A COMPARISON OF GRANULAR HERBICIDES FOR CHILEAN NEEDLE GRASS (*STIPA NEESIANA*) CONTROL

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SUMMARY

Granule formulations of hexazinone, chlorthiamid and dichlobenil were compared for Chilean needle grass (*Stipa neesiana*) control in Marlborough in 1987/88. Hexazinone at 16 kg/ha, applied in August to well-established tussocks, killed the plants and prevented seeding and seedling establishment for at least 7 months. Lower rates did not give complete control but 8 kg/ha hexazinone prevented seeding and seedling establishment. Chlorthiamid up to 60 kg/ha and dichlobenil up to 54 kg/ha gave only partial control of the tussocks and did not prevent the surviving plants from seeding 3 months after treatment.

INTRODUCTION

Chilean needle grass (*Stipa neesiana* Trin. and Rupr.), a South American tussock, presently occurs in drought-prone pastures only at Waipawa in Hawkes Bay and near Lake Grassmere in Marlborough. Its potential range in New Zealand is probably much of the summer-dry grazing lands of the east coasts of both islands and the dryer parts of Canterbury and Otago and so eradication, or at least containment, is desirable. It is a noxious plant in New Zealand and its sharp awned seeds damage the pelts, eyes and flesh of grazing animals, particularly sheep (Bourdôt and Ryde 1986).

Glyphosate at rates of 0.72 kg/ha and above is highly effective against Chilean needle grass (Bourdôt and Hurrell 1987), particularly for killing extensive areas of the grass prior to pasture renovation. However much of the Chilean needle grass in the Grassmere area is distributed as small populations in remote areas, with difficult access due to steep or broken terrain (Bourdôt and Hurrell, unpublished survey), where it would be impractical to employ conventional herbicide application techniques. Granular-formulated herbicides offer advantages of ease of transport and application which make them ideal for use in situations where the operator may be on foot or on a motorcycle.

This paper reports the results of an evaluation of three granular herbicides for the control of Chilean needle grass. The objective was to identify chemicals which would kill well established tussocks and prevent seedling establishment for an extended period.

METHODS AND MATERIALS

A roadside-bank population of Chilean needle grass was chosen as the experimental site. The grass has occupied the bank since about 1930 and currently forms a near pure stand of coalescing tussocks.

Three granular herbicides, each at three rates (Table 1), were compared in the experiment. Application rates were arranged as a geometric series based on label recommendations for total vegetation control, with the highest rate used being twice the highest label rate.

One replicate of each treatment was located on an area of tussocks with 10 cm high regrowth, following a recent fire. Two further replicates were located on an adjacent unburnt area dominated by 30 cm high tussocks.

Plots 1m × 1m, with a 1m wide untreated buffer between each, were located along a line of similar contour and about 45° slope. The herbicides were applied by hand during light misty rain on August 27, 1987. Topsoil was moist following substantial recent rainfall.

Treatment effects were visually assessed 13 and 33 weeks after treatment, on

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November 30, 1987 and April 14, 1988 respectively. Plots were scored for ground cover of living Chilean needle grass leaf tissue, relative to the untreated area adjacent to each plot, by two observers. The occurrence of flowering plants was noted 13 weeks after treatment.

TABLE 1: Herbicides tested against Chilean needle grass.

Chemical	Trade name	ai %	rate (kg ai/ha)
hexazinone	Velpar 20G	20	4.0
"	"	"	8.0
"	"	"	16.0
chlorthiamid	Prefix	7.5	15.0
"	"	"	30.0
"	"	"	60.0
dichlobenil	Casoron G	6.75	13.5
"	"	"	27.0
"	"	"	54.0

RESULTS

The results are illustrated in Figure 1.

On 30 November, 13 weeks after treatment, the untreated areas adjacent to the treated plots were entirely covered by seeding Chilean needle grass up to 0.75m high. Hexazinone at 4 and 8 kg/ha reduced cover to 1.3 and 0.3% of untreated, respectively, and at 16 kg/ha all plants were killed. Neither chlorthiamid nor dichlobenil gave such good control, even at the highest rates of application (Fig. 1a). Seeding plants occurred in all treatments except the 8 and 16 kg/ha rates of hexazinone. Similar results were obtained in the burnt and unburnt blocks.

Fig. 1: The effect of granular herbicides on the relative ground cover of Chilean needle grass (a) 13 weeks and (b) 33 weeks after treatment. $\square$ — $\square$, hexazinone at 4, 8 and 16 kg/ha; $\circ$ — $\circ$, chlorthiamid at 15, 30 and 60 kg/ha; $\diamond$ — $\diamond$, dichlobenil at 13.5, 27 and 54 kg/ha.

On 14 April, 33 weeks after treatment and after a period of summer drought, the cover of untreated Chilean needle grass was 11% on average, but varied over the experimental area. The remaining cover consisted mostly of dead vegetation but considerable bare ground occurred in all plots. Cover of Chilean needle grass, relative to untreated, was higher than at the previous assessment in all treatments. However, hexazinone had maintained its superiority, with no living plants at 16 kg/ha (Fig. 1b).

Seedlings of Chilean needle grass occurred on bare ground on plots treated with hexazinone at 4 kg/ha but were absent at the higher rates. Interestingly some danthonias (*Rytidosperma* spp) had colonised the bare ground in one replicate of all three hexazinone treatments.

Leaching of the chemicals down-slope was minimal (about 250 mm) in all treatments.

DISCUSSION

Effective containment or eradication of Chilean needle grass will necessitate the control of populations at the perimeter of its present range. The location of these outlying populations, the migratory "stepping-stones" for the species, has recently been ascertained in Marlborough by a detailed survey of more than 7000 ha of grassland around the major infestation at Blind River (Bourdôt and Hurrell unpublished). Eradication of these populations by conventional spray treatment could be difficult because of the isolation and often difficult "tunnel-gully" terrain. Grubbing, which has been successfully employed for control of nassella tussock (*Stipa trichotoma*), has been suggested. Unfortunately Chilean needle grass often does not have a dense and well-defined tussock form when in association with other grasses, making the identification of an individual plant difficult. For this reason grubbing is unlikely to be a suitable method of control.

The results of this work have shown that hexazinone granules, applied in August at 16 kg/ha, give rapid knockdown and death of established Chilean needle grass. At rates of 8 kg/ha and above, autumn seedling establishment into the bare soil is prevented. Bare areas would be readily found in follow-up inspections and, if necessary retreated before the next seeding period. This granular formulation of hexazinone would therefore be a very convenient and effective means of eradicating small isolated populations of this weed.

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