CHEMICAL CONTROL OF BARLEY GRASS UNDER GRAZING CONDITIONS

M. J. HARTLEY, G. C. ATKINSON, K. BIMLER* and G. A. DOUCH

Ruakura Agricultural Research Centre, M.A.F., Hamilton

Summary

Barley grass *(Hordeum* spp) infested pastures in Waikato and Hawkes Bay were divided in 0.2 ha paddocks and treated for barley grass control. Ethofumesate, propyzamide and TCA/2,2-DPA were used and the paddocks grazed by sheep. During the initial six month period dry matter and stock production were reduced by all treatments and barley grass control was variable. Ethofumesate checked clovers but increased ryegrass *(Lolium* spp), propyzamide increased white clover *(Trifolium repens)* but destroyed ryegrass. TCA/2,2-DPA left a better pasture balance but barley grass control was inconsistent. These are preliminary results only.

INTRODUCTION

It has been shown that herbicide treatment of pasture to control barley grass *(Hordeum murinum)* can increase stock production during the summer following treatment in spite of a reduction in dry matter production (Hartley and Atkinson 1972). This increase resulted from a reduction in the amount of barley grass seed and consequent stock damage which was shown to reduce stock thrift. A similar but less marked improvement in stock performance was shown during the second summer while treated and untreated pastures performed equally during the rest of the year (Hartley and Atkinson 1973). In the initial trials, data collection did not commence until five months after treatment and continued for only two summers so that neither initial alteration in productivity nor long term effects of treatments were assessed. It is imporant to know, not only the benefits of treatment, but also any initial production loss that might be expected, and for this reason a further set of trials was commenced in Waikato and Hawkes Bay with data recorded from time of treatment. These trials will continue for three to four years measuring the duration of satisfactory barley grass control and the effects on pasture composition, dry matter production and stock performance. This paper reports on the initial period of the trials and thus supplies some of the information missing from the previously published work.

METHOD

Two pastures with moderate barley grass infestation in Waikato, at Rukuhia and Tokanui, and one heavily infested pasture in Hawkes Bay, at Ahuriri near Napier, were divided into 0.2 ha paddocks. At Rukuhia and Tokanui there were 15 and 12 paddocks respectively, which were treated with either ethofumesate (previously NC 8438) at 2.0 kg/ha in early June, propyzamide (previously pronamide) at 0.5 kg/ha in early August or a proprietary mixture of 65% TCA and 11% 2,2-DPA at 8.0 kg/ha product in late August. There were three replicates of each treatment as well as three untreated controls and, at Rukuhia only, three "hand weeded" paddocks where barley grass was prevented from seeding

* Ministry of Agriculture & Fisheries, Hastings.

by mechanical means. These latter paddocks are for future study so the results are not reported here. At Ahuriri, only ethofumesate (2.0 kg/ha on 7/6/73), and an emulsefiable concentrate of 40% TCA, 20% 2,2-DPA (5.7 litres/ha product on 26/7/73) were used each on eight paddocks, four of which are scheduled for a retreatment the following winter. There were four control paddocks. All treatments were applied in 123 litres of water/ha by boom sprayer mounted on a Land Rover.

Because of the initial check expected from herbicide treatment, uniform stocking across all treatments was impracticable. Stock numbers (hoggets plus ewes as "extras") were adjusted to keep all paddocks at a uniform pasture height of 2 to 4 cm after grazing. The Waikato trials were rotationally grazed on a three week rotation with one flock per treatment, and Ahuriri was set stocked. Stock were weighed every three or four weeks, both number and weight being recorded, and drenched for parasite control. Because of the complications of variable stock numbers and the effect of pasture compositional changes on live weight gains, stock performance per treatment has been calculated on an estimate of the metabolisable energy (ME) consumed (Table 1). This assumed a daily maintenance requirement of 148 k calories ME/ $kgLW^{3/4}$ (LW = live weight) for woolly hoggets, 167 k calories ME/$kgLW^{3/4}$ for shorn hoggets and 130 k calories ME/$kgLW^{3/4}$ for woolly ewes. Live weight gains were calculated as 6.29 M calories ME/kg LW gain for hoggets and 8.51 M calories ME/kg LW gain for ewes. Information supplied by Mr P. V. Rattray, Nutrition Centre, Ruakura.

Pasture dry matter production was recorded by trimming from large pasture cages (Table 1) and pasture compositional changes by herbage dissection and point analysis (Table 2). Final barley grass control assessments were made by seed head counts from 30 to 50 random 0.09 m^2 quadrats per paddock (Table 1) and autumn point analysis (Table 2).

RESULTS AND DISCUSSION

Waikato, Rukuhia and Tokanui trials

Pasture dry matter production, as expected, was reduced by all herbicide treatments during this period immediately after treatment. The check, however, lasted for only three months for propyzamide to five months for ethofumesate, after which dry matter production was comparable with the untreated areas (Table 1 and Fig. 1). The TCA/2,2-DPA mixture gave less initial check but the effect was still apparent in January, though not significant.

TABLE 1: PASTURE PRODUCTION (kg DM/ha), STOCK PERFORMANCE (Mcal ME/ha) and BARLEY GRASS CONTROL (No. seed head/ha) (data expressed relative to control with actual level on control in parenthesis for period June 1973 to January 1974)

			Treatment	
RUKUHIA	*control*	*ethofumesate*	*propyzamide*	*TCA/2,2-DPA*
pasture production	100 a (6810)	89 a	71 a	81 a
stock performance	100 aA (27 600)	96 aAB	68 bB	85 abAB
barley grass	100 aA ($0.3x10^6$)	24 abAB	9 bB	16 bAB
TOKANUI				
pasture production	100 a (6130)	79 a	74 a	90 a
stock performance	100 aA (21 00)	87 abA	74 bB	92 abA
barley grass	100 aA ($0.2x10^6$)	19 bAB	8 bB	19 bAB
AHURIRI				
pasture production	100 aA (10 120)	64 bB	—	76 bB
stock performance	100 aA (15 800)	79 bB	—	78 bB
barley grass	100 aA ($3.2x10^6$)	2 bB	—	75 bB

Stock performance was similarly checked by propyzamide and TCA/2,2-DPA but marginally less so by ethofumesate.

Barley grass control was not satisfactory (Table 1). The actual amount of barley grass present was low, and on the control paddocks at Tokanui reached only 20% of the amount recorded on the same paddocks the previous year. This reduction, possibly as a result of rotational grazing and full utilisation of the spring growth, reduced the absolute difference between treatments. The low incidence of barley grass made sampling more difficult and possibly less accurate. Propyzamide gave the best control with a 90% reduction, while the other herbicides achieved only about 80% reduction.

Both ethofumesate and TCA/2,2-DPA gave some increase in ryegrass (*Lolium* spp) at the expense of other grasses while propyzamide significantly increased an otherwise low white clover (*Trifolium repens*) component and also increased the weed population at the expense of all grasses (Table 2).

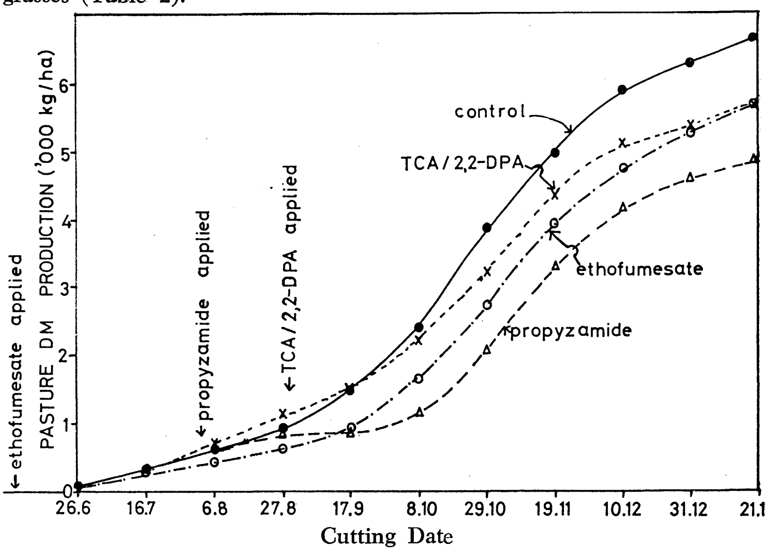

Fig. 1: Cumulative pasture dry matter production for six month post treatment.

Hawkes Bay, Ahuriri trial

The barley grass infestation on this trial was about ten times that on the Waikato sites; consequently, loss of dry matter production, as a result of using barley grass herbicides, was greater. Production loss was particularly severe after the use of ethofumesate which also controlled the spotted bur medick (*Medicago arabica*), the third major component of the sward. (The sward was approximately one third each of ryegrass, barley grass and spotted bur medick.) However, ethofumesate reduced stock production significantly less than it reduced dry matter production, probably because both species depressed were unpalatable to sheep.

Barley grass control by ethofumesate on this site was very satisfactory with a 98% reduction by seed head counts (Table 1). The TCA/2,2-DPA mixture gave very inconsistent results giving 80% control on four paddocks one side of the trial, but only 20% on the other four paddocks. Soil analysis did not reveal any explanation for this inconsistency but a more detailed soil survey will be conducted.

A considerable proportion (20% to 40%) of the barley grass was Mediterranean barley grass *(H. hystrix)*. This species* is a prolific seeder over a long season and appeared slightly more resistant to herbicide treatment.

Ethofumesate greatly increased the ryegrass component of the sward at the expense of barley grass and the legumes (Table 2). However, by autumn the germination of the annual spotted bur medick was equal to that on the other paddocks but clovers were still reduced.

Because of the dry summer, none of the trials were stocked during the dangerous "barley grass season". Therefore the improvements shown in the previous work (Hartley and Atkinson 1972, 1973) were not repeated. The trials will continue for two or three years in order to assess whether subsequent pasture performance justifies herbicide treatment for barley grass control. Meanwhile it should be remembered that this report covers only the initial period of the trial and true assessment of the effect of any herbicide cannot be made so early.

TABLE 2: PASTURE COMPOSITION

			Treatment	
	control	*ethofumesate*	*propyzamide*	*TCA/2,2-DPA*
NOVEMBER 1973				
WAIKATO trials herbage dissection				
ryegrass	33 abA	47 abA	29 bA	51 aA
barley grass	3	1	2	1
other grass	50 aA	37 abAB	15 cB	31 bcAB
clover	4 bAB	2 bB	20 aA	5 bAB
other species	5 bA	6 bA	30 aA	9 bA
dead matter	6 a	7 a	3 a	4 a
AHURIRI point analysis 800 point/treatment†				
ryegrass	33 bB	83 aA		44 bB
barley grass	27 aA	1 cC		13 bB
medick*	32 aA	8 bB		38 aA
litter and bare ground	7 a	9 a		5 a
MAY 1974 with May 1973 in parenthesis				
WAIKATO trials point analysis 1200 point/treatment				
ryegrass	53 aA (40)	54 ab (42)	35 bA (38)	51 abA (37)
barley grass	4 a (3)	2 a (3)	2 a (6)	2 a (5)
other grass	3 (28)	4 (27)	2 (28)	2 (31)
clover	10 bcB (7)	4 cB (11)	32 aA (11)	15 bB (10)
other species	5 a (10)	5 a (6)	7 a (7)	4 a (8)
litter and bare ground	25 a (11)	31 a (10)	21 a (10)	26 a (11)
AHURIRI point analysis 1600 point/treatment†				
ryegrass	53 cB (33)	81 aA (36)		65 bB (38)
barley grass	28 aA (22)	1 cB 25)		15 bA (23)
clover	6 aA	1 bB		6 aA
medick	7 a (16)*	8 a (16)*		8 a (16)*
litter and bare ground	3 bA (26)	8 aA (20)		5 bA (19)

† half that No. on controls.
* including some *Trifolium* spp.

* *Hordeum hystrix* seed not only causes eye and pelt damage equally with *H. murinum* but also penerates sheeps' gums causing considerable irritation. Seed removed from the gums of three ewes grazing on pasture where the barley grass was estimated as 60% *H. murinum* and 40% *H. hystrix* were identified as as 16 *H. murinum* and 269 *H. hystrix*. Seed collected from skin and eyes did not differ significantly from a 60:40 ratio.

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(Chairman's Summary continued)

Thompson's paper on ragwort control made the important distinction in evaluating chemical treatments between recovering ragwort plants and regenerating seedlings. The resilience of mature ragwort plants in surviving chemical treatment was demonstrated as was the likelihood of pasture damage from broadcast application of some herbicide mixtures. Not unexpectedly, pasture competition was shown to be a major influence in controlling re-infestation.

The choice of treatments however came under criticism from the floor and it seems unfortunate that, in view of the substantial effort being directed by farmers toward ragwort control, the practicalities of a farm situation were not more evident.