EFFECTS OF SPRAYS ON GORSE REGROWTH AT DIFFERENT GROWTH STAGES

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Summary

Regrowth of gorse (*Ulex europaeus*) was sprayed with 2,4,5-T and a proprietary mixture with picloram 3½, 8½ and 13 months after cutting in November 1976. The earliest spraying, when regrowth was approaching 50 cm, was the most effective. The second spray on similar sized growth in winter was almost as effective but, after new growth had started in spring, spraying was followed by greater recovery. The earlier sprays on sprouts from burnt stumps were less effective than without burning. The mixture gave slightly better results than 2,4,5-T alone and 6kg/ha was more effective than 3 kg/ha. Seedlings were well controlled by all treatments.

INTRODUCTION

In the control of gorse standing bushes may be destroyed by cutting, burning, spraying or by combined treatments. The initial clearing, however, is normally followed by the growth of numerous seedlings and by a variable amount of stump or basal stem regrowth. Young regrowth is soft and susceptible to 2,4,5-T, with or without additives, but becomes more resistant as the shoots harden (Matthews 1975). Gorse stumps sprout vigorously after cutting or burning at any time of year so that regrowth may be at its most susceptible growth stage at any period, depending on when the cutting or burning took place. After the first growing season is over, however, the normal seasonal growth pattern is resumed and the shoots are at their most susceptible in early summer.

In work by Chavasse and Davenhill (1973) a good kill of shoots 8-15 cm long was obtained by spraying in April after burning in February. Further regrowth occurred after this treatment but was killed back by a second spray a year later and no more regrowth took place. Other workers have preferred to use a single spray on older regrowth. Matthews (1975), for example, recommends spraying regrowth at 60-90 cm, preferably after some plants have flowered, and Thompson (1973) reported good results on regrowth 70-120 cm high from plants which had been cut 2 years earlier. No reports are known of any direct comparison of the effectiveness of herbicides applied to gorse shoots which have grown to different heights following a clearing operation. The present study was undertaken to supply this information and to help in determining the regrowth stage of gorse at which spraying can be expected to give the most lasting effects.

METHOD

An area of dense gorse up to 4 m high was cut with a chain saw at 10-20 cm on 9-13 November 1976. The trash from about half of the cleared area was carried off. On the other half it was burnt on 24 November. The burn was slow and largely upwind and nearly all of the cut

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material was consumed. The effect of the burn on the stumps ranged from light scorching to heavy charring and partial to complete combustion of the loose, surface litter resulted.

On the unburnt area most stumps were sprouting vigorously after a month while regeneration on the burnt area was only just starting. Both burnt and unburnt areas were marked out into 6m² plots containing up to 20 gorse stumps. Sprays of 2,4,5-T butyl ester and a proprietary 4:1 mixture of 2,4,5-T and picloram were compared and applied at one of the three dates, 28 February, 1 August and 6 December 1977. At each date the longest shoot of each of 20 resprouting stumps was measured and the mean heights are shown in Table 1. At the two earlier dates regrowth from the burnt stumps was less advanced than that from the unburnt but, by the final date, there was little difference. After spraying, 10 regenerating stumps per plot were marked with numbered wires and assessment of the effects made on the marked plants. Chemical rates were 3 and 6 kg/ha (total a.i.) and whole plots were sprayed at 2000 litres/ha by means of a boom attached to a propane pressured experimental sprayer. The burnt area was found to be too small to include all the intended treatments and only the lower rate of the 2,4,5-T/picloram mixture was applied. Treatments were replicated three times and the experiment terminated 2 years after the initial clearing.

RESULTS

Within 10 weeks of clearing the site, clumps of Yorkshire fog (*Holcus lanatus*) and sweet vernal (*Anthoxanthum odoratum*) formed a large degree of ground cover on the unburnt plots and relatively few gorse seedlings had emerged (a mean of 170/m² over 10 x 0.1 m² quadrats). Little grass cover had established on the burnt area during this time but more gorse seedlings appeared (mean of 640/m²). The effects of the first spray treatment on 5-8 cm seedlings in the burnt area are shown in Table 1 and it is clear that all treatments gave high percentage kills. During the five months after spraying, which included the autumn germination period, only an additional 3/m² appeared and seedling regrowth on these plots remained minor.

At the time of the first treatment at the end of February, three months after cutting, the gorse shoots were still soft, extension growth was still in progress and all treatments resulted in a rapid and complete brown off. On the unburnt plots a high proportion of stumps subsequently showed no further signs of growth and were starting to rot in the ground after 22 months. Burnt stumps showed a higher degree of recovery and the regrowth had reached a height of 50-100 cm by the conclusion of the experiment.

By the second date, in early August, growth had ceased and the shoots had hardened off. The effects of the chemicals took longer to develop and, on the unburnt plot, the number recovering was slightly (though not significantly) larger than from the first spraying date. Again there was a higher degree of recovery on the burnt plots.

The final application was made in early summer when new growth had started and the tips of the shoots were soft. The final assessment on these plots was made only 12 months after spraying but, although a few plants assessed as live were noted as being sick and might subsequently have died, in general only small changes in percentage kill estimates were recorded after 12 months. The results in the table show that this application was considerably, and significantly, less effective than the earlier ones but the difference between the burnt and unburnt plots was less consistent.

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TABLE 1: The effects of herbicides applied to regenerating gorse at different times after cutting or cutting followed by burning, together with the effects on seedlings.

Chemical	Rate (kg/ha)	Unburnt % dead without regrowth 8.12.78	Burnt % dead without regrowth 12.12.78	% kill of seedlings 25.7.77
Date 1 28.2.77		46cm*	25cm*	
2,4,5-T	3	81	43	96
2,4,5-T	6	93	53	93
2,4,5-T/picloram	3	83	63	97
2,4,5-T/picloram	6	90	-	-
Date 2 1.8.77		52cm*	34cm*	
2,4,5-T	3	67	17	-
2,4,5-T	6	73	62	-
2,4,5-T/picloram	3	76	50	-
2,4,5-T/picloram	6	100	-	-
Date 3 6.12.77		69cm*	73cm*	
2,4,5-T	3	42	0	-
2,4,5-T	6	45	20	-
2,4,5-T/picloram	3	40	50	-
2,4,5-T/picloram	6	78	-	-
Control, unsprayed		8	0	0
LSD (P = 0.05)		30	42	-
Means				
Date 1		87	53	-
Date 2		79	43	-
Date 3		51	23	-
LSD (P = 0.05)		15	24	-
2,4,5-T		66	-	-
2,4,5-T/picloram		79	-	-
LSD (P = 0.05)		12	-	-
3 kg/ha		65	-	-
6 kg/ha		80	-	-
LSD (P = 0.05)		12	-	-

* average regrowth height at spraying

DISCUSSION

The best control of gorse in this experiment resulted from spraying clumps of regrowth from unburnt stumps when the average height of the longest shoots was approaching 50 cm, 15 weeks after cutting. Dormant shoots treated five months later, after making little further growth, were only slightly less affected while after a further four months, there was significantly less effect on actively growing but older shoots. These were killed back for long distances but tended to sprout again from the base, presumably as a result of insufficient penetration or translocation of the chemical.

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The results suggest that during the first season of coppice growth the size of the shoots may be more important than whether or not they are extending rapidly. On the regrowth appearing after burning the treatments were equally effective in killing the shoots which had already sprouted but, because regrowth was delayed, larger numbers of sprouts developed subsequent to spraying so that the final effect of treatment was reduced.

As an average over all dates and rates the 2,4,5-T/picloram mixture was slightly but significantly more effective than 2,4,5-T alone. The interaction between dates and chemicals was not significant but the figures suggest that there may have been a trend for the increased activity resulting from adding picloram to be greater with the treatments applied to the older shoots. The higher chemical application rate was significantly more effective than the lower and there were no significant interactions between rate and chemical or date.

It may be concluded from this work that, in the absence of burning, gorse regrowth is best sprayed in the first season after cutting and that, if the treatment is applied when shoots are at their most sensitive, when the longest shoots have reached a length of about 50 cm, relatively low rates of chemical are sufficient. After burning, which delays regrowth, the results are less clear and further work is needed to determine whether burnt stumps go through a stage in which all potential shoots have grown, while still being highly sensitive to spraying. The suggestion that, with regrowth from burnt stumps, there is more advantage in using formulations of 2,4,5-T with picloram also requires further investigation.

The trial has shown that burning after clearing results in increased germination of seedling gorse, but suggests that, if overall sprays are applied to control stump regrowth, most seedlings are also killed.

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