EFFECTS OF SIMAZINE APPLICATIONS AND WATERING ON ASPARAGUS SEEDLINGS

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Summary

Simazine at 0.4 kg/ha before emergence had little effect on seedling asparagus with 32 mm of rainfall during the two weeks following application, but significantly reduced foliar and root growth when an additional 200 mm of irrigation water was applied during this period. Bioassays showed that after 33 days less than half of the applied amount of simazine remained and that it had not been appreciably leached by the irrigation treatment.

INTRODUCTION

When establishing asparagus beds by direct drilling, growers encounter a new weed control situation. Residual herbicide treatments such as simazine at 2 kg/ha, which are used in the mature crop, are not tolerated by seedling asparagus. However, as little as 0.4 kg/ha of simazine is used to provide weed control for several weeks in other crops, for example brassicas (Fryer and Makepeace 1972). This could be of practical value in asparagus seedbeds, and the possibility of using such a low dose safely was investigated under two watering regimes.

METHODS AND MATERIALS

A four replicate trial was conducted on Levin silt loam soil comprising approximately 5% organic matter to compare the effect on asparagus seedlings of six treatments, 0, 0.4 and 0.8 kg/ha of simazine, with and without applied irrigation. On 7 February 1975 plots 1.5 m wide and 3.0 m long were precision drilled at 1.5 cm depth with four rows of asparagus 6 cm apart in the row and 33 cm between rows. On the third and sixth days after drilling, 34 mm of sprinkle irrigation was applied overall to ensure that moisture did not limit seedling growth. Seven days after drilling simazine treatments were applied with a propane powered sprayer. During the next two weeks, in addition to 32 mm of natural rainfall, irrigation was regularly applied to the appropriate plots to a total of 200 mm — an amount considered to equal the heaviest rainfall likely. Non-irrigated plots were protected by portable plastic-covered wooden frames during irrigation, and adequate guard areas were allowed to protect plots from water run-off.

Plant counts were taken when the crop had fully emerged, 24 days after drilling. Plants from the centre two rows of each plot were dug, washed and weighed after a further 35 days.

Residues of simazine in the surface 2 cm were estimated by bioassay of soil samples taken from the 0.4 kg/ha treatments, 33 days after application. Two three-replicate assays were run, one using oats (*Avena sativa*) and the other white mustard (*Sinapis alba*) as test species, and standard series were prepared from applications equivalent to 0, 0.2, 0.4 and 0.6 kg/ha. Small polystyrene drinking cups fitted with cotton-

Proc. 28th N.Z. Weed and Pest Control Conf.

wool wicks for subsequent sub-irrigation were filled with uniformly mixed and moistened soil. Seeds were allowed to imbibe at 23°C overnight and then sown, five per cup, at a depth of 1.5 cm. After 14 days growth in a glasshouse at approximately 19°C, seedlings were cut off at soil level and fresh and dry weights recorded.

RESULTS AND DISCUSSION

The asparagus seedlings emerged uniformly, and there were no differences in plant counts, nor visual differences in growth. There was no response to watering as such, but as shown in Table 1, plant dry weight, especially the root system, was affected by increasing simazine rates and this occurred to a greater extent with irrigation. Under irrigation, significant foliage and root reduction occurred with the lowest rate of simazine, 0.4 kg/ha.

The two bioassays, which were in good agreement, showed that after 33 days considerably less simazine remained than the 0.4 kg/ha originally applied. By comparing the oat and mustard fresh weights obtained from the field samples with the standards, Fig. 1, a residual level of approximately 0.15 kg/ha can be interpolated. No differences were detected between the irrigated and non-irrigated soil samples and their values are combined in Fig. 1.

Reasons for the greater reduction in asparagus growth on simazine treated irrigated plots were not elucidated. The bioassays did not suggest that watering caused any increased leaching of simazine. Differences in root distribution in wet soil, and therefore of chemical uptake, could at least partially explain the effect.

Vegetables

TABLE 1: DRY WEIGHT OF ASPARAGUS SEEDLINGS (g/plot)
AFTER PRE-EMERGENCE APPLICATIONS OF SIMAZINE,
WITH AND WITHOUT IRRIGATION

<i>Treatment</i>	<i>Rate kg/ha</i>	<i>No irrigation Foliage</i>	<i>Irrigation</i>	<i>Means</i>
no simazine		2.45 abAB	2.95 aA	2.70 aA
simazine	0.4	2.22 abcAB	1.87 bcB	2.04 bAB
simazine	0.8	1.73 bcB	1.57 cB	1.65 bB
Means		2.13 a	2.13 a	
CV %			21.6	
<i>Roots</i>				
no simazine		2.13 aA	2.11 aA	2.12 aA
simazine	0.4	1.90 abAB	1.64 bB	1.77 bB
simazine	0.8	1.16 cC	0.91 cC	1.04 cC
Means		1.73 aA	1.55 bA	
CV %			12.4	

ACKNOWLEDGEMENTS

The author wishes to thank members of the Weed Control Section at Levin Horticultural Research Centre who assisted with this work.

REFERENCES

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POISONOUS PLANTS

CHAIRMAN'S SUMMARY

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This was the first session of its type presented at a New Zealand Weed and Pest Conference and provided a considerable amount of factual information on the toxicity of a number of weeds to livestock. The paper of Mortimer and White gives a detailed account of the toxicity of some composite weeds with major emphasis on the toxicity of ragwort to sheep and cattle. Although the toxicity of ragwort to stock is well known the degree of toxicity is not fully appreciated and it may well be that many stock deaths attributed to facial eczema or other diseases could have been due to ragwort poisoning.

In discussion it was stated that ragwort can remain toxic to stock in hay or silage for two or more years and that ragwort toxicity could occur in sheep on a diet containing more than 10 percent of ragwort on a dry matter basis. General information such as was introduced by this paper should be presented to advisers and farmers to assist in assessing the value of a ragwort control programme.

Simpson's paper recorded cases of sheep poisoning relating to goat's rue, tall fescue, reed canary grass and hemlock under an unusual farm management system. In 1974 the Animal Health Laboratory diagnosed 94 cases of stock poisoning due to plants. Forty-five of these cases were diagnosed as ragwort poisoning; 41 in cattle, 2 in sheep and 2 in horses. It must be remembered that these diagnosed cases are most probably only a very small proportion of the stock losses which do occur due to toxic plants particularly in country which is under development. Greater efforts should be made to acquaint farmers with the potential hazard.