EFFECT OF APPLYING GLYPHOSATE AND CLOPYRALID BY ROTARY WEED WIPER ON CALIFORNIAN THISTLE IN SOUTHLAND

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Californian thistle (*Cirsium arvense*) is an aggressive perennial weed in pasture, reducing pasture and animal production (Hartley and James 1979). Long term control may be achieved by depleting its root reserve through repeated destruction of aerial shoots (Donald 1990). Control options include intensive grazing, mowing and MCPB/MCPA herbicide sprays (Hartley *et al.* 1984; Mitchell and Abernethy 1993), and applying translocating herbicides to mature thistles using a rotary weed wiper (Martin *et al.* 1990). In Southland, the herbicides glyphosate and clopyralid are commonly applied by weed wiper. This paper reports on a field trial in the Te Anau Basin which compared these two materials for reducing populations of emerging thistle shoots in the year following treatment.

An untreated control and 1:40 dilutions of either glyphosate (Roundup) at 9 g ai/litre or clopyralid (Versatill) at 7.5 g/litre were applied with 0.1% Pulse penetrant on 25 February 1993 onto 6 x 20 m plots by a double pass of a rotary weed wiper. The amount of glyphosate and clopyralid applied by the weed wiper was 2.50 and 2.75 litres/ha, respectively. The woollen-carpet roller was set 20 cm above ground to contact thistle plants, most of which were flowering. The treatments were arranged in a randomised block design with three replicates. Flowering and vegetative thistle shoots were counted on a 21 m long by 1 m wide fixed transect in each plot before the application of each treatment, and again on 1 February 1994. Analysis of variance was performed on the natural logarithms of thistle density and proportions of shoots less than 20 cm in height. The latter provided an indication of whether the treatments delayed emergence of regenerating thistles. The least significant ratio (LSR) (Table 1) is the back-transformed least significant difference between the means of the $\log_e$ data. If the ratio between the larger and smaller of two means is greater than the LSR, the means are significantly different at the 5% level.

Before treatment, the plots contained 8.0 thistle stems/m² (SEM = 0.56), with densities uniform over treatments ($P > 0.05$). Compared with the untreated control plots

TABLE 1: Geometric means of Californian thistle stem density.

Treatment	25 February 1993	1 February 1994	
	Thistle stems (Total No./m ²)	Thistle stems (Total No./m ²)	No. below 20 cm in height
untreated	8.4	20.3	1.9
glyphosate	7.5	7.9	3.0
clopyralid	7.5	2.0	1.5
LSR _(5%)	1.17	2.08	3.18
Significance	ns	($P < 0.01$)	ns

LSR is least significant ratio.

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one year after treatment, 61% fewer thistle stems were observed in plots treated with glyphosate, and 90% fewer stems in plots treated with clopyralid (Table 1). One year after treatment, thistle numbers had risen by a factor of 2.4 in untreated plots, were similar for the glyphosate treatment, and were 73% lower in clopyralid treated plots compared with the pre-treatment thistle numbers. No significant ($P>0.05$) herbicide effects which may have altered the timing or level of shoot emergence were observed when comparing the proportion of emerging thistle shoots below 20 cm in height.

Under the conditions of the trial, clopyralid appeared to be the more effective chemical of the two tested at the given rates for reducing populations of thistles approximately one year after treatment.

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REFERENCES

- Donald, W.W., 1990. Management and control of Canada thistle (*Cirsium arvense*). *Weed Sci.* 5: 193-250.
- Hartley, M.J. and James, T.K., 1979. Cost benefit of selective control of Californian thistle in pasture. *Proc. 32nd N.Z. Weed and Pest Control Conf.*: 245-249.
- Hartley, M.J., Lyttle, L.A. and Popay, A.I., 1984. Control of Californian thistle by grazing management. *Proc. 37th N.Z. Weed and Pest Control Conf.*: 24-27.
- Martin, P., Fullerton, D.K. and James, T.K., 1990. Weed trials using a rotary weed wiper. *Proc. 43rd N.Z. Weed and Pest Control Conf.*: 262-265.
- Mitchell, R.B. and Abernethy, R.J., 1993. Integrated management of Californian thistle in pasture. *Proc. 46th N.Z. Plant Protection Conf.*: 278-281.