RESEARCH NOTES ON SELECTIVE CONTROL OF BARLEY GRASS IN PASTURE

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Summary

The bionomics of barley grass (*Hordeum murinum*) are discussed and the shortcomings of current chemical treatments related to them. The potential advantages of using materials which combine knockdown and residual effects are stated and results achieved with the triazines, simazine, atrazine and prometryne are given.

INTRODUCTION

Barley grass is an increasing problem in large areas of both Islands and must be rated as a major pasture weed. Invasion of pasture by this unpalatable species causes loss of grazing, and damage to sheep carcasses and pelts from seed penetration causes a significant economic loss (Loughnan, 1964).

Increase in prevalence of barley grass (*Hordeum murinum*) can be attributed to two main factors:

(1) Increase in soil fertility. While this is an overall advantage in farming, it does encourage the barley grass plant and leads, through higher stocking rates, to more extensive sheep camps where pasture is thinned and invasion opportunities are increased.

(2) The shortcomings of current chemical methods of control.

Consideration of this second aspect shows that no material currently used fulfils the practical requirements for barley grass eradication. Past work has shown that, under the supervision of technically qualified people, a high measure of barley grass control can be achieved with such materials as dichloropropionic acid, TCA and paraquat. In farm practice, however, eradication is rarely, if ever, achieved. The main reasons for this failure are:

(1) Inability to recognize barley grass at the vegetative stage when most treatments are recommended.

(2) Incomplete spray coverage of infested areas.

(3) Failure to carry out the repeat treatment necessary with non-residual materials.

(4) The difficulty, due to its prolonged seeding and germination time, of treating when the entire barley grass population is at a suitable growth stage.

The last of these factors is discussed further in this paper.

While Harris (1959, 1961) has shown that under favourable conditions all barley grass seed will germinate within four weeks of reaching the soil, he also found that under field conditions viable seeds shed in late summer were still present in the soil in July. Similarly, Meeklah (1964) found viable seed in the ground in the Taieri and Maniatoto districts through the winter till September and October.

It appears that the greater proportion of the seed germinates in autumn and plants survive in a dormant state through the winter but there is also a definite spring germination from over-wintered seed.

Chemical control to date has not been completely satisfactory (Meeklah, 1964; Leonard, 1964). Materials used have not been sufficiently versatile to cope with the conditions described.

The wide variations observed in times of seed fall and of germination confirm the need for materials giving a combination of knockdown of existing plants together with long-term residual effect to control subsequently germinating seed. None of the currently used materials possess both these properties.

Consideration of these requirements strongly suggests that members of the triazine group would be suitable for this use. Simazine is well recognized as a residual material which is dependent on root absorption for activity, and atrazine and prometryne are both foliar and root absorbed.

Meeklah (1964) has already shown that lucerne stands can be proofed against barley grass by application of simazine and the known activity of atrazine and prometryne strongly suggested their potential value.

A programme of trial work was planned to evaluate the effectiveness of these materials, alone or in combination, when applied at different times of the year. Dichloropropionic acid was included in all trials as a standard. The two main periods selected were late winter prior to spring germination, and late summer prior to or at seed fall. This latter time has the advantages that the extent of infestation would be clearly defined and also that the greater proportion of seeds would germinate during the following few weeks.

Different rates have been used to arrive at an application toxic to barley grass but tolerated by pasture species.

EXPERIMENTAL

The results from two trials in Canterbury can be reviewed. Plot size was 1/160th acre in Trial A and 1/320th acre in Trial B, with three replicates in each. Evaluation was by visual assessment of barley grass population rated on a 1 to 10 scale, with 10 representing complete control and 1 no detectable control. Results shown are the means for the three replicates. Application rates are given in terms of lb active ingredient per acre.

TRIAL A

Treatments were applied on July 6, 1964, when barley grass was in the vegetative stage and 3 to 5 inches high. Results from two assessments are quoted in Table 1.

TABLE 1: TRIAL A RESULTS

Treatment (lb)	*Barley Grass Control* Sept. 11, 1964	Feb. 16, 1965
Atrazine 1.0*	10	9
Atrazine 1.0	9	8
Simazine 1.0	8	8
Simazine 0.5/Prometryne 0.5*	8	8
Simazine 0.5/Prometryne 0.5	8	8
Simazine 1.0/Dichloropropionic acid 1.5	9	9
Dichloropropionic acid 1.5	8	8

* Indicates addition of surfactant.

TRIAL B

Treatments were applied on March 19, 1965, when barley grass was seeding. The assessment was made on May 21, 1965 (Table 2). Pasture tolerance is rated on a 1 to 10 scale.

TABLE 2: TRIAL B RESULTS

Treatment (*lb*)	*Barley Grass Control*	*Pasture Tolerance*
Dichloropropionic acid 1.5	1.0	10.0
Dichloropropionic acid 1.5/Simazine 1.0	9.0	8.0
Simazine 0.75/Prometryne 0.75	9.3	8.6
Simazine 1.0	5.6	9.0
Simazine 0.75	5.0	9.0
Atrazine 1.0*	9.3	8.0
Atrazine 0.75*	9.6	8.6
Control	1.0	10.0

* Indicates addition of surfactant.

DISCUSSION

Results from Trial A indicate a high degree of knockdown. While residual effect is necessary to deal with the limited spring germination, knockdown is particularly important for winter application to deal with the predominant over-wintering vegetative growth.

It is interesting to note that the results with simazine, which depends entirely on root absorption for its effect, were comparable with dichloropropionic acid, indicating an aprpeciable knockdown at this rate.

One aspect of trial assessment which has emerged is the risk of invasion of treated plots as a result of seed shed or carried from untreated plants along the plot margins.

Results from Trial B confirm the residual action of these triazine treatments destroying barley grass plants soon after germination. As is normal with triazine herbicides, germination is not prevented but as soon as the seedling roots develop the herbicide is absorbed.

It has been observed that application of triazines at the seed-head stage hastens the breakdown of the standing plants and thus reduces the period over which seed is shed.

Pasture tolerance in Trial B is acceptable and further work on this aspect is intended.

Simazine, atrazine and prometryne possess the properties which present knowledge of barley grass bionomics suggests are desirable for effective chemical control. They have shown ability to kill existing barley grass plants and control subsequent germinations. These results are sufficiently encouraging to warrant further investigation, particularly for application close to seed fall.

REFERENCES

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