Pasture Weeds

Research Note

THE EFFECT OF GRAZING AND PASTURE SPECIES ON THE SURVIVAL OF SCOTCH THISTLE

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SUMMARY

The establishment and survival of Scotch thistle (*Cirsium vulgare*) in competition with different pasture species under different grazing managements was recorded. The survival of established thistles was reduced by rotational grazing but establishment of seedlings was higher following rotational grazing than set-stocking. Heavy treadings appeared to reduce the survival of thistle seedlings but may have increased the survival of larger thistles. Thistle numbers were lower in browntop (*Agrostis tenuis*) pasture than in perennial ryegrass (*Lolium perenne*) pasture. The effect of Yorkshire fog (*Holcus lanatus*) was dependent on grazing management.

INTRODUCTION

Observations suggest that pasture abuse, such as overgrazing or pugging, frequently results in an increase in weeds. A trial was set up to measure the effects of pugging and pasture species on the establishment of various lines of weed seed. The sown weeds did not establish but a naturally occurring population of Scotch thistle showed interesting variations in population density according to pasture species and grazing management. The numbers of thistles were recorded and examined in relation to pasture history in an attempt to determine what affected thistle establishment and survival.

METHOD

The trial was conducted on twelve small paddocks (15 x 24 m). In April 1979 one 90 m² plot in each paddock was cultivated and sown to either 'Grasslands Ruanui' perennial ryegrass at 20 kg/ha, Yorkshire fog at 10 kg/ha or browntop at 3 kg/ha, all with white clover at 1.5 kg/ha. The paddocks were not grazed again till September 1979 when one third of each plot was set-stocked with sheep and grazed fairly hard (2.3 cm). The remaining two thirds were caged and grazed on a short or long rotation (mob stocked every 3 or 6 weeks) till February 1980 when the entire area was grazed intermittently as one unit till September 1980.

In September 1980 half the paddocks, two of each grass species selected at random, were pugged by moving large numbers of sheep in for short periods (about 1 day at a time) under wet conditions and walking them round. This was done three times and the paddocks looked very muddy afterwards but appeared to recover quickly. A few weeks later half the paddocks (three pugged, three clean) were set-stocked while the other six were mob stocked about once a month.

Early in 1981 two generations of Scotch thistles were observed, one generation in flower and one as rosettes. Experience from the adjacent area where Scotch thistle establishment was being monitored, indicated that the flowering thistles would have germinated in the autumn 1979 and the rosettes in summer/autumn 1980. In February 1981 all thistles of both ages were counted on each 30 m² sub-plot.

Proc. 34th N.Z. Weed and Pest Control Conf.

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RESULTS

It is important to remember that the flowering thistles would have established at the same time as the grass was sown whereas the rosettes established into a one year old sward. At the time of the pugging treatment and the start of the subsequent grazing the 'flowering thistles' would have been rosettes and the 'rosettes' fairly small seedlings.

Since the trial was not designed for an examination of Scotch thistle establishment there were some weaknesses in the design which precluded valid statistical analysis. However, a number of factors appear to have had a strong effect on Scotch thistle establishment and survival.

The effects of pugging and subsequent grazing on established Scotch thistles are shown in Table 1. The effect of grazing was consistent in all grasses on both ages of thistle and showed rotational grazing to have reduced the number of thistles relative to set-stocking. Pugging appeared to increase the number of flowering thistles in Yorkshire fog and possibly ryegrass but reduced the number of rosettes in Yorkshire fog and browntop.

Table 1 The effect of pugging and subsequent grazing (1980-81) on survival of Scotch thistle in different pasture species (means of 12 plots).

	Treatment				
Pasture Species	Pugged	Not pugged	Set-stocked	Rotational grazed	Mean
Flowering thistles No./10m²					
Ryegrass	4.1	2.7	4.6	2.3	3.4
Yorkshire fog	3.2	1.2	3.7	0.6	2.2
Browntop	1.0	1.2	1.8	0.4	1.1
Mean	2.8	1.7	3.4	1.1	
Rosettes No./10m²					
Ryegrass	8.7	7.3	10.9	5.0	8.0
Yorkshire fog	9.4	16.6	21.7	4.3	13.0
Browntop	1.4	4.1	3.6	1.9	2.8
Mean	6.5	9.3	12.1	3.7	

There were three times as many thistles of both ages in ryegrass as in browntop (Table 1). Yorkshire fog had an intermediate number of flowering thistles but considerably more rosettes than either of the other grasses.

Table 2 shows the effect of the 1979-80 grazing management on subsequent thistle establishment. The previously set-stocked areas had approximately half the number of rosette thistles as found on the rotational grazed areas. Short and long rotation had equal numbers.

Table 2 Effect of pre-establishment grazing on number of Scotch thistle rosettes per 10m² (mean of 16 plots)

Pasture Species	Grazing management Sept 1979-Feb 1980			Mean
	Set-stocked	Short rotation	Long rotation	
Ryegrass	4.0	10.3	9.7	8.0
Yorkshire fog	7.4	15.8	15.9	13.0
Browntop	1.5	2.8	3.9	2.8
Mean	4.3	9.6	9.8	

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DISCUSSION

The invasion of pasture by weeds is dependent on a complex interaction of many factors including pasture species, grazing and treading.

Pasture species

As found with gorse seedlings (Hartley and Phung 1979; Hartley *et al* 1980) browntop was better able than ryegrass to prevent Scotch thistle establishment under all conditions examined. The different relative control of flowering thistles and rosettes by Yorkshire fog indicates the performance of this grass is very dependent on management. Following germination of the flowering thistles (and the grass) the area was ungrazed for several months and the Yorkshire fog developed a very dense sward. At no time after the germination of the 'rosettes' were the swards ungrazed for any extended period. Ungrazed Yorkshire fog was shown by Hartley and Phung (1979) to be particularly damaging to gorse seedlings and it appears to have a similar effect on Scotch thistle seedlings. It appears a weak competitor under more intensive grazing.

Grazing management

When applied to an existing thistle/grass complex rotational grazing gave better control of thistles than set-stocking. A similar result was found with gorse seedlings (Hartley and Phung 1979). However, where differential pasture managements were applied before the thistles germinated the opposite result was achieved. Though the earlier differential grazing management terminated in February 1980 the resulting sward differences persisted and were still apparent the following spring. Over this period, during which the 'rosette' thistles would have germinated, the previously set-stocked swards were short and dense while the rotationally grazed swards were lax and open. It appears, therefore, that rotational grazing is needed to control established thistles but set-stocking to prevent their establishment.

Pugging

There were indications that the effect of pugging depends on the size of the thistles and the type of grass. The slight increase in flowering thistles following pugging suggests that the larger thistles were damaged less by the degree of pugging imposed than was the grass, especially Yorkshire fog and ryegrass. The young thistles, however, suffered relatively more damage than the grass especially when trodden in association with the prostrate grasses, Yorkshire fog and browntop.

ACKNOWLEDGEMENTS

Thanks to my colleagues for help with stock management and counting of thistles.

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