EFFECT OF WATER VOLUME ON METSULFURON APPLIED TO GORSE

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Weed control can be a major component of the cost of forest establishment in New Zealand. Reductions in the cost of aerially applying herbicides could be achieved if applications were made in volumes of water less than the usual 200-300 litres/ha. Trials have shown that asulam, glyphosate, and oxadiazon can be applied to bracken in lower volumes of water without compromising herbicidal effectiveness (Richardson *et al* 1986).

Metsulfuron is used for the control of gorse (*Ulex europaeus*), with a label recommendation that it be applied in a minimum volume of 200 litres of water/ha in forestry operations. The trial reported here was undertaken to determine if metsulfuron could provide effective control of mature gorse if applied in a lower volume of water.

The trial site was a dense stand of mature gorse averaging 2.5 m in height, 10 km north of Murupara in the central North Island. A mixture of metsulfuron (Escort) and Silwet L-77 (Pulse) at rates of 0.275 kg/ha and 0.192 litres/ha respectively, was applied in either 46 or 202 litres of water/ha. Tartrazine, a water soluble dye, was added to enable measurement of the spray deposited on the gorse.

Each treatment was applied to 0.8 ha of gorse on 19 March 1986 using a helicopter fitted with D5-25 nozzles for the 46 litres/ha application and D8-46 nozzles for the 202 litres/ha application, producing spray droplets with volume medium diameters of 295 and 839 μm respectively. The volume of spray applied was measured using a flowmeter fitted to the aircraft. The helicopter flew at 40 knots and at 10 m bout widths in a half overlap configuration. During spraying, wind speed 10 m above ground level ranged from 1.9 to 4.25 km/h, temperature varied from 8 °C to 12 °C, and the relative humidity was greater than 96%.

To quantify spray deposition, 50 gorse shoots 10 cm long were collected after the spray had dried, from the top of the gorse canopy, on either side of a track through the centre of each treatment block, and individually sealed in plastic containers. About 5 hours after spraying, shoots were washed with a known volume of distilled water, and the tartrazine measured using a spectrophotometer. A sample of each spray mix taken from the helicopter tank was used as a reference standard.

To calculate a correction factor for dye absorption by the gorse, known volumes of each spray mix were applied to unsprayed gorse shoots and to glass slides with a micropipette. After 5 hours, the shoots and the slides were washed with distilled water and the amount of dye recovered was then measured. The correction factor was determined by comparing the dye recoveries from the gorse shoots with that from the glass slides.

The surface area of each gorse shoot was estimated using an image analyser.

A Spray Recovery Index (SRI) was calculated for each application volume as follows:

$$\text{SRI} = \frac{\text{spray deposit per unit area of gorse } (\mu \text{ litres/cm}^2) \times 100}{\text{application volume (litres/ha)}}$$

The larger the SRI, the greater the proportion of the spray deposited on the foliage. Differences in the SRI between treatments were compared using a t test. Results are shown in Table 1. There was no significant difference in the SRI after the corrections for absorption had been made. The difference between correction factors may reflect a greater uptake of spray into the plant where the concentration of Silwet L-77 is higher,

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an effect which has been demonstrated in laboratory studies (Gaskin and Zabkiewicz 1988).

TABLE 1: Efficacy of spray application

	Application volume (litres/ha)		Unsprayed
	46	202	
Uncorrected SRI	0.49	0.85	
Correction factor	0.51	0.89	
Corrected SRI(SD)	0.96 (0.31)z	0.95 (0.34)z	
% of stumps regrowing (SD)	15 (15.1)a	20 (8.2)a	85 (12.7)b

Treatments joined with a common letter do not differ significantly $P=0.01$.

The gorse which had been sprayed, together with gorse on an adjoining unsprayed area, was crushed with a bulldozer in January 1987, 10 months after spraying, and burnt 2 months later. Ten 5 m × 5 m assessment plots were established in each of the two areas sprayed with metsulfuron, and in the unsprayed area. In January 1988 ten gorse stumps were selected at random in each assessment plot, (100 stumps per treatment) and examined for regrowth. Differences between treatments were evaluated using analysis of variance on transformed data (square root transformation).

The number of gorse stumps regrowing in the two spray application treatments did not differ significantly, but a significantly greater ($P=0.01$) number of stumps which had not been sprayed prior to burning, continued to grow (See Table 1).

These results demonstrate that 0.275 kg/ha of metsulfuron and 0.192 litres/ha of Silwet L-77 can be applied from the air to stands of large mature gorse in water volumes of either 46 litres/ha using D5-25 nozzles or 202 litres/ha using D8-46 nozzles without affecting the efficacy of the operation. Use of the lower water rate would result in savings in application costs.

REFERENCES

- Gaskin, R.E. and Zabkiewicz, J.A., 1988. Effect of Silwet L-77 on the uptake and translocation of metsulfuron in gorse. *Proc. 41st NZ Weed and Pest Control Conf.* (In press).
- Richardson, B., Ray, J., and Vanner, A., 1986. Retention of spray on bracken pinnae: effect of application volume and formulation. *NZ J. For Sci.* 16: 87-95.