

Orchard Crops and Shelter

## MORE HERBICIDES FOR SOIL CONSERVATION TREE NURSERIES

A.N. GILCHRIST

*Aokautere Science Centre, Water and Soil Division, MWD, Palmerston North*

### SUMMARY

Nine residual herbicides were each used at three rates on newly planted cuttings of one poplar clone, two willow clones and coralberry. Cultivation, the control treatment, allowed best growth of all species. Diuron, linuron, nitralin and simazine were the best herbicides on the poplar and both willows. All herbicides significantly reduced the growth of coralberry but none affected survival. Atrazine at 2.7 kg/ha significantly reduced survival of poplars and willows. Simazine, best in an earlier trial, gave significantly poorer stem growth than cultivation in all species.

### INTRODUCTION

Few herbicides are labelled with recommendations for use in poplar, willow, and other hardwood tree and shrub nurseries. Stott (1980) has reviewed the development and chemical control of weeds in willow and poplar nurseries, and recommendations have been published for the use of herbicides in poplar and willow cutting beds, nursery stoolbeds and transplant lines in Britain (Fryer and Makepeace 1978). Weed control in tree nurseries however is a matter of local knowledge.

Some New Zealand work has already been reported (Gilchrist 1979) and this paper presents the results of a further trial to extend the range of herbicides screened and to confirm previous results.

### METHOD

The trial was established on Manawatu fine sandy loam at the National Plant Materials Centre nursery at Aokautere in September 1978. The cultivated area had previously been used for vegetable production.

Four test species were used: Flevo hybrid black poplar (*Populus x euramericana* cl. 'Flevo'), Pekin hybrid willow (*Salix matsudana x alba* cl. 'Aokautere', formerly cl. 'NZ 1002'), purple osier (*S. purpurea* cl. 'Irette') and coralberry (*Symphoricarpos orbiculatus*).

Each species was planted in two adjacent rows 1 m apart per replicate. The species were not randomised. The herbicide treatments were randomised for each block (which contained one replicate of each species) and were applied with an Oxford Precision Sprayer using three jets across the rows to give a swath width of 1.5m. This gave a plot size of 1.5 x 2m containing 12 cuttings of which 8 were later measured. Trial design was thus three randomised complete blocks for each species.

Nine residual herbicides were tested at three rates as listed in Table 1. A cultivated treatment was included as a control. On 6 September the herbicides nitralin and trifluralin were applied, and were rotary-hoed into the soil within three hours of application.

The still-dormant, 25-cm-long unrooted cuttings were then planted 25 cm apart within each row. The other herbicides were applied over the planted cuttings on 19 September.

Two observers assessed weed control on 3 November 1978 and again, with identification of dominant weeds not controlled, on 2 April 1979. Length of the longest stem was measured in late May-early June 1979 and subjected to analysis of variance for each species.

*34th Proc. N.Z. Weed and Pest Control Conf.*

## Orchard Crops and Shelter

### RESULTS AND DISCUSSION

Height measurements of the poplar and willows and length of the longest stem of the rather prostrate coralberry are given in Table 1. The only significant mortality was in the poplar and willows caused by the high rate of atrazine.

#### Poplars

All chemical treatments resulted in significantly poorer height growth than cultivation. Best were diuron at 4.5 kg/ha, linuron at 1 kg/ha and simazine at 1.7 kg/ha.

Subsequent experience suggests that the substituted ureas diuron, linuron, and monolinuron should not be sprayed over poplars in leaf but should be used only on dormant plants or around shielded ones.

#### Willows

Diuron at 4.5 kg/ha resulted in height growth not significantly different from cultivation in either willow. All other treatments were significantly poorer in purple osier but in the Pekin hybrid tree willow diuron at 1.1 kg/ha, nitralin at 4.5 kg/ha and linuron at 1.5 kg/ha gave no significant suppression in height growth. Since this trial was concluded we have experienced moderate damage with diuron at 4.0 kg/ha, linuron at 1.2 kg/ha, and monolinuron at 1.1 kg/ha when sprayed over another Pekin willow hybrid clone (*Salix matsudana* x *alba* cl. 'Tangoio') in full leaf.

**TABLE 1: Mean length in centimetres of longest stem of test plants 8 to 9 months after spraying with residual herbicides.**

Herbicide	Rate (kg/ha)	Flevo poplar	Hybrid Pekin willow	Purple osier	Coralberry
atrazine	0.9	117	204	111	60
atrazine	1.8	107	171	102	54
atrazine	2.7	101	125	90	55
chloroxuron	1.5	129	208	83	37
chloroxuron	3.0	97	169	73	41
chloroxuron	4.5	105	181	69	42
diuron	1.1	132	224	99	52
diuron	2.2	120	200	97	44
diuron	4.5	149	228	140	59
linuron	0.5	116	183	99	51
linuron	1.0	145	210	113	49
linuron	1.5	134	221	95	59
nitralin	1.0	121	197	78	49
nitralin	2.2	126	198	102	57
nitralin	4.5	130	222	113	59
prometryn	0.6	102	165	56	42
prometryn	2.3	116	192	80	44
prometryn	1.8	124	187	103	54
propazine	0.5	87	187	69	51
propazine	1.1	97	174	84	46
propazine	1.7	84	205	118	57
simazine	1.1	116	184	116	52
simazine	1.7	140	215	123	56
simazine	2.3	135	200	119	56
trifluralin	0.5	91	146	57	46
trifluralin	2.0	104	168	63	48
trifluralin	4.5	112	206	104	47
cultivation		196	267	178	85
unweeded		93 ± 13	138 ± 31	47 ± 2	43 ± 3
LSD 5%		28	46	40	16

## Orchard Crops and Shelter

### *Coralberry*

All chemical treatments were significantly poorer than cultivation as measured by maximum stem length. Best treatments were atrazine at 0.9 kg/ha and the high rates of diuron, linuron, nitralin and propazine.

### *Weeds*

The dominant weeds in the unweeded plots were fathen (*Chenopodium album*) and broad-leaved dock (*Rumex obtusifolius*).

Best weed control was given by the triazines (atrazine, propazine, and simazine) and by two of the substituted ureas (diuron and linuron). Besides fathen, chloroxuron failed to control wireweed (*Polygonum aviculare*) and, at the two lower rates, willow weed (*P. persicaria*). Nitralin failed to control white clover (*Trifolium repens*) except at the high rate and did not control black nightshade (*Solanum nigrum*). Willow weed was not controlled by prometryn. Trifluralin at 4.5 kg/ha did not control white clover.

## CONCLUSIONS

Diuron at rates up to 4.5 kg/ha can be used in poplar and willow nurseries as an alternative to simazine. In this trial it was marginally superior to both linuron and simazine. It should not be used on young trees in leaf. It can be used on dormant cuttings for weed control lasting over the critical spring period, and if used at a high enough rate or on soils with sufficient colloid should last well into the autumn. [For black poplars such as Flevo, terbacil at 1 to 2.5 kg/ha can be used instead (Gilchrist 1979)].

Weeds in coralberry may be controlled by atrazine at rates up to 1.1 kg/ha without unacceptable mortality or loss of growth. With simazine the applications rate is not so critical although results reported by Gilchrist (1979) suggest that applications of more than 2.3 kg/ha may be harmful.

## ACKNOWLEDGEMENTS

Messrs T.I. Cox and C. Spence and Ms G. Carter, Levin Horticultural Research Centre, for chemicals and their application; colleagues in the Ministry of Works and Development for technical assistance and critical reading of the script.

## REFERENCES

- Fryer J.D. and Makepeace, R.J. (eds) 1978: *Weed control Handbook 2*: 281. 8th Edition Blackwell Scientific Publications, Oxford.
- Gilchrist, A.N. 1979: Herbicides for soil conservation tree nurseries. *Proc. 32nd NZ Weed and Pest Control Conf.* 284-8.
- Stott, K.G. 1980: The control of weeds in short rotation coppice willow. *Proc. Conf. on Weed Control in Forestry April 1-2, 1980, University of Nottingham, U.K.*: 33-44.