THE EFFECT OF OVERSOWN GRASSES AND HERBICIDES ON BARLEY GRASS

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Summary

Barley grass (*Hordeum* spp) infested dairy pasture was sprayed with paraquat in the autumn and oversown with different grasses. Some oversown plots were sprayed in June with propyzamide or ethofumesate. In the first year 'Nui' ryegrass (*Lolium perenne*) reduced barley grass herbage and seed head numbers. All herbicides reduced barley grass. In the second year both prairie grass (*Bromus catharticus*) and 'Nui' reduced barley grass herbage but not seed heads. No oversowing treatment without herbicides reduced barley grass levels below those in untreated pasture.

INTRODUCTION

There are several causes for the spread of barley grass (*Hordeum* spp) in New Zealand. Among them are changes in pasture composition, increasing fertility, and higher stocking rates. Three ways in which barley grass can be attacked are by changing the management system, by spraying with herbicides, or by introducing pasture species which can compete more effectively with barley grass.

Herbicides have been used for many years to control barley grass but often they damage other pasture species and open the way to re-invasion. Levy (1948) and others have advocated oversowing to control barley grass but there is little evidence of the effectiveness of this. Henderson and Grant (1974) showed that oversowing with a heavy rate of prairie grass suppressed vegetative growth of barley grass but did not reduce the number of seed heads.

In the experiment described, four grass cultivars were oversown in the autumn and some plots were treated with herbicides in the winter. Observations were continued for 2 years.

METHOD

The trial was laid down at Flock House Dairy Beef Unit in March 1974 on an area of Manawatu silt loam. Before the experiment the pasture was predominantly ryegrass (*Lolium* spp) and white clover (*Trifolium repens*) with some barley grass, prairie grass and cocksfoot. The area was sprayed with dicamba immediately beforehand in order to reduce the high clover (*Trifolium* spp) content.

Plot size was 3 × 1.5 m with 11 treatments arranged in four randomised blocks. The relevant plots were sprayed with paraquat (0.28 kg/ha) on 20 March, after barley grass germination had begun, and oversowing took place two days later. Ethofumesate (3 kg/ha) and propyzamide (1.5 kg/ha) were applied in June. Treatments are shown in Table 1.

* Sometimes known as *B. unioloides*.

Relevant plots were oversown with 'Grasslands Matua' prairie grass (*Bromus catharticus**), 'Grasslands Nui' ryegrass (*L. perenne*), 'Grasslands Manawa' ryegrass (*L. multiflorum x L. perenne*) or 'Grasslands Apanui' cocksfoot (*Dactylis glomerata*). All oversown seed was coated with methyl cellulose and dolomite. Sowing rates of uncoated, viable seed were prairie grass 70 kg/ha, ryegrasses 30 kg/ha and cocksfoot 18 kg/ha.

Seedlings were counted on 3 May 1974 and, beginning on 25 June, harvests were taken for yields and botanical composition. Electric handpieces were used to cut two quadrats, each of 0.37 m^2, from each plot to a height of about 10 mm. The whole area was then mown to cutting height. Harvests were made at 6 - 8-week intervals in 1974 and at 8 - 10-week intervals in 1975. After the November harvests in both years the pasture was allowed to grow so that barley grass seed heads could be counted.

For statistical analysis counts were converted to $(\sqrt{x} + 1)$ and an arcsine transformation used on percentage data. Percentages shown in the Table are derived from raw data.

RESULTS

Mean percent establishments were prairie grass 35%, Manawa ryegrass 20%, Nui ryegrass 51% and cocksfoot 4.4%.

Table 1 shows total dry matter yields of each treatment for both years of the experiment, the proportion of barley grass in each treatment in November of each year and the number of barley grass seed heads in both years.

Soon after the experiment commenced it became obvious that many barley grass seeds had germinated *after* paraquat application. This accounted for the high levels of barley grass in the paraquat treated plots in 1974 and for the high seed head numbers in the first year.

In the first year, application of propyzamide and ethofumesate reduced barley grass to levels below those in either untreated or paraquat-treated plots, although the reductions were not always significant (Table 1). Only 'Nui' ryegrass, without subsequent herbicide application, reduced barley grass herbage and seed heads below that in plots which were treated with paraquat but not oversown.

In 1974, total dry matter production of both propyzamide treatments and of the 'Manawa' + ethofumesate treatment was significantly lower than that of untreated pasture or of plots treated with paraquat but not oversown. Both 'Nui' oversowing treatments gave lower overall yields than the untreated pasture.

Total yield in 1975 was similar for all treatments except that it was still appreciably lower in plots treated with ethofumesate in 1974. Yields of prairie grass plots were significantly higher than those of other treatments. Barley grass content was much lower in all plots in 1975 compared with 1974 except in plots treated with propyzamide or ethofumesate. Both propyzamide-treated plots, both 'Nui' treatments and the prairie grass treatment contained less barley grass than did plots treated with paraquat but not oversown. In 1975 there were no significant differences in barley grass seed head numbers.

DISCUSSION AND CONCLUSIONS

From this experiment it is clear that desiccating a sward containing barley grass too early in the autumn can do more harm than good. It also shows how important strong autumn pasture competition is in keeping barley grass at a low level. In the first year the oversown grasses reduced barley grass content but not to levels as low as those in untreated pasture. June treatment with propyzamide or ethofumesate was needed to reduce barley grass effectively.

TABLE 1: EFFECT OF TREATMENTS ON TOTAL DRY MATTER YIELDS, ON BARLEY GRASS SEED HEAD NUMBERS AND ON THE BARLEY GRASS COMPONENT OF THE SWARDS.

(Total dry matter and number of seed heads are expressed as a percentage of figures for residual pasture in 1974.)

	Total dry matter		*Barley grass seed heads*		*% barley grass by weight in herbage*	
	1974	*1975*	*1974*	*1975*	*1974*	*1975*
untreated pasture	(11612 kg/ha)	—	(59/m²)	—		
	100 bcde	99 bcdef	100 de	27 def	6.3 cdef	9.5 cde
paraquat	96 cdefg	108 bc	575 ab	71 def	64.9 a	16.0 c
propyzamide	74 i	104 bcd	0 f	9 ef	0 f	1.0 def
ethofumesate	105 bcd	85 fghi	1 f	30 def	0.6 ef	8.0 cdef
paraquat + prairie grass	91 defg	132 a	416 abc	8 ef	48.6 ab	2.7 def
paraquat + 'Nui'	85 fghi	112 b	303 c	14 def	42.6 b	2.2 def
paraquat + 'Manawa'	92 defg	105 bcd	363 bc	41 def	49.3 ab	5.6 cdef
paraquat + cocksfoot	89 efgh	105 bcd	623 a	18 def	53.8 ab	4.0 cdef
paraquat + ethofumesate + 'Nui'	81 ghi	83 ghi	29 def	52 def	2.6 def	1.6 def
paraquat + ethofumesate + 'Manawa'	76 hi	91 defg	11 ef	21 def	3.7 def	7.1 cdef
paraquat + propyzamide + cocksfoot	47 j	113 b	43 def	10 ef	0.5 ef	1.3 def
CV %	9.5		42.5		38.3	

Duncan's letters refer to both years for each set of data.

In the second year after oversowing, prairie grass and 'Nui' ryegrass seemed to offer most resistance to barley grass and there was some carry-over of herbicidal effects from the previous year. None of the barley grass levels were significantly lower than in untreated pasture. The pasture was cut hard but infrequently. Such a treatment might be expected to favour the oversown species at the expense of barley grass but even so, oversowing had relatively little effect on barley grass in the 2 years of the trial.

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