SEASONAL EFFECTS OF GLYPHOSATE AND SILWET M APPLIED TO MATURE GORSE

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SUMMARY

The moisture content of mature gorse (*Ulex europaeus*) sprayed with glyphosate alone or with glyphosate plus Silwet M at different times of the year was measured at 6-week intervals. Glyphosate alone resulted in only a temporary reduction in moisture content, and regrowth occurred even on the apical portion of the stem. Glyphosate plus Silwet M resulted in marked desiccation of the plant material. The apical portion of the gorse died within 24 weeks of herbicide application and the mid-basal section of the woody stem exhibited temporary stem desiccation, but as regrowth occurred moisture content increased.

After the February 1985 application heavy rain fell within 30 minutes of spraying. Glyphosate alone had no effect on gorse plants but glyphosate plus Silwet M caused rapid stem desiccation and apical death.

INTRODUCTION

Earlier work (Zabkiewicz *et al* 1985) demonstrated the potential of the additive Silwet L-77 to improve the efficacy of glyphosate when applied to mature gorse. Further, there appeared to be a seasonal effect in that autumn application resulted in higher mortality of gorse than spring or summer applications. In this initial trial, rates of glyphosate were not high enough to give good gorse control, while Silwet rates were thought to be too high.

A further trial was established at Mt Thomas, North Canterbury, to evaluate the effectiveness of glyphosate alone and together with Silwet M as a means of preparing mature gorse for burning. Treatments were applied at different times to see if any seasonal trends were apparent.

METHODS

The gorse site at Mt Thomas in Canterbury, situated on heavy yellow-grey earths at an elevation of 300 m, had been burnt 10 years previously and the regrowth averaged 2 m.

Plots were 5 x 2 m in size and treatments were replicated three times in a fully randomised design.

Herbicide treatments were applied to different plots at two monthly intervals commencing in April 1984 with the final application being made in February 1985. A single rate (5.4 kg ai in 300 litres of water/ha) glyphosate (Roundup) was used either with or without Silwet M (Pulse) at 0.2% v/v (600 ml/ha). A CO₂ boom sprayer (770039 flat fan nozzles, 205 kPa) held 1 m above the canopy was used in a double pass to give the required applied volume. All spraying was carried out between 7.30 and 8.30 a.m. in calm weather with the temperature below 18 °C, and RH above 65%.

A total of 45 gorse stems was harvested, at 5-cm intervals, along a diagonal transect within each plot. For each stem the top (foliage), mid-section, and basal portion (each 20 cm in length) were selected and bagged. Fresh weights were taken and the material was oven dried at 80 °C for 48 hours to determine its percentage moisture content (MC). This procedure was carried out at 6 weekly intervals for 36 weeks in all instances, except for the February 1985 series when sampling was extended to 48 weeks after application of the herbicide. Unsprayed gorse samples were also collected for comparison.

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Fig. 1: Plant moisture content in relation to herbicide treatment and time of application. (Where data points are touching or are joined by a vertical line, the difference between treatments is not significant; where data points are not joined by a vertical line, differences are significant at $p < 0.05$).

Data from each portion of the stem at each sampling were subjected to analysis of variance to test for treatment effects. An LSD test was applied and differences at the 95% level are given in Fig. 1.

RESULTS AND DISCUSSION

Herbicide application had an obvious effect on moisture content of the gorse plant (Fig. 1).

In all months except February 1985, glyphosate resulted in reduced moisture content of the gorse foliage. With the addition of Silwet M, the moisture content was reduced even further and stem regrowth was much slower. This effect was particularly obvious after the February 1985 application, which was followed by heavy rain within 30 minutes of spraying. This suggests that the additive may improve the "rain-fastness" of glyphosate.

In all samples treated with glyphosate plus Silwet M the top 50-60 cm of the stems were dead at about 24 weeks after treatment. Those plots which were sprayed with glyphosate alone showed some stem desiccation, but moisture content increased again as fresh regrowth occurred both from the stem tissue and from the apical foliage. Glyphosate alone caused only temporary brown-out of plant material.

For the mid and basal stem portions desiccation was temporary, although moisture content was considerably lower for those plots which had received glyphosate plus Silwet M. However, such desiccation was short-lived and recovery of moisture content was related to appearance and development of regrowth on the stem at about 60 cm below the canopy down to ground level.

Earlier work (Balneaves and Zabkiewicz 1981) discussed aspects of preparing gorse for burning and demonstrated the need to reduce stem moisture content to below 40% to ensure a relatively stick-free site after burning. Glyphosate plus Silwet M achieved this at all application times, albeit briefly. In stems treated with 2,4,5-T in earlier work stem desiccation was slower (15 months), but moisture content remained at low levels for a much longer period of time (3-6 months). At this site regardless of the time of application of herbicide, moisture content did not fall below 40% before October (Fig. 1). Weather conditions over autumn and winter did not allow the stems to dry below the critical level earlier. Thus, there were differences in the time taken for the moisture content to drop below 40% related to application time. Nevertheless, this trial has demonstrated that glyphosate plus Silwet M may be applied at any time. Of particular interest for land development from "weeds to trees" in the South Island is the option of spraying gorse in April [also an ideal time to spray bracken fern (Balneaves and Perry 1982)] for burning in the following spring/summer period. Previously forest growers in Nelson/Marlborough and Otago have had to rely on separate applications of 2,4,5-T/picloram and asulam. The use of one herbicide simplifies operations and reduces costs.

Although a total kill by herbicide was not achieved, this study has shown that, using glyphosate and Silwet M, mature gorse plants can be brought into a suitable condition for burning. This may be particularly useful in sensitive areas, i.e., adjacent to water catchments or crops where use of phenoxyacetic herbicides is restricted.

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