THE EFFECT OF TIME OF APPLICATION OF HEXAZINONE ON THE CONTROL OF SWEET BRIER

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SUMMARY

Hexazinone was applied to sweet brier (*Rosa rubiginosa*), by spot-gun at 1.5, 2.0, 2.5 and 3.0 g/bush (once only) each month for 2 years. Time of application did not affect the efficiency of kill at the three high rates. The 1.5 g rate was marginal for maximum control of the bush size in the experiment, and thus failed to control sweet brier when rainfall was sufficient to more than saturate the soil causing leaching and run-off.

INTRODUCTION

The use in New Zealand of modified animal drenching guns as herbicide spot-gun applicators was first reported by Porter (1979), while detailed responses in terms of sweet brier control by hexazinone have been reported by Meeklah and Mitchell (1981). Providing the dose was related to bush size, good control (i.e. 98% dead wood per bush) was obtained.

The application technique seems well suited for use on sweet brier, which generally exists as discrete bushes rather than as a continuous canopy.

Hexazinone is the principal herbicide in use with this method of application (M.J. Cornwell, pers comm), but to make most opportune use of labour it is necessary for farmers to know if hexazinone can be used effectively at any time of the year. Results from a field trial carried out at Omakau, Central Otago, directed at this question are reported in this paper.

MATERIALS AND METHODS

The experimental site was on a Clare hill sandy loam, with 3.4% organic matter and 8% clay. Meteorological data from N.Z. Meteorological Service, Ophir Station, were used to calculate moisture deficits for a soil of this type which has an estimated available water holding capacity of 75 mm for the 0-40 cm soil depth. This Meteorological Station was in the Manuherikia Valley, 16 km NE of the experimental site, and of similar altitude.

Hexazinone at a concentration of 1.0 g ai/40 ml water, was applied by 'spot-gun' to the crown of each bush at a rate of 1.5, 2.0, 2.5 and 3.0 g. Bushes were treated once only at 24 times of application i.e., monthly from 5.6.79 to 12.5.81. Each treatment was replicated on six bushes selected at random from those within the size range 150 ± 30 cm in height and 30 ± 7.5 cm in basal stool diameter. Visual assessments of percentage dead wood/bush were made about 2 years after application.

RESULTS

A very high kill rate of bushes was obtained from the 2, 2.5 and 3 g rates, with no more than 5% of the total of 144 bushes surviving in each treatment. Also no more than one of the six replicate bushes in each month/treatment combination survived. Thus no response to time of application was shown.

Fig. 1 compares results from the 1.5 g rate with those of 2.0 g. The same lack of pattern was evident at 1.5 g, except for the June, July, August period of 1980 when 50% of the treated bushes failed to die.

Figs 2, 3 and 4 illustrate monthly rainfall totals, daily soil moisture deficit, and monthly deep percolation plus run-off losses respectively at the Ophir Meteorological Station.

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Fig. 1: Effect of time of application of hexazinone for control of sweet brier (Omakau).

Fig. 2: Total monthly rainfall June 1979 — April 1981 (Met. Station 1 59161, Ophir).

Fig. 3: Mean daily soil moisture deficit, from 30.6.79 to 21.4.81 (Met. Station 1 59161, Ophir). Soil moisture capacity $S = 75.0$ mm.

Fig. 4: Monthly run-off (mm) at Ophir (Met. Station 1 59161).

DISCUSSION

There was little relationship between rainfall, soil moisture, and reduced effect of hexazinone on sweet brier in Figs 1, 2 and 3. However a close relationship is apparent between monthly run-off and percent dead wood on brier treated with the lowest rate of hexazinone, 1.5 g (Figs 1 and 4). The period when hexazinone at 1.5 g was least effective coincides with the period when monthly run-off was at its peak. No other measured climatic phenomena appeared to have an aberration which coincides with the period of reduced herbicide efficiency.

It is not surprising that over-saturation of soil moisture should have a marked effect on hexazinone efficiency where the dosage is probably marginal.

Previous work by Meeklah and Mitchell (1981) indicated a hexazinone dose of 2.25 to 3.75 g suitable for bushes of the size range used in this experiment. This chemical is very soluble (33000 mg/litre water) compared with some other herbicides e.g., picloram 430 mg/litre, bromacil 815 mg/litre and simazine 3.5 mg/litre (Worthing 1979). Harrington *et al* (1982) suggested that on hill slopes large amounts of hexazinone, in a saturated soil, may be leached out of the system with smaller amounts being washed down hill.

We conclude that marginal doses of hexazinone may fail to give satisfactory kills of sweet brier when rainfall is sufficient to more than saturate the soil causing deep percolation and run-off. These conditions are more likely to occur in the winter months when evaporation is low and soil moisture relatively high. At other times of the year and at higher dose rates at any time of the year, effective control can be expected.

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