SELECTIVE AERIAL TREATMENT OF BARLEY GRASS

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Summary

Aerial application of a proprietary emulsifiable concentrate formulation of TCA and 2,2-DPA to run-out ryegrass/clover pasture infested with barley grass (*Hordeum murinum*) during late autumn to early spring, resulted in significant season-long weed control and improved dry matter production of ryegrass and clovers. Treatments compare ethylene glycol diesters and sodium salt formulations with control. Results from aerial applications were comparable with those from ground applications.

INTRODUCTION

SINCE many barley grass (*Hordeum murinum*) infested areas are in large, arid paddocks (Meeklah, 1964) and in hill country where ground access is difficult, aerial spraying of selective herbicides coupled with other management practices is warranted.

Technical supervision is required to effect reliable farmer scale results from ground application of 2,2-DPA, TCA and paraquat when each is used alone (McPhail and Cassels, 1965). These compounds alone for various reasons have not proven acceptable for aerial application. Ground applications of the diester formulation of TCA plus 2,2-DPA e.c. (hereafter designated T/D.ec) parallel results obtained with a proprietary mixture of TCA plus 2,2-DPA salts (hereafter designated T/D). This mixture gives more reliable and superior barley grass control than either material used alone (Moffat and MacDiarmid, 1970).

EXPERIMENTAL

Large-scale aerially applied trials with a plot size of 40 × 110 metres were laid with a Hughes helicopter. The spraying gear was a conventional 7.9 m boom, fitted with Spraying Systems D8 discs and No. 45 cores, with a nozzle spacing of 20 cm. The rig was operated at 2.11 kg/cm², 56 km/h and 2 to 2.5 m high. This gave an effective swath width of 10 m. To ensure adequate foliar coverage two parallel passes were made, in opposite directions, each applying half the total spray volume of 225 l/ha (Naish, 1972).

Smaller-scale ground-applied trials with a plot size of 4.6 × 30.5 m were laid with a vehicle-mounted 4.6 m boom, delivering 225 l/ha at 4.5 km/h.

TRIAL 310-050*: small scale—Bridge Pa, Hastings—laid 7/5/71 under fine and warm weather conditions, to actively growing pasture 8 to 13 cm high.

% species present at treatment—visual assessment:

barley grass (<i>Hordeum murinum</i>)	....	....	....	....	40
perennial ryegrass (<i>Lolium perenne</i>)	....	....	....	....	20
red clover (<i>Trifolium pratense</i>)	....	....	....	....	20
white clover (<i>T. repens</i>)	....	....	....	....	10
strawberry clover (<i>T. fragiferum</i>)	....	....	....	....	5
subterranean clover (<i>T. subterraneum</i>)	....	....	....	....	5

TRIAL 310-052*: small scale—Bridge Pa, Hastings—laid 8/6/71 under overcast, cool weather conditions, to actively growing pasture 8 to 15 cm high.

% species present at treatment—visual assessment:

barley grass	....	....	....	....	....	30
perennial ryegrass	....	....	....	....	....	40
red clover	....	....	....	....	....	5
white clover	....	....	....	....	....	20
strawberry clover	....	....	....	....	....	5

TRIAL 310-061: aerial large scale—Ruakura Road, Hastings—laid 20/7/71 under cool weather conditions during late afternoon, to actively growing permanent pasture 8 to 10 cm high.

% species present at treatment—visual assessment:

barley grass	....	....	....	....	....	....	30
perennial ryegrass	....	....	....	....	....	....	35
strawberry clover; white clover; spotted burr clover (<i>Medicago arabica</i>)	....	....	....	....	....	....	35

TRIAL 310-068*: aerial large scale—Bridge Pa, Hastings—laid 25/8/71 under cool, moist weather conditions, to actively growing pasture 5 to 8 cm high.

% species present at treatment—visual assessment:

barley grass	....	....	....	....	....	....	35
perennial ryegrass	....	....	....	....	....	....	25
red clover	....	....	....	....	....	....	20
subterranean clover	....	....	....	....	....	....	10
spotted burr clover	....	....	....	....	....	....	5
white clover	....	....	....	....	....	....	5

TRIAL 310-069: aerial large scale—Argyll, Central Hawke's Bay—laid 26/8/71 under cool, still, morning dew conditions, to pasture 8 to 13 cm high.

% species present at treatment—visual assessment:

barley grass	....	....	....	....	....	....	30
perennial ryegrass	....	....	....	....	....	....	40
Yorkshire fog (<i>Holcus lanatus</i>)	....	....	....	....	....	....	15
bromus mollis (<i>Bromus mollis</i>)	....	....	....	....	....	....	10
white clover	....	....	....	....	....	....	5

The proprietary liquid formulation, T/D.ec, contained 36% w/v TCA plus 9% w/v 2,2-DPA as the ethylene glycol diesters in the form of an emulsifiable concentrate.

The proprietary mixture contained 63% w/w TCA plus 11% w/w 2,2-DPA as the sodium salts in the form of water-soluble pellets, T/D. Each formulation was applied as below:

<i>T/D.ec</i>		<i>T/D</i>	
<i>Active Ingredient</i>	<i>Product</i>	<i>Active Ingredient</i>	<i>Product</i>
<i>kg/ha</i>	<i>l/ha</i>	<i>kg/ha</i>	<i>kg/ha</i>
3.0/0.8	8.4		
4.0/1.0	11.2	4.2/0.8	6.7
6.0/1.5	16.8	5.7/1.0	9.0

RESULTS

Figure 1 summarizes barley grass control and pasture composition measured as kilograms dry matter content per hectare.

Significant barley grass control (approximately 95%) resulted from aerial application of T/D.ec at 4.0/1.0 and 6.0/1.5 kg/ha. In addition, ryegrass and clover percentage content increased, while total DM production remained similar to the untreated control.

Results from aerial treatments parallel those from ground treatments.

DISCUSSION

Aerial application of two rates of T/D.ec resulted in increased DM of clover and perennial ryegrass at the times of evaluation and significant control of barley grass when applied during late autumn to early spring period. During this period the pastures were still actively growing and the barley grass was in the early vegetative stage of development. The 4.0/1.0 kg/ha rate gave consistently good barley grass control and very acceptable ryegrass/clover tolerance, resulting in increased dry matter production of desirable species and a more balanced pasture compared with control. It is worthy of note that the higher rate gave even greater differences compared with control, but this rate may prove less selective if overlaps resulting in double dosing occur. It does indicate, however, the wide degree of selectivity obtained with the lower rate. There was no visually obvious pasture damage resulting from the large-scale treatments, possibly because the aerial spraying technique employed normally results in a dosage variation of only $\pm 50\%$ when misaligned spray runs are made.

Reliability of aerial spray treatment for barley grass control depends largely on the correct calibration of the equipment, the nature of the terrain, the skill of the pilot, and atmospheric conditions at the time of application.

Eradication of barley grass in pasture does not normally result from single applications of selective herbicides. However, two, or less often three, successive annual applications of T/D formulations, result in re-establishment of ryegrass/clover pastures (G. W. Woon, pers. comm.). These successive treatments are often better coupled with pasture over-sowing of seed and fertilizer, when renovating heavily infested areas.

It is considered that aerial applications of T/D.ec will prove effective to the farmer for treating heavily infested ridges where there is a significant ryegrass/clover population. The emulsifiable concentrate formulation of TCA/2,2-DPA proved easier to handle than the pelleted form especially in relation to dissolution and dosage measurement.

FIG. 1: Barley grass control and pasture composition.

Future developments could well include the testing of ultra-low-volume spraying techniques which could improve the economics of aerial treatment.

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