GORSE CONTROL WITH GLYPHOSATE

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SUMMARY

From February 1981 a series of trials was conducted throughout the North Island to evaluate glyphosate for control of gorse (*Ulex europaeus*). Glyphosate alone at 0.36 kg ai/100 litres was unsatisfactory. At 0.54 kg ai/100 litres good control was achieved only when applied to gorse in the soft spine, no flower, growth stage. Good control was also achieved, at all growth stages, when octylphenoxypolyethoxyethanol (Triton X45) at 0.5% or polyalkyleneoxide modified dimethyl polysiloxane (Silwet L77) at 0.25% was added to glyphosate at 0.36 kg ai/100 litres. Both of these surfactants conferred significant rainfastness to glyphosate, when applied to gorse.

INTRODUCTION

Gorse has long been a problem brushweed in New Zealand agriculture, as demonstrated by the numerous papers on its biology and control. Problems associated with its control have been compounded by the recent expansion of horticulture, and subsequent creation of "hormone" sensitive areas, where the use of phenoxy herbicides has been restricted.

Glyphosate (Roundup) is a good candidate for brushweed control in horticultural areas because it is non volatile, has no significant soil activity, and is already accepted for use under various horticultural tree and vine crops.

Limited published information exists on the effectiveness of glyphosate on gorse. Small amounts with 2,4,5-T were shown to give no improvement on the control achieved with 2,4,5-T alone (Hartley *et al* 1983). Preest (1980) defined the position of glyphosate for control of gorse seedlings. He showed that 4.0 kg ai/ha glyphosate gave consistently high levels of control from all but February treatments, but that 2.0 kg ai/ha gave more variable control, failing in the January to April period. Zabkiewicz and Gaskin's (1978) work on cuticle and wax formation in gorse, gave a lead on possible reasons for the variable performance of glyphosate during the January to April period. It was considered that the heavier wax layers during this period, were an impediment to the entry of glyphosate. In subsequent work, Zabkiewicz (pers comm) determined the wetting angle of glyphosate on gorse epicuticular wax, with and without various surfactant additives. His results demonstrated a significant improvement in droplet wetting angle when either Triton X45 or Silwet L77 were added to glyphosate indicating that improved control could be achieved with the use of these additives.

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Gorse growth stage affects the activity of glyphosate on gorse and recommendations should be related to plant growth stage, rather than calendar month. For the purposes of this paper two general growth stages are identified. These are:-

1. Soft spine, no flower (spring to early summer)
2. Hard spine (winter and autumn)

The paper outlines the results of ten trials laid down in three locations in the North Island of New Zealand, evaluating glyphosate plus surfactants for control of gorse.

METHOD

Glyphosate was applied at 0.18-0.72 kg ai/100 litres with and without Silwet L77 and Triton X45 at 0.25% and 0.5% respectively. In all trials a formulation of 2,4,5-T plus picloram (Tordon Brushkiller DS) was applied as a standard treatment (Table 1). Applications were made to achieve complete foliage wetting with little run-off, using a brush-gun fitted with either a No. 4 or No. 6 spray tip and operated at a pressure of 1000, 1500 or 2000 kPa.

All trials were of randomised block design with three or more replications. Replications were either individual bushes, groups of bushes, or uniform plots cut out of an even stand of gorse. Trials were at Kaikohe, Papakura and Wairoa on all growth stages of gorse.

Evaluations were made by eye, initially at 1-2 months after treatment (MAT) to assess brown-out and subsequently at 3-4 monthly intervals to assess longer term control.

In some of the trials, burning or mowing of plots 2-3 MAT was carried out to evaluate these techniques as post-treatment management alternatives.

Significant rain fell within 6 h of completing two trials, allowing a general observation to be made on rainfastness. In one of these trials a repeat trial was treated under dry conditions to allow a more direct comparison.

RESULTS AND DISCUSSION

Treatment results were consistent at all locations. They varied according to the particular gorse growth stage at treatment, and the rate of glyphosate and additive used.

All glyphosate plus additive treatments gave rapid gorse brown-out, with total brown-out being achieved in 2-3 months regardless of season. This is in contrast to the 2,4,5-T plus picloram treatments, which gave rapid brown-out from applications made during soft spine, but very slow brown-out (4-5 months) from applications made during the hard spine growth stage.

With all treatments, the attainment of good brown-out was directly related to the degree of plant wetting achieved at application. Poor application, with poor plant coverage resulted in poor overall brown-out, and subsequent unsatisfactory long-term control. Gorse treated during the hard spine growth stage was harder to wet with glyphosate alone, than gorse treated during the soft spine growth stage resulting in greater levels of control achieved during the latter growth stage. Good control (95% + at 24 MAT) with glyphosate alone, was achieved only during the soft spine growth stage and only with 0.54 kg ai/100 litres water or higher rates (Table 1).

With the addition of either Triton X45 or Silwet L77 to glyphosate, gorse wetting and subsequent control problems were overcome, resulting in a high level of control with less glyphosate, during both growth stages. Although lower rates of glyphosate with either additive (Treatments 1 and 2) gave good results during both growth stages, 0.36 kg ai/100 litres plus either additive, (Treatments 4 and 5) was more reliable.

Results with glyphosate 0.36 kg ai/100 litres plus additives compare favourably with the standard of 2,4,5-T plus picloram, giving slightly better control at both growth stages.

Burning or mowing were evaluated in some trials, to establish the benefits or otherwise of these techniques in both aiding gorse control and allowing the establishment of new pasture.

Neither of these management tools were observed to have had a negative effect on gorse control, it was considered that the effects of burning or mowing on the surviving plants were beneficial to their control. Gorse stem dehydration from glyphosate treatments was rapid, enabling a good burn to occur at 2-3 MAT, and new pastures to be established.

It is recommended that glyphosate have a period of not less than 6 h before rain, if optimum control is to be achieved on most species. General observations were made from at least two trials, showing that glyphosate plus either Triton X45, or Silwet L77 required significantly less time before rainfall, than glyphosate alone, to achieve optimum results on gorse.

TABLE 1: Glyphosate on gorse.

No. Trials Locations	Treated Growth Stage	4		6	
		Northland Auckland, Wairoa Soft spine no flower		Northland Auckland, Wairoa Hard spine	
Treatment	kg ai/100 litres	% Control 12 MAT	24 MAT	%Control 12 MAT	24 MAT
1. glyphosate + Silwet L77	0.18 0.25	87	70	88	71
2. glyphosate + Silwet L77	0.27 0.25	-	-	100	87
3. glyphosate	0.36	62	80	46	48
4. glyphosate + Triton X45	0.36 0.50	100	-	96	94
5. glyphosate + Silwet L77	0.36 0.25	97	95	97	85
6. glyphosate	0.54	96	95	67	64
7. glyphosate	0.72	90	96	79	81
8. 2,4,5-T + picloram	0.100 0.025	97	83	90	74

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REFERENCES

- Hartley, M.J., Balneaves, J.M. and Popay, A.I., 1983. Herbicide additives to 2,4,5-T for gorse control. *Proc. 36th N.Z. Weed and Pest Control Conf.*: 43-48.
- Preest, David, 1980. Seasonal variation in seedling gorse susceptibility to four herbicides. *Proc. 33rd N.Z. Weed and Pest Control Conf.*: 165-169.
- Zabkiewicz, J.A. and Gaskin, R.E., 1979. The effect of fire on gorse seeds. *Proc. 31st N.Z. Weed and Pest Control Conf.*: 47-52.