a.i. per acre. If invert emulsion is used at 1 lb a.i. per acre, very efficient results can be obtained with the addition of 1 pint of lissapol or ½ gallon of dieselene. Quicker knock-downs can be secured by increasing the rates of dieselene.

In general I would advise using invert emulsion at 1 or 2 lb a.i. per acre or you can use butoxy ethanol ester of 2,4,5-T at about the same rates and under favourable conditions good kills will be secured.

Fenuron is useful for treating odd bushes. The dry form of 2,4,5-T has not proven satisfactory.

Gorse is the most generally feared scrub weed by farmers of New Zealand. Here gorse flowers and seeds twice a year and the seed crop, though much reduced by the gorse seed weevil, is still heavy enough to produce a plentiful supply of plants under favourable conditions and the seed can last in the ground for several years. Gorse, however, has its weak points. One is that the seedling is very palatable and is nutritious and will not withstand grass and clover competition. Also, when old, gorse burns fiercely in dry weather and when old loses much of its vigour. The most economical method of dealing with gorse on hill country has been to let it grow tall and thick, burn it in a dry autumn, sow grass and clover seed immediately on the ash with ample fertiliser, fence into small blocks, and stock heavily with dry sheep as soon as possible after the seed has been sown to tramp it into the ground and so that the first shoots of gorse are nibbled as soon as they appear. The establishing grass and clover gradually replaces the seedling gorse which should be so heavily stocked that it does not develop spines. The old gorse stumps will sprout soft leaves at their base which will be given equal attention by the sheep. However, they are more persistent as a rule and some spot spraying of the old stumps is necessary generally in the second summer following the burn. Any gorse from seedling or stump which gets into the spine stage and is not eaten despite heavy stocking should be spot sprayed or cut. All over spraying should not be resorted to, as this will detrimentally affect the pasture. Success hinges on the maxim that grass and clover are better adapted to close and continuous grazing than is young gorse.

On easier country gorse can be tackled by mowing machines, rotary slashers, and flail machines, which combined with optimum topdressing can deal with gorse even in the absence of sheep such as on dairy farms. As

time goes on after several cuts the gorse is gradually eliminated. Its elimination is accelerated if the pasture is allowed to grow rather long between grazings at seasons of the year when growth is very rapid. Thus the shutting up of fields for silage in the spring has a salutary effect on the gorse. The gorse of course will be present in the silage, and fields probably therefore should not be closed for silage until the gorse population is somewhat reduced by the preliminary cutting.

EARLY TRIALS WITH CHEMICALS

Early trials with spraying materials for gorse indicated that the butoxy ethanol ester of 2,4,5-T might be better than the butyl ester. They also demonstrated that 1 lb a.i. per acre of 2,4,5-T applied to gorse and followed by another 1 lb a.i. per acre application next season was as effective as 3.6 lb a.i. per acre applied at the one time. With contractors employed and their time to be considered the 3.6 lb a.i. per acre application of 2,4,5-T was perhaps justified, but farmers with their own equipment were advised to reduce the application to 1 lb a.i. per acre or in other words mix much more water with their 2,4,5-T. More water resulted generally in a better cover and more economical use of 2,4,5-T. The material must cover all parts of the plant with the minimum of run-off. The amount of water is dependent on the fineness of the spray, the finer particle size being preferred because it gives a better cover.

RECENT TRIALS WITH CHEMICALS

The advent of new materials, mixed isomers of trichlorophenoxyacetic acid (CS-301) and invert emulsion of 2,4,5-T and fenuron, spurred us on to fresh investigations. A specially prepared 2,4,5-T powder which presumably when applied at 10 lb a.i. per acre would apply 3.6 lb a.i. per acre was tried out at 40 lb a.i. per acre through a blower and also at 2½ lb a.i. per acre. The only effect of these treatments was to suppress flowering. There was considerable drift from the area treated with 2½ lb a.i. of the dust.

The fenuron was sprinkled evenly by hand over the tops of bushes in September 1960 at ⅛, ¼, ⅜, ½, and ⅝ oz a.i. per bush. The gorse bushes were 2 ft to 3 ft 6 in. high. The material has been effective at the higher rates particularly on the smaller bushes. It might have been more effective if it had been applied at the bases of the plants. It should be applied on the uphill side, because is spreads downhill, and in the trial one of the untreated gorse plants below a treated one has been affected by the fenuron spreading in this way. Fenuron would appear to be a useful material as an easy means of dealing with scattered bushes and this could be done quite effectively on horseback.

The claim that the addition of tenac would improve the effectiveness of 2,4,5-T was not borne out in a trial conducted in 1959. The tenac was added at 1 pint per acre.

In 1959 and 1960 the mixed isomers of trichlorophenoxyacetic acid have been compared with butyl and butoxy ethanol esters of 2,4,5-T in several trials in the Auckland Province. The results from this material varied from equal to the butyl ester of 2,4,5-T to much inferior. The poorer results from this product might be attributed to the inferiority of it when first placed on the market and also it might not be as effective when applied too late in the autumn. Butoxy ethanol ester of 2,4,5-T appeared generally to substantiate its position of superiority to butyl ester of 2,4,5-T.

The differences between these different forms of 2,4,5-T were very closely examined in a replicated randomised trial laid down this year. The figures represent the percentage of foliage which became brown on the plots by the middle of June.

TRIAL 61/1002—A. R. MOORE—LAID DOWN 12/1/61

Treatments	1 lb a.i. per acre A	B	C	D	2 lb a.i. per acre A	B	C	D	4 lb a.i. per acre A	B	C	D	8 lb a.i. per acre A	B	C	D
Butyl ester of 2,4,5-T	70	55	70	65	80	85	80	90	100	100	100	75				
		65 average (44)				84 average (71)				94 average (90)						
Butoxy ethanol ester of 2,4,5-T	80	85	90	90	90	97½	85	90	95	100	100	95				
		86 average (62)				91 average (69)				98 average (96)						
Mixed isomers of trichlorophenoxyacetic acid					55	80	70	70	95	85	97½	97½	100	100	100	100
						69 average (46)				94 average (88)				100 average (99)		

The figures in brackets refer to the average position by the end of March.

The trial shows that mixed isomers of trichlorophenoxyacetic acid are only half as effective as butyl ester. It also substantiates the superiority of butoxy ethanol ester at the lowest rate and indicates that quite good results may be obtained from very low rates of 2,4,5-T, particularly if the butoxy ethanol ester is employed.

The invert emulsion of 2,4,5-T has shown considerable promise. We ran into trouble in the early trials in making a satisfactory mixture.

In some of the trials large and uneconomical amounts of dieselene were included at up to 160 to 200 gallons per acre. Recognising this in one trial the dieselene was applied alone to see the effect of this material. The gorse became brown in colour to a medium extent from this treatment and then quickly recovered. The following table outlines the treatments and results from this trial.

TRIAL 60/1173—E. P. BRYANT—LAID DOWN 20 to 21 APRIL 1960

Treatment	*a.i. per acre*	*Replicates* 1	2	3	*Summary*
Butyl ester of 2,4,5-T + 200 gallons of water	1	No kill	No kill	No kill	No permanent control
	2	Poor kill	Poor kill	Poor kill	Little permanent control
	4	Good kill	Fair kill	Poor kill	Average control
Butoxy ethanol ester of 2,4,5-T + 200 gallons of water	1	No kill	No kill	No kill	No permanent control
	2	No kill	Fair kill	Poor kill	Little permanent control
	4	Fair kill	Good kill	Poor kill	Average control
Invert emulsion of 2,4,5-T + 100 gallons of dieselene	1	Fair kill	Good kill	Poor kill	Average control
	2	Good kill	Good kill	Good kill	Good control
	4	Good kill	Good kill	Good kill	Good control
Invert emulsion of 2,4,5-T + 20 gallons of dieselene	2		No kill		No permanent control
	4		Good kill		Good control
Mixed isomers of trichlorophenoxyacetic acid + 200 gallons of water	1	No kill	No kill	No kill	No permanent control
	2	No kill	No kill	No kill	No permanent control
	4	Poor kill	Poor kill	Poor kill	Little permanent control
Dieselene 160 gallons			No kill		No permanent control

In this trial there is no difference between the butoxy ethanol and butyl esters and mixed isomers of trichlorophenoxyacetic acid are definitely inferior.

Invert emulsion with a low rate of dieseline was tried out in only one replicate and so no conclusions from this trial concerning this material could be made.

In another trial the invert emulsion was compared with other formulations in two replications.

In one series the invert emulsion was applied mixed only in water and in the other strictly according to the manufacturer's instructions, 0.5 lb a.i. per acre of invert to 10 pints of dieselene to 70 pints of water.

Surprisingly enough the invert mixed only with water gave the better results.

TRIAL 60/1005—A. M. TILL—LAID DOWN 8/1/60

Treatment	*Rep.*	a.i. per acre 1.8 lb	2 lb	2.7 lb	3 lb	3.6 lb	4 lb	5.4 lb	6 lb
Mixed isomers of trichlorophen-oxyacetic acid	A		15		10		7		6
	B		16		6		1		2
Butyl ester of 2,4,5-T	A	18		20		5		2	
	B	12		10		7		2	
Butoxy ethanol ester of 2,4,5-T	A	8		2		2		1	
	B	20		6		4		10	
Invert emulsion of 2,4,5-T	A		1		0		0		0
	B		4		15		4		0

Water at 200 gallons per acre was used to spread the materials. The figures give the number of surviving bushes per plot of 1/200 acre. Invert emulsion was mixed with water in Series A. There is very little difference between the other formulations.

In view of the good results from invert emulsion in these and other trials, in 1961 we decided to make a special examination of invert emulsion and try to find out what sort of mixture would be the most successful and economic. We therefore used varying rates of invert emulsion 2,4,5-T, water, dieselene, and a wetting agent. The following table outlines the results as evaluated by the end of March, with the results by the middle of June in brackets.

In one section of the trial the invert emulsion was applied at 4 lb a.i. per acre with varying rates of dieselene and lissapol. The treatments and results were as follows:

TRIAL 61/1025—A. R. MOORE—LAID DOWN 12/1/61

Invert emulsion at 4 lb a.i. per acre	Estimated percentage foliage affected and brown in colour					
	Rep. A		Rep. B		Average	
1. 80 gals. of water ----	80	(92½)	40	(80)	60	(80)
2. 80 gals. of water + 3 pints of lissapol ---- ----	95	(100)	100	(100)	97½	(100)
3. 70 gals. of water + diesel at 10 gals. ---- ----	100	(100)	95	(100)	97½	(100)
4. 75 gals. of water + diesel at 5 gals. ---- ----	70	(97½)	70	(95)	70	(96)
5. 78 gals. of water + diesel at 2 gals. ---- ----	100	(100)	100	(100)	100	(100)
6. 78 gals. of water + diesel at 2 gals. + lissapol at 3 pints ---- ---- ----	95	(97½)	100	(97½)	97½	(97½)

The plots were sprayed twice to obtain a good cover. It can be seen that the dieselene or lissapol is needed to obtain the best results and there is not much difference between rates of dieselene.

In section 2 of this trial the invert emulsion was applied at 1 lb a.i. per acre, again with varying rates of dieselene and the wetting agent.

TRIAL 61/1025—A. R. MOORE—LAID DOWN 12/1/61

Invert emulsion of 2,4,5-T at 1 lb a.i. per acre	Estimated percentage foliage affected Rep. A		Rep. B		Average	
7. 80 gals. of water	30	(55)	30	(75)	30	(65)
8. 80 gals. of water + lissapol at 3 pints	50	(90)	75	(95)	62½	(92½)
9. 78 gals. of water + 2 gals. of dieselene	90	(100)	80	(90)	85	(95)
10. 79 gals. of water + 1 gal. of dieselene	60	(90)	70	(97½)	65	(94)
11. 79½ gals. of water + ½ gal. of dieselene	60	(95)	Missed		60	(95)
12. 79½ gals. of water + ½ gal. of dieselene + lissapol 3 pints	60	(95)	80	(95)	70	(95)

Here the varying treatments can be more closely analysed because the amount of invert applied was barely sufficient to obtain a reasonable kill and the rates of dieselene appear also to be borderline. It can be seen that at least 2 gallons of dieselene are required for a quick knockdown, but that it would appear that the lower rates would be eventually as effective. Also the addition of lissapol gives a quicker knockdown where an inadequate amount of dieselene for this purpose has been applied. The main point is that some dieselene or up to 3 pints of lissapol are needed.

In the third section of the trial the varying mixtures were applied with a boom with invert emulsion applied at 1, or 1.2 lb a.i. per acre. Again the treatments and effects were as follows:

TRIAL 61/1625—A. R. MOORE—LAID DOWN 12/1/61

Invert at 1.2 lb a.i. per acre	Estimated percentage foliage affected Rep. A		Rep. B		Average	
13. 80 gals. of water	30	(50)	30	(50)	30	(50)
14. 80 gals. of water + lissapol at 1 pint					60	(95)
15. 80 gals. of water + lissapol at ½ pint					60	(90)
16. 79 gals. of water + diesel at 1 gal. + lissapol at ½ pint	70	(95)	70	(95)	70	(95)
17. 79½ gals. of water + diesel at ½ gal. + lissapol at ½ pint					70	(95)

Here the lissapol at ½ and 1 pint per acre gave similar results to lissapol at 3 pints in section 2.

Unfortunately there were no treatments with dieselene only added, but the combination of dieselene and lissapol was only a little superior, mainly in speed of knockdown, to lissapol only.

The inference that can be taken from this trial is that with invert emulsion at 4 lb a.i. per acre, you should add either lissapol at 3 pints per acre or add dieselene at 2 gallons per acre. Smaller rates that were not tried might suffice. At 1 lb or 1.2 lb a.i. per acre good results can be expected with the addition of 1 pint of lissapol or ½ gallon of dieselene. A quicker knockdown may be secured by increasing the rates of dieselene.

In general at this stage I would advise using invert emulsion at 1 or 2 lb a.i per acre. It would appear that we have in this product a remarkably efficient material for gorse control.