TIMING OF MCPA APPLICATIONS FOR CONTROL OF GIANT BUTTERCUP

A.I. POPAY, D.K. EDMONDS, L.A. LYTTLE and H.T. PHUNG

Agricultural Research Division, MAF, P.O. Box 1654, Palmerston North

SUMMARY

In a series of trials at several sites over four seasons, giant buttercup (*Ranunculus acris*) was treated with MCPA at 1 kg ai/ha at monthly intervals between March and November. Buttercup numbers were assessed in the following December or January. Applications made in August or September gave the best results. In some seasons, April, early May, October or November applications were also effective.

INTRODUCTION

Although giant buttercup occurs throughout most of New Zealand (Garnock-Jones 1981), it is only regarded as a weed in certain dairying areas in the Waikato, Taranaki, southern Hawkes Bay, northern Wairarapa, Horowhenua and Golden Bay. The leaves of the plant contain the glycoside ranunculin which can cause blistering of the lips and tongue of grazing animals (Connor 1977). Although no cases of poisoning have been reported in New Zealand (Connor 1977), cattle avoid eating the leaves and also tend to ignore clovers and grasses growing close to buttercup plants. Pasture productivity is therefore reduced because the buttercups themselves take up pasture space and nearby pasture plants are not fully utilised.

Despite recommendations for chemical control made by Tuckett (1961) and Matthews (1975), farmers still seem to have difficulty in achieving adequate control. In 1980 a series of trials was begun in southern Hawkes Bay, northern Wairarapa and Taranaki to see how best to control giant buttercup. Popay *et al* (1984) reported on the effects of repeat applications of herbicides within one season and over several seasons. Some limited comparisons of the effects of MCPA and MCPB were also reported. The trials described here tested the effects of single applications of MCPA at 1 kg ai/ha applied at different times of the year.

MATERIALS AND METHODS

Ten experiments were carried out between 1980 and 1983. The names of the farmers on whose properties the trials were conducted are shown in Fig. 1. The Morgan and Brown properties were near Eltham in Taranaki. Mabey's was on Ballance-Gorge Road near Ballance in northern Wairarapa. Suisted's was on Bowman Road and Bradley's on Range Road, both near Woodville in southern Hawkes Bay.

In all trials, MCPA at 1 kg ai/ha (Shell Weedkiller M or IWD Weedar MCPA) was applied once to each plot on the dates shown in Fig. 1. Treatments were arranged in four randomised blocks, with one or two untreated plots per block. At Morgan's in 1983, plot size was 20 × 6 m and herbicide was applied through a C-Dax CDA sprayer with three micromax units at 1.8 m spacing, disc speed 2000 rpm, delivering a total of 40.9 litres/ha at 8 kph forward speed. In all other experiments, plot size was 10 × 3 m and herbicide was applied in 220 litres water/ha through a propane-pressurised knapsack sprayer operating at 210 kPa, with a 1.5 m boom which was either hand-held or mounted on bicycle wheels. The boom was fitted with four Tee-jet 730154 nozzles at 380 mm spacing; forward speed was 3.6 kph. All trials were open to grazing, but were not grazed for 2 weeks or more after herbicide application. After that they were rotationally grazed by dairy cows.

Because giant buttercups tend to occur in clumps of 3-6 plants, vegetatively produced from the parent (Sarukhan and Harper 1973), 'clumps' of buttercups were counted in each plot in most trials in December or January following treatment. In all trials the buttercup and clover cover of each plot was visually assessed at the same dates, and also on a few other occasions.

Proc. 37th N.Z. Weed and Pest Control Conf.

Fig. 1: Numbers of buttercup plants as % of those in untreated plots (arcsin transformation) following application of MCPA at different times of the year. Vertical bars show the LSD (5% level) between treatments for each site. At the dates marked with *, heavy rain fell shortly after herbicide application.

Buttercup counts or cover estimates for each plot were converted to a percentage of the count or cover of the untreated plot or plots in the same replicate. An arcsin transformation (Snedecor and Cochran 1971) was carried out on these percentages and the transformed data used in an analysis of variance.

RESULTS AND DISCUSSION

Means of transformed data for each application date in each trial are presented in Fig. 1. For the trial at Bradley's in 1982, buttercup clumps were too numerous and too close together to be counted accurately so that buttercup cover in each plot was compared with the untreated plots. In all other trials, buttercup cover assessments gave similar results to counts and the data presented are for counts of buttercup clumps. The number of clumps per m² at assessment is shown in Table 1.

The application dates which gave best buttercup control are summarised in Table 1. In general, the most reliable and consistent control of buttercups came from September applications of MCPA. In nine out of the ten trials, September applications gave best control or gave results not significantly different from the best dates. August applications were as effective in six trials. At both Morgan's and Brown's in 1982, 7 mm of rain fell, starting about 15 minutes after the herbicide had been sprayed in August, probably affecting the herbicide activity. In 1982, April or early May were effective dates for spraying, but this was not so in 1980 or 1983. November applications worked well at the Taranaki sites, but not at the others.

Buttercup cover tended to be lowest in May, June and July, when cattle seemed to graze the plants to some extent and recovery was slow. New buttercup growth began in August and buttercup cover reached its maximum in November and December. The poor control of buttercup with herbicides applied during winter was probably because leaf area was small and the plants relatively inactive. Although plants were not very much bigger in August, they were beginning to grow. Although buttercup cover was at its greatest in October and November, at the start of the flowering, the degree of herbicidal control achieved varied from site to site.

TABLE 1: Numbers of butter cup clumps/m² in untreated plots, dates of best treatment and dates of treatments not significantly different from the best, for each trial.

Trial	Clumps/m ²	Best treatment date	Other good treatment dates
1980 Mabey	3.3	19 Aug	25 Sept
Suisted	3.5	25 Sept	19 Aug
1981 Mabey	4.1	20 Aug	24 July: 20 Oct
Bradley	2.9	14 Oct	24 July: 19 Aug: 25 Sept
1982 Morgan	3.3	15 Nov	16 Mar: 16 Apr: 16 Sept
Brown	5.4	16 Sept	16 Mar: 16 Apr: 23 Jul: 15 Nov
Bradley	(93% cover)	29 Sept	3 May: 30 Aug
1983 Suisted	4.7	15 Aug	23 Sept
Morgan	1.4	16 Nov	28 Sep
Mabey	5.2	23 Sept	

MCPA at 1 kg ai/ha damages clovers but this damage is temporary and clover content of the sward usually recovers after a few months. In these trials, clovers were visually assessed in November, December or January. At this time clovers in autumn- and early winter-sprayed plots had mostly recovered, but those from late winter- and spring-sprayed plots were often suppressed. However, these results do not give any indication of the losses of clover and pasture production which may have occurred earlier in the season.

ACKNOWLEDGEMENTS

Thanks are due to the farmers on whose properties these trials were conducted, and to P. Sanders for technical assistance with some of the earlier trial work.

REFERENCES

- Connor, H.E., 1977. The poisonous plants in New Zealand. Government Printer, Wellington, p. 146.
- Garnock-Jones, P.J., 1981. Check list of dicotyledons naturalised in New Zealand. 9. Ceratophyllaceae, Nymphaeaceae, Ranunculaceae, and Violaceae. *N.Z. J. Bot.* 19: 157-160.
- Matthews, L.J. 1975. Weed control by chemical methods. Government Printer, Wellington, pp. 259-261.
- Popay, A.I. 1984. Chemical control of giant buttercup (*Ranunculus acris* L.) in preparation Sarukhan, J. and Harper, J.L., 1973. Studies on plant demography: *Ranunculus repens* L., *R. bulbosus* L. and *R. acris* L.I. populations flux and survivorship. *J. Ecol.* 61: 675-716.
- Snedecor, G.W. and Cochran, W.G., 1981. Statistical methods. Iowa State University Press, Ames. Iowa.
- Tuckett, A.J., 1961. Giant buttercup. *Proc. 14th N.Z. Weed Control Conf*: 124-126.