CHEMICAL WEED CONTROL IN *SOLANUM LACINIATUM*

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Summary

Fifteen herbicides were evaluated for crop tolerance and weed control in *Solanum laciniatum*. Tolerance was good with all pre-plant treatments except EPTC and poor with all pre-emergence treatments except paraquat and metobromuron. All post-emergence applications adversely affected the crop. Metribuzin 0.4 and 0.8 kg/ha and linuron 1.0 kg/ha applied pre-emergence, as well as metribuzin 0.4 kg/ha and MCPB 0.75 kg/ha applied post-emergence resulted in dry matter yields significantly heavier than from the untreated control. Hand weeding increased yield by 170%, an increase achieved also by the low rate of metribuzin in spite of its killing a third of the plants.

INTRODUCTION

Solanum laciniatum, a source of an alkaloid used in the drug industry, is a plant slow to establish and initially a poor competitor, making it susceptible to suppression by weeds. Previous methods of weed control have involved the use of napropamide, paraquat or trifluralin in combination with cultivation.

Three trials were conducted during 1974-75 to evaluate several herbicides for crop tolerance and weed control in *Solanum laciniatum*.

MATERIALS AND METHODS

Solanum laciniatum was seeded in Eyre fine sandy loam soil on 3 October 1974 at the rate of 0.45 kg/ha (60 cm rows). Treatments (Tables 1 and 2) were arranged in a randomised complete block design using three replicates and a plot size of 2.4 by 8 m. Herbicides were applied with a bicycle wheel plot sprayer delivering 224 litres/ha at 210 kPa and pre-plant herbicides were incorporated to the recommended depths by rotary hoe. Plots to be treated post-emergence were sprayed initially with paraquat at the rate of 1 kg/ha on 1 November 1974, four days prior to the beginning of crop emergence. The crop was harvested on 18 March 1975. Sufficient soil moisture for satisfactory growth was maintained throughout the growing season by overhead sprinkler irrigation.

RESULTS AND DISCUSSIONS

The main weeds at the trial site were catchfly (*Silene gallica*), fathen (*Chenopodium album* agg.), sheep's sorrel (*Rumex acetosella*), shepherd's purse (*Capsella bursa-pastoris*) and spurrey (*Spergula arvensis*).

All pre-plant herbicides gave good initial weed control, but this was gradually lost with all treatments except napropamide, and crop smothering resulted. Only napropamide 1.75 and 3.5 kg/ha provided enough

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New Crops

residual weed control to allow a measurable dry matter yield. The tolerance of *Solanum laciniatum* to all pre-plant herbicides, except EPTC, appeared acceptable.

TABLE 1: PRE-PLANT AND PRE-EMERGENCE HERBICIDES FOR WEED CONTROL IN *SOLANUM LACINIATUM*

Chemical	Pre-plant ¹ Rate (kg/ha)	Incorporation depth (cm)	Chemical	Pre-emergence ² Rate (kg/ha)
dinitramine	0.5; 1.0	3 to 4	dinoseb amine	2.0
EPTC	2.0; 4.0	6 to 7	ethofumesate	1.0; 2.0
napropamide	1.75; 3.5	4 to 5	linuron	1.0; 2.0
nitralin	1.0; 2.0	4 to 5	methabenzthiazuron	1.5; 3.0
trifluralin	0.75; 1.5	4 to 5	metobromuron	0.75; 1.5
			metribuzin	0.4; 0.8
			paraquat	1.0

¹ Applied on 3.10.74.

² Dinoseb amine and paraquat applied on 23.10.74, all other treatments applied on 13.10.74.

TABLE 2: DRY MATTER YIELDS, PLANT COUNTS AND RATINGS OF *SOLANUM LACINIATUM* TREATED WITH POST-EMERGENCE HERBICIDES ON 23.11.74

Chemical	Rate (kg/ha)	Crop tolerance ¹ 10/12/74	% Weed control 10/12/74	Plant counts at harvest % of untreated	Yield % of untreated
bentazone	0.75	0.3	87	56 c	108 c
	1.5	0.2	98	23 d	41 de
ethofumesate	1.0	5.2	18	112 ab	151 bc
	2.0	4.5	58	94 b	136 bc
MCPB	0.5	7.0	02	104 ab	94 cd
	0.75	8.0	07	125 a	181 b
metribuzin	0.4	0.8	100	65 c	267 a
	0.8	0.0	100	5 d	25 e
prometryn	0.4	0.3	87	65 c	126 bc
	0.8	0.0	100	8 d	27 e
hand weeded	—	10.0	100	102 b	272 a
untreated	—	10.0	00	100 b	100 c
actual No. and yield				6.5/m row	1410 kg/ha
CV %				16.9	29.8

¹ Tolerance rating (0 = no tolerance, 10 = complete tolerance).

Weed control was relatively good with pre-emergence herbicides except the low rates of metobromuron and ethofumesate. Metribuzin 0.4 and 0.8 kg/ha and linuron 1.0 kg/ha gave excellent weed control and were the only pre-emergence treatments which resulted in yields significantly greater than those obtained from the untreated control. Acceptable crop tolerance was achieved with paraquat and metobromuron only. Yield and crop tolerance ratings for linuron, methabenzthiazuron, metribuzin, and possibly ethofumesate, indicate that no higher rates of these chemicals could be used.

Considering the post-emergence herbicides (Table 2), weed control was excellent with bentazon, metribuzin and prometryn: however these treatments significantly reduced plant counts and crop tolerance was poor.

New Crops

None of the dry matter yields for the low rates of post-emergence applied chemicals were significantly lower than for the untreated control but they were less than from hand weeding except for the treatment metribuzin 0.4 kg/ha. This caused a significant reduction in plant numbers, and the high yield reflects the ability of *Solanum laciniatum* to compensate for a population reduction.

Of the herbicides used in these trials, the most promising would be napropamide pre-plant; linuron and metribuzin pre-emergence; MCPB and metribuzin post-emergence. It is important to note, however, that linuron and metribuzin must be used at lower rates to minimize reductions in plant population. Combinations of the more promising chemicals should be investigated.

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SCRUB WEEDS

CHAIRMAN'S SUMMARY

A. BOWERS

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The first three papers in this session dealt with bracken, still one of the major weeds in New Zealand. Preest gave a review of the problem in forestry and of current control measures and, rightly, emphasised management as part of any control method. He showed that many chemical tools are available and suggested that greater knowledge of the plant is essential if these tools are to be used successfully.

In his second paper Preest indicated that the addition of diesel to asulam and glyphosate can give adequate control of mature bracken fronds in mid-summer. This is important from the point of view of the forest manager, as it is not always practicable to treat large areas of bracken at a specific stage of growth.

Kennedy gave a brief review of his experiences in bracken control using bromacil and karbutilate and illustrated the problem on railway reserves with slides.

Rae and Patterson reported on scrub weed control with thiazafuron. With adequate rainfall following application weed control is unaffected by time of application. This herbicide has strong residual properties and cannot be used for site preparation.

Naish reported on a technique using potted plants for initial screening of chemical effects on weed species. There is an adequate correlation between pot tests and field trials, allowing rapid assessment of herbicide effects and therefore better design of field trial work.

Three papers discussed the movement of chemicals in gorse. Rolston and Robertson have shown in laboratory studies that humidity can affect the degree of absorption and that stage of growth can affect translocation. Although the addition of non-ionic surfactants improves the *in vitro* absorption of picloram, there is some doubt as to whether this has any effect on long term control of gorse in the field.

Thompson showed that soil moisture conditions have a marked effect on plant desiccation with 2,4,5-T but little or none with picloram. Movement of 2,4,5-T effects to protected parts of the plant was limited, particularly with a late autumn application. The addition of diquat or dicamba improved desiccation but did not improve translocation to any marked degree and had no effect on re-growth. Picloram alone and as an additive to 2,4,5-T had the capacity to effect to protected parts of the plant.