HERBICIDES FOR THE SPOT TREATMENT OF RAGWORT IN PASTURE

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Summary

When a range of granular herbicides were applied at recommended rates to multicrowned ragwort (*Senecio jacobaea*) plants, picloram gave the most effective ragwort control closely followed by chlorthiamid, with dichlobenil, 2,4-D and dicamba in descending order of effectiveness. Asulam as a foliar spray was less effective than any granular material except dicamba. Soil type had little effect on herbicide performance.

INTRODUCTION

The wide range of herbicides in common use for the treatment of ragwort suggests that none are entirely satisfactory for the control of this weed. For many years the liquid form of 2,4-D has been the recommended material for ragwort, but because granular herbicides are more convenient to store, transport and apply they are increasingly preferred for the spot treatment of individual plants. The most commonly used granule is that of picloram, which was found by Thompson (1974) to give more effective ragwort control than herbicides applied as foliar sprays. However, there are a number of other granular materials which are claimed to be equally effective and less costly than picloram. In addition to 2,4-D these include dicamba and the soil active herbicides chlorthiamid and dichlobenil. Asulam as a foliar spray has found increasing use, particularly in lucerne (*Medicago sativa*).

The two trials described in this report were conducted to compare ragwort control by picloram, dicamba, chlorthiamid, dichlobenil and 2,4-D applied as granules and asulam as a spray.

EXPERIMENTAL

On 26.9.74 the herbicides shown in Table 1 were applied as spot treatments to individual ragwort plants at two sites, one on a clay based soil near Morrinsville, and the other on a free draining silt loam near Kiwitahi. The trial areas were each divided into twelve plots and two plots at each site allocated to each herbicide. After all ragwort plants had been treated with the appropriate herbicide, 10 random plants on each plot (20/treatment) were pegged to identify for more detailed examination during the course of the project. Granular materials were applied to the crushed centres of plants and asulam spot sprayed to run off. Granular herbicides were applied using standard kitchen teaspoon measures as per label recommendation. Soil moisture was near field capacity at both sites when treatments were applied and remained

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high over the following month. All ragwort at both sites were multi-crowned plants at the late rosette stage. At Morrinsville plants had a mean diameter of 45 cm and an average of 12 crowns while those at Kiwitahi were 41 cm with 10 crowns. Soil samples showed no viable ragwort seed in the soil at either site.

TABLE 1: Herbicide treatments

picloram	2.0% granules	0.5 tsp*	= 2.5 g product/plant
dicamba	5.0% granules	1.0 tsp	= 4.0 g product/plant
chlorthiamid	7.5% granules	0.25 tsp	= 2.0 g product/plant
dichlobenil	7.5% granules	0.25 tsp	= 2.0 g product/plant
2,4-D	10.0% granules	1.0 tsp	= 10.0 g product/plant
asulam	40.0% liquid	4 kg/1200 litres	to run-off

* tsp = standard kitchen teaspoon measure (level)

Treatment effects were assessed at frequent intervals with a final inspection in July 1975.

RESULTS

Table 2 shows the extent and rapidity of knockdown of the aerial parts of treated ragwort plants and indicates the proportion of plants which survived to the flowering stage.

TABLE 2: Effect of herbicides on ragwort rosettes

Treatment	Morrinsville			Kiwitahi		
	% knock-down*	knock-down time ‡	% plants flowered	% knock-down*	knock-down time ‡	% plants flowered
picloram	99	9	2	99	7	2
dicamba	70	13	24	82	13	15
chlorthiamid	99	6	4	99	5	5
dichlobenil	91	8	8	95	8	7
2,4-D	84	9	14	88	9	9
asulam	84	12	14	90	12	11

* knockdown = plant foliage destroyed to ground level

‡ knock down time = weeks to reach maximum knockdown

The amount of crown and root regrowth approximately nine months after treatment is shown in Table 3 as percent of the number of ragwort plants originally treated with each herbicide.

The destruction of ragwort plants left some fairly large circles of bare ground to be reoccupied by the surrounding pasture species. The effect of herbicides on the pasture and the recolonisation of

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treatment sites as assessed at an inspection six months after treatment is summarised below.

Picloram: bare areas almost fully recolonised by grass, clover absent or very weak to 80 cm from treatment centre.

Dicamba: bare ground almost fully reoccupied by grass, clover very weak to 50 cm from treatment centre.

Chlorthiamid: bare patches up to 20 cm diameter still clearly defined, with normal grass and clover to edges.

Dichlobenzil: still some bare patches with clover the main colonising species.

2,4-D: normal grass and clover cover.

Asulam: normal grass and clover cover.

TABLE 3: Ragwort crown and root regrowths, July 1975 (as % of initial plant numbers)

Treatment	Morrinsville		Kiwitahi	
	Crown	Root	Crown	Root
picloram	< 1	10	0	9
dicamba	2	23	4	32
chlorthiamid	0	13	< 1	15
dichlobenil	< 1	27	1	31
2,4-D	2	24	3	30
asulam	7	28	6	31
Mean initial plant number/treatment:	146		151	

DISCUSSION

Earlier work by Thompson (1974) found picloram granules to be more effective in controlling ragwort than foliar sprays of 2,4-D, 2,4-D plus picloram and 2,4-D plus dicamba and Tables 2 and 3 show they were also generally superior to the other granular materials used in these trials. However, they have the disadvantage of being extremely toxic to clovers, and pasture assessments indicated that the recommended rate for spot application to a single ragwort plant can destroy or seriously weaken clover on an area up to 2 m² for six months or more.

Dicamba was also highly toxic to clovers although less soil persistent than picloram. In the liquid form it is a widely used additive to 2,4-D as a foliar spray for ragwort, but Tables 2 and 3 show the herbicidal effects of the 5% granules were slow and inadequate, so that a high proportion of treated ragwort plants survived to the flowering stage and regrowth control was poor.

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Chlorthiamid gave particularly rapid destruction of ragwort plants and was only slightly inferior to picloram in controlling root regrowth. This material has marked soil sterilant properties and its persistence and lack of selectivity towards pasture species prevented recolonisation of treatment sites until well into the following autumn.

Although less persistent than chlorthiamid, dichlobenil also showed soil sterilant characteristics and inhibited grass growth on treated sites for six months or more. In ragwort control it was generally inferior to chlorthiamid, particularly in preventing root regrowth. 2,4-D and asulam also gave poor control of regrowth from ragwort roots, but because of its slow knockdown and the number of plants which it allowed to survive and produce crown regrowth the foliage applied asulam was considered inferior to all granular herbicides.

There was not much evidence of differences in herbicide effect due to soil type. While the less effective granules of dicamba and 2,4-D gave rather better control of ragwort root regrowth on the clay soil at Morrinsville than on the lighter Kiwitahi silt, site differences had little effect on the performance of the more effective picloram and chlorthiamid.

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REFERENCES

- Thompson, A., 1974. Herbicide effects on ragwort and pasture. *Proc. 27th N.Z. Weed and Pest Control Conf.*: 90-93.