TIMING OF HERBICIDE APPLICATIONS FOR NODDING THISTLE CONTROL IN CANTERBURY

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SUMMARY

In four trials in three seasons, MCPA at 1.0 and 1.5 kg ai/ha was applied monthly from autumn until early summer to dense stands of nodding thistle (*Carduus nutans*). Treatments in April, May, September and October were more effective than winter and summer applications in reducing the thistle populations.

INTRODUCTION

Nodding thistle continues to rate highly as a problem pasture weed in many areas of the Canterbury plains and was ranked as the third most serious weed in the South Island in a recent farmer opinion survey (Bascand and Jowett 1982). Control with phenoxy herbicides has in many instances been poor and this may be related to the timing of application and the stage of growth of the thistles. Delahunty (1960) reported the results of trials over three seasons in mid-Canterbury and concluded that treatment with MCPA, 2,4-D or MCPB at various rates was effective in April, May, August and September but not in other months. In the Waikato and Hawkes Bay late autumn/early winter application is more reliable than spring treatments (Popay *et al* 1982).

Due to the lack of data upon which recommendations for thistle control could be based, a series of experiments was undertaken to re-examine the current recommendations. Results from four trials, in three seasons, with the aim of finding the optimum timing of herbicide applications for Canterbury conditions are reported in this paper.

METHODS AND MATERIALS

Four sites (one in 1979, two in 1980 and one in 1981) with dense and uniform populations of nodding thistles were chosen in the autumn before treatment. The site in 1979 was at Fereday Island, Rakaia on border-dyke irrigated Waimakariri stony silt loam soil. In 1980, one site was located at Southbridge on a sprinkler irrigated Templeton silt loam and the other was a dryland site at Winslow on a Lismore stony silt loam. The 1981 site was located at Greendale on a non-irrigated Templeton/Eyre-Paparua stony silt loam. The experimental design was a factorial, with factors being rate of MCPA and time of application. Four replicates of the treatments were applied to 10 x 2 m plots in a randomised block layout. Three untreated control plots were included in each replicate. MCPA at 1.0 and 1.5 kg ai/ha was applied in the middle of each month from autumn until summer, using a trolley-mounted (1979) or hand held (1980 and 1981) 2 m wide boom sprayer using Teejet 8002 nozzles operated at 210 kPa.

The density of thistles was assessed by counting the total number of live plants on each plot in the January following treatment.

RESULTS

The numbers of live thistles remaining after treatment, as a percentage of the number on control plots, for each month when treatments were applied, are shown in Figs. 1a, 1b, 1c and 1d.

At the Rakaia site in 1979, all treatments except July and August at 1.0 kg ai/ha gave a reduction in thistle population of greater than 92% in spite of the high field population of over 26 thistles/10 m² (Fig. 1a). Thistles were small and remained in the

Proc. 36th N.Z. Weed and Pest Control Conf.

rosette stage for the duration of the trial at this site. Similar results occurred at Southbridge in 1980 for applications from March until October but the percentage of thistles remaining after November and December sprayings was high particularly at the low rate (Fig. 1b). Thistles had commenced flower-stem extension prior to the November application and by mid-December were about 45 cm tall.

The results from Winslow were more variable. As at the previous sites, treatments applied in April, May, September and October resulted in a reduction of the thistle population of greater than 92%. In contrast to the previous sites, a much higher percentage of the population survived the applications in June, July and August (Fig. 1c). Thistles remained in the rosette stage from autumn through winter and commenced flower-stem extension in early December at this site.

Fig. 1: Effect of time of application of MCPA on thistle populations at four sites in Canterbury.

At Greendale in 1981 results were similar to the other sites except that a relatively high proportion of thistles remained after March and May treatments (Fig. 1d). Thistles continued to germinate and emerge during late autumn at this site and by May, the population was dominated by seedling thistles (60% of the total). Many thistles remained small (<5 cm diam) until flower-stem extension commenced in early December. The lowest counts resulted from September, October and November applications with more than 90% reduction in the population.

The difference between the two rates was significant ($P < 0.5$) when averaged over all treatment dates in the trials at Rakaia, Southbridge and Winslow (Figs. 1a, 1b and 1c). The high rate resulted in a consistently lower proportion of thistles remaining after treatment.

DISCUSSION

It has been shown that applications of MCPA to small rosettes in autumn and spring gives good thistle control. Applications to slow-growing thistles in winter and to those which have begun flower-stem extension in early summer, are not effective. This concurs with the conclusions of Delahunty (1960) and Popay *et al* (1982).

Although equally good control can be achieved in autumn and spring, the earlier time is preferable because thistles are removed while they are still predominantly small and before any significant loss of pasture availability due to their presence has occurred. In addition, the temporary reduction in clover production which has been observed following the use of phenoxy herbicides in pasture (McLean 1957) is minimal following autumn applications and greatest after spring applications. Early application means clovers will have recovered by the spring when maximum pasture production is required for fattening and conservation.

Timing of application in relation to seedling germination is also important. At Greendale in 1981 autumn drought conditions resulted in a deterioration of the pasture sward and a flush of seedlings during the early part of the trial. Seedlings did not occur at the other sites. Some of these seedlings would have germinated after March April and May treatments and would probably have remained until counts were taken in January 1982. Therefore the total number of thistles recorded for these treatments would have consisted of both thistles which survived treatment and new germinations. The presence of these unsprayed seedlings accounts for the high proportion of plants remaining after treatment in these months. It will therefore be prudent to delay treatment until seedlings have germinated in the autumn, but not so late as to coincide with the winter period. If seedlings are still emerging in late autumn, spraying would be better delayed until spring.

ACKNOWLEDGEMENTS

The authors wish to thank Messrs P. Montgomery, B. Nimmo, G. Seyb and G. Gough for the use of their land and Messrs M. Langlands for technical assistance and D. Saville for biometrical advice.

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