CONTROL OF SWEET BRIER BY THE AERIAL APPLICATION OF GLYPHOSATE AND SILWETT L77

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SUMMARY

Glyphosate, at rates from 2.7 to 5.4 kg/ha, plus Silwett L77 at 0.25% v/v, was applied from the air to sweet brier (*Rosa rubiginosa*) in the late summer and autumn in Central Otago. For reliable control, rates of glyphosate had to be 4.3 kg/ha or greater and applied after flowering and before leaf yellowing. Control levels continued to improve in subsequent seasons. Annual and perennial grasses and clovers quickly re-established in the same autumn.

Keywords: sweet brier, glyphosate, Silwett L77, aerial application

INTRODUCTION

Sweet brier (*Rosa rubiginosa*) has long been a problem in the drier inland regions of the South Island. Turner *et al* (1986) noted that, although broadcast treatments with picloram/2,4,5-T and metsulfuron gave a high degree of kill, the residues of these products were long lasting. Picloram persisted for up to 2 years and metsulfuron for at least 9 months before clover could be established, especially in drier environments.

A pilot trial in 1984 indicated that glyphosate at 7.2 kg/ha controlled sweet brier when applied by helicopter in the autumn with little long term effect on clovers. New grasses soon germinated later that same autumn and the pasture recovered to produce well over the winter and spring. However, the cost of treatment at that rate was high and further work was not justified.

A series of handgun trials (Monsanto, unpublished data) also indicated that glyphosate and Silwett L77 controlled sweet brier. Best results were obtained in the autumn after flowering and before leaf yellowing and senescence. This is because foliar active glyphosate is primarily a phloem transported herbicide that, along with photosynthates, accumulates in the strongest sinks (Grossbard and Atkinson 1985 # i). In the autumn, after flowering, the predominant sinks are the fruit, stems and roots of deciduous plants.

More recently a high degree of kill of sweet brier was observed when glyphosate and Silwett L77 were applied for commercial bracken fern (*Pteridium esculentum*) control in the autumn in Central Otago. It was decided to initiate a series of aerial trials to establish if this combination could be a satisfactory non-residual herbicide alternative for sweet brier control. This paper outlines the results of aerial trials at six sites laid down over 1989 and 1990 in Central Otago.

METHOD

The sites used were selected to represent a cross section of bush size, vigour and Central Otago geography. Two sites were very steep, "hard to fly" gullies with large sweet brier bushes (up to 3 m tall) and four were relatively flat and "easy to fly sites". Two of these "flat" sites were very dry and northerly facing and consequently the brier bushes were smaller and hardier. The other two sites faced south, were less dry with larger more vigorous bushes. Bush size varied from 1-3 m tall at most sites.

Generally treatments were applied from post flowering to early leaf senescence when the foliage was beginning to yellow off (February/March depending on the season). One trial was treated later at about 20-30% yellowing (early April).

Glyphosate (Roundup) was evaluated at 2.7, 3.2, 4.3, 5.4 kg/ha and Silwett L77 (Pulse) was added at 0.25% v/v for all treatments. Application was made by a helicopter fitted with Spraying Systems D6-45 disc and core nozzles applying 220

Proc. 44th N.Z. Weed and Pest Control Conf. 1991: 25-27

litres/ha using the half overlap method. Plot size was either 0.5 or 1.0 ha with one replicate per treatment. Visual ratings of percent control, percent “glyphotic regrowth” and percent healthy regrowth were recorded at 10-12 months and 22-24 months after treatment (MAT). “Glyphotic” regrowth is typified by a profusion of severely stunted tightly bunched malformed leaves on the main canes.

The effect on non-target species was also noted. In all cases the predominate pasture species were browntop (*Agrostis capillaris*) and to a lesser extent clovers (*Trifolium* spp). Other species were sweet vernal (*Anthoxanthum odoratum*), Danthonia (*Rytidosperma* spp), and various herbs such as *Crepis* spp.

RESULTS AND DISCUSSION

Glyphosate (plus 0.25% v/v Silwett L77) at 2.7 and 3.2 kg/ha were unsatisfactory treatments (Table 1), although control improved with time. The higher rates of 4.3 and 5.4 kg/ha provided excellent long term control of sweet brier (Table 1). At these rates most of the bushes were killed outright and the remainder had severe “glyphotic” regrowth. The interveinal tissue of these severely stunted and tightly bunched malformed leaves was either absent, or much reduced, and chlorotic yellow-green in colour. The majority of these malformed leaves, the parent canes and eventually the bush died during the following summers and hence control levels continued to improve. Glyphosate activity was still evident in the bushes 2 years after application. This recurring glyphotic regrowth was not unexpected as continuing glyphotic regrowth and die-back was evident up to 5 years after application in the 1984 pilot trial. Grossbard and Atkinson (1985 #ii) reported similar symptoms of glyphotic regrowth reoccurring over several seasons on deciduous crops such as pears, raspberries, currants, apples, and grapes.

TABLE 1: Mean percent, control and regrowth of sweet brier at 9-11 and 22-24 months after treatment with four rates of glyphosate, and 0.25% v/v Silwett L77.

Glyphosate rate kg ai/ha	9-11 MAT				22-24 MAT			
	% control ¹	% GR ²	% HR ³	No. trials	% control	% GR	% HR	No. trials
2.7	35	58	7	2	45	18	22	2
3.24	75	18	7	6	85	8	7	3
4.32	88	8	4	5	90	8	2	2
5.4	97	3	0	2				

¹ % Control = % of plants or parts of plants where no regrowth was evident.

² % Glyphotic regrowth = % of plants or parts of plants where glyphosate affected growth was present. This regrowth was typified by tight bunching of leaves and often died back during the summer.

³ % Healthy regrowth = % of plants or parts of plants unaffected by the application of glyphosate. Leaves appeared normal and fully formed.

Control levels were similar on dry north facing sites, moist vigorous south facing slopes and the “hard to fly” gullies with little variation between sites. Only one plot produced a result not consistent with similar treatments elsewhere; this plot was beside a dusty track and later it was found that the plant foliage had been covered in dust at treatment. Glyphosate rapidly binds to soil particles which prevents its herbicidal activity (Grossbard and Atkinson 1985 #iii), and hence the reduced result.

In the early April treatment, at 20-30% leaf yellowing, control was lower, and there was more glyphotic regrowth at 22 months after application, than there was at similar rates applied earlier. Therefore it is advisable to avoid late treatments.

Good application technique is important. Bushes that were not fully covered were beginning to regrow from the unsprayed branches. Therefore slope adjustment and accurate flying are advisable to ensure optimum control levels.

At all rates the grasses present were killed but the perennial clovers were suppressed only for a short while before they recovered. After spraying, annual and perennial grasses and clovers germinated later the same autumn and the pasture had mostly regenerated itself by the spring. The key to this rapid re-establishment was the survival of perennial clovers and the regeneration of annual clovers in the same season. One farmer observed that the stock camped on his trial site all winter because of the amount of clover present and that the grasses appeared to be more palatable than grasses in other areas treated with residual herbicides.

CONCLUSIONS

Glyphosate at 4.3 kg/ha and higher plus Silwett L77 at 0.25% v/v should give high levels of sweet brier control when applied from the air in the late summer or early autumn. Application should be made between flowering and leaf yellowing. Annual and perennial grasses and clovers should re-colonise the sites soon after spraying.

ACKNOWLEDGEMENTS

The co-operation and assistance from the following people is gratefully acknowledged: Murray Turner, NPO Clyde, for site selection and trial establishment, the farmers who provided the sites and colleagues from Monsanto NZ Ltd.

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