CONTROL OF CALIFORNIAN THISTLE BY GRAZING MANAGEMENT

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SUMMARY

Different sheep grazing management systems were used on a moderately dense stand of Californian thistles (*Cirsium arvense*). Application of MCPB, or topping were included in some treatments. Hard rotational grazing throughout the spring and summer gave 95% control of thistles in the following year. A single application of MCPB in December, after lax spring grazing, followed by medium rotational grazing in the summer gave equally good results. Topping was less effective than MCPB in regaining control after lax spring grazing. Medium rotational grazing gave some reduction in thistle numbers but lax spring and summer grazing led to increased thistle numbers.

INTRODUCTION

Californian thistle is a widespread weed of crops and pastures in many countries. Work by the authors on chemical control in pastures has given variable results. There is, at present, no selective herbicide that can reliably eliminate Californian thistle from clover-based pasture with a single application. Repeat treatments are therefore necessary, which makes control expensive, and if clover-damaging herbicides are used, reduces pasture productivity (Hartley and Thomson 1981). However, these authors also showed that Californian thistle density could be reduced by cattle grazing alone if the grazing pressure was reasonably high, and that herbicide treatment or topping of Californian thistles gave about 90% control in one year under intensive cattle grazing.

A pilot trial in 1981-82 suggested that intensive sheep grazing could also reduce Californian thistle numbers substantially. A grazing trial was therefore started in spring 1982 to see how sheep grazing could be used to control Californian thistles and for how long treatments needed to be continued to achieve worthwhile control. The results to the end of the second season are reported here.

METHODS

The trial was conducted on Tokamaru silt loam on the Hauorongo Research Area near Palmerston North. A 2 ha paddock of established pasture with a widespread infestation of Californian thistles was divided into 40 paddocks, each of 450 m², connected by races. All paddocks were mapped for thistle area and density in autumn 1982. Four paddocks were rejected because of low thistle numbers and the rest were blocked on the basis of thistle density and allocated to the nine treatments (Table 1). Some manipulation of replicates was necessary so that Treatments 1 to 4 were on adjacent paddocks in each replicate and the four paddocks of Treatment 5 were in two adjacent pairs. Otherwise treatments were arranged at random. Wethers were used for grazing. The spring and summer grazing systems are shown in Table 1. During the spring the paddocks of Treatments 1 to 4 were joined within each replicate and grazed together. Likewise Treatment 5 paddocks were grazed as two pairs. This was done so that the desired stocking rate could be obtained during the set stocked periods. The paddocks of Treatment 3 were sprayed with MCPB at 1.5 kg ai/ha on 1 December 1982 and on 16 December 1983. The thistles in Treatment 4 were mown to a height of 10 cm with a sickle-bar mower on 9 December 1982 and 15 December 1983. After this the grazing systems were changed to the summer regimes.

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TABLE 1: Treatments used and effect on Californian thistle numbers.

Spring	Treatments*	Mean No.thistle shoots/m ²		No.1.9.83 as % of initial No.
		Pre-treatment 1982	Pre-graze 1983	
1.Lax set-stocked (33)	Lax rotationally grazed 182/ha 2d/4w (26)	3.35	4.39	131
2.Lax set-stocked (33)	Medium rotationally grazed 182/ha 3d/4w (39)	3.40	2.38	70
3.Lax set-stocked (33)	MCPB followed by medium rotational grazing 182/ha 3d/4w (39)	2.08	0.15	7
4.Lax set-stocked (33)	Topped followed by medium rotational grazing 182/ha 3d/4w (39)	1.60	1.04	65
5.Hard set-stocked (44)	Hard set-stocked (44)	2.28	1.27	56
6.Lax rotationally grazed 231/ha 2d/2w (33)	Lax rotationally grazed 182/ha 2d/4w (26)	2.26	3.82	169
7.Medium rotationally grazed 231/ha 3d/2w (50)	Medium rotationally grazed 182/ha 3d/4w (39)	2.28	1.24	54
8.Hard rotationally grazed 231/ha 4d/2w (66)	Hard rotationally grazed 182/ha 4d/4w (52)	3.46	0.18	5
9.Hard rotationally grazed 462/ha 4d/4w (66)	Hard rotationally grazed 364/ha 4d/8w (52)	1.83	0.54	29
LSD 5%				42

* No. sheep/ha for x days/x week rotation. Figures in parenthesis = mean No. sheep/ha.

The rotational grazing treatments were applied in order of treatment number. The same mob of sheep grazed each treatment in sequence. The different intensities of grazing (lax, medium, hard) were achieved by grazing for 2, 3 or 4 days as appropriate in each rotation. All paddocks received the same grazing before the trial began, and during the period from May to September.

Thistle numbers were recorded regularly along three permanent transects, each 31 m long by 1 m wide, in each paddock. Counts were made before grazing treatments were imposed in the spring of each year and at the end of each rotation.

In the second year (1983-84) pasture dry matter was estimated with an electronic pasture probe. Fifty probe readings were taken per paddock before and after grazing on the rotationally grazed treatments. A 60 x 40 cm cage was placed in each of the set-stocked paddocks and 20 probe readings taken at placement and two (spring) or four (summer) weeks later. The cage was then moved to a new site within the paddock. No calibration cuts were taken, and a standard calibration curve was used to estimate standing dry matter from the probe readings.

RESULTS

Fluctuations in Californian thistle numbers over two seasons on a seasonal basis are shown in Fig. 1. These graphs do not necessarily give an accurate measure of control, since the number of thistle shoots counted at any time during the growing season was affected by the intensity of grazing just beforehand. Comparison of numbers present before grazing in September 1983 with the pregrazing numbers in October 1982 shows the thistle control achieved in one season (Table 1).

Fig. 1: Numbers of Californian thistle shoots as a percentage of numbers present at 13 October 1982. Treatment numbers on the graph are as shown in Table 1.

Fig. 2: Residual dry matter (kg/ha immediately after each grazing in rotational grazing treatments, or standing dry matter in set stocked treatments. Treatment numbers of the graph are as shown in Table 1.

Lax grazing in spring and summer (Treatments 1 and 6) led to an increase in the number of thistles from one season to the next. Medium rotational grazing resulted in a 30-50% reduction in thistle numbers. Hard set-stocking throughout spring and summer led to a similar reduction in thistle numbers. Hard rotational grazing during spring and summer (Treatment 8) gave very effective thistle control. The same intensity of grazing applied less frequently (Treatment 9) gave slightly less effective control.

Lax spring grazing, which allowed the thistles to grow, followed by a single application of MCPB in December and medium rotational grazing in summer also gave excellent thistle control. A single topping treatment, instead of MCPB application, was not as effective.

In the second season (1983-84), grazing pressures were high during September and early October and thistle numbers declined in most treatments, but the thistles recovered when grazing pressure was reduced later in the season. As a result of the long, mild summer, thistle numbers were still very high in April. Treatments 3 and 8, which had been so successful in the first season, continued to maintain good control of thistles in the second season.

An indication of the grazing pressures involved is given in Fig. 2. In general, the pasture dry matter left following grazing was as expected from the treatments applied. Pasture was, however, grazed to lower levels in Treatments 3 and 4 than in Treatment 2. This may have been because of fewer mature thistles in Treatments 3 and 4 so that the sheep could graze harder, or the thistles themselves may have contributed to the estimated residual dry matter in Treatment 2.

DISCUSSION

Newly emerging shoots of Californian thistles are relatively soft and will be grazed if stocking pressure is high enough. When the thistles become mature and hard, sheep have to be under extreme pressure to eat them. Under the hard rotational grazing system, thistle shoots were grazed off regularly while they were still soft, and presumably the food reserves in the roots were steadily depleted so that very few shoots were produced in the second season. This hard rotational grazing would be impractical over a whole farm, but Californian thistles commonly occur in patches and it may be possible to graze such patches hard enough and frequently enough to achieve control. However, hard grazing is often difficult to achieve during the spring unless large numbers of dry stock are available.

The equally good thistle control achieved by spraying with MCPB and then a moderate rotational grazing is a promising alternative. This treatment could easily be fitted into a farming system since hard grazing is not required until summer, after lambs are weaned. The herbicide used should be MCPB since MCPA or 2,4-D would damage clovers and reduce productivity (Hartley and Thomson 1981; Hartley 1983).

A number of herbicide trials conducted by the authors (unpublished) have given erratic control of Californian thistles under uncontrolled grazing. In this trial and in an earlier trial in Taranaki (Hartley and Thomson 1981) MCPB proved to be effective. In both trials herbicide application was followed by medium/hard grazing. It seems that moderately hard grazing following MCPB application is essential to achieve good thistle control.

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