CONTROL OF WOOLLY NIGHTSHADE

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SUMMARY

Woolly nightshade (*Solanum mauritianum*) a strong growing shrub that is prolific in the northern North Island has proved difficult to control. Trials comparing various chemicals and methods of application showed that basal application or cut stump painting with 2,4,5-T/diesel, soil injections with hexazinone, high volume foliar applications of 2,4-D/picloram or 2,4,5-T/picloram and ultra low volume application of 2,4,5-T/picloram gave reliable control.

INTRODUCTION

Woolly nightshade, the largest member of the *Solanum* genus found in New Zealand, is a strongly growing shrub usually about 4 m tall but occasionally reaching 10 m. The leaves, especially when young, have a white tomentum composed of stellate hairs. It has ovate leaves about 40 cm long, bluish flowers about 10 mm in diameter which occur in many flowered corymbs and yellow globular berries about 10 mm in diameter with star-shaped hairs (Connor 1977).

Woolly nightshade which is a native of tropical America was first reported in New Zealand in 1883 (Allan 1940). It is found throughout the North Island and northern parts of South Island but is most prevalent in the northern half of North Island where it often forms pure associations (Matthews 1975). Woolly nightshade has been suspected of poisoning stock in New Zealand and Australia (Connor 1977). Because of its suspected toxicity and its ability to invade and spread prolifically in difficult to manage hill country pasture, it has been classified as a Class B noxious weed in North Island and northern South Island of New Zealand.

In Australia, where woolly nightshade is prevalent in northern and central coastal areas of New South Wales and coastal Queensland, Whittet (1968) reported that it can be controlled by a mixture of 2,4,5-T and 2,4-D at 0.2% on young plants. In Papua New Guinea, Chadhokar (1978) found that young plants were killed by spraying with 0.2%, 2,4,5-T in water and noted that older plants were killed by painting the stems or cut stumps with 0.5-1.0% 2,4,5-T in diesel.

In New Zealand control of woolly nightshade has proved more difficult with Matthews' (1975) recommendation of a basal application of 2,4,5-T in diesel as the best method of control appearing to be based on limited evidence and Little's (1980) method of ring-barking to ground level is labour intensive. Because of the lack of published information on control and the advent of new application technology trials were laid down between 1978 and 1980 with various herbicides using several methods of application.

MATERIALS AND METHODS

Trials were laid down at Kaitaia on 13.12.78 and at Coromandel on 7.11.79 and 13.12.80 using a randomised block design with three or four replications. Treatment details and results are shown in Table 1.

Chemicals were chosen on the basis of current recommendation of 2,4,5-T and supplemented with herbicides of known activity on scrub weeds. Herbicides were also

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tested with the recently developed ultra low volume (ULV) spraying technique. The recently released herbicides triclopyr and hexazinone were included because triclopyr was being evaluated as a scrub weed herbicide and hexazinone has been used in Australia to control woody weeds using the soil injection method (Alchin *et al* 1979). The 2,4,5-T/picloram stem injection technique was included because of the potential use in built up areas or near sensitive crops.

For basal applications the stem of the bush was saturated with the chemical mix to a height of six times the stem diameter using a knapsack sprayer fitted with a straight jet in 1978 and 1979 and with a paint brush in 1980. Frilling was done by slicing 4-12 times, into the bark and outer stem with a slasher. In stump painting treatments the entire stump was painted immediately after the bush was cut down. For stem injection a hypodermic syringe was used to inject between 0.5 and 1.0 ml of undiluted chemical into the cork cambium at several points around the stem. Soil injection involved the use of a modified drench gun (Porter 1979) to apply 4 ml of undiluted chemical to the soil near the stem of the bush.

Foliar applications consisted of applying the spray to the point of runoff with a knapsack sprayer fitted with twin hollow cone nozzles at 350 kPa in the Kaitaia trial and with a hand gun at 1400 kPa at Coromandel. ULV applications were applied overall with a motorised mist blower fitted with a 'Micron' attachment in the feed line and set at the smallest aperture.

For most treatments 20-50 bushes were treated.

RESULTS AND DISCUSSION

Visual assessments were made several times following treatment to confirm plant death. At the final assessment 4-5 months after treatment (Table 1), counts were made

TABLE 1: Treatment results

Treatment	Concentration %	Application method	% plants dead and date of assessment			
			Kaitaia	Coromandel		
			28.3.79	Trial 1 27.2.80	Trial 2 23.4.81	Trial 3 23.4.81
—		untreated	0	0	0	0
—		cut only	2	0	0	0
2,4,5-T	1.8*	cut and paint	100	90	100	99
2,4,5-T	0.6*	frill and basal	46	95		
2,4,5-T	0.6*	basal	33	90	100	100
2,4,5-T/picloram	0.33/0.08*	basal		88	100	100
2,4,5-T/picloram	20/5	injection		35	31	28
triclopyr	0.16	foliar	79	68		
2,4-D/picloram	0.1/0.025	foliar	97	100	97	93
2,4,5-T/picloram	0.1/0.025	foliar	92	100	95	83
2,4,5-T/dicamba	0.15/0.035	foliar		10		
2,4,5-T	0.18	foliar		1	47	6
glyphosate	0.18	foliar		13		
2,4-D/picloram	4.0/1.0	ULV			84	70
2,4,5-T/picloram	4.0/1.0	ULV			100	82
2,4,5-T	7.2	ULV			40	12
glyphosate	7.2	ULV			4	0
hexazinone	25	soil injection			100	100
LSD (P<0.05)			26	16	17	17
CV%			15.1	10.5	9.0	10.3

Notes: * Diesel mixtures, remainder water mixtures.

Foliar sprays based on 1:200 dilution of formulated material

ULV based on 1:4 dilution of formulated material.

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of dead plants — a plant being deemed dead if the entire bark of the bush was grey and crumbly to touch. The bushes were easy to categorise with very few (<1%) borderline cases.

The effective treatments giving consistent control of 80-100% were, cut stump painting, soil injection with hexazinone, high volume foliar sprays of 2,4-D/picloram or 2,4,5-T/picloram and ULV spraying with 2,4,5-T/picloram.

Basal applications were very effective in all but the Kaitaia trial. It appears that the efficacy of the treatment was related to the accuracy of application and that the failure at Kaitaia was due to inadequate coverage of all the stem to ground level.

The plants killed by ULV treatments were all on the edges of the plots and therefore were likely to have received a higher dose. This difference suggests that the level of control could be increased by a higher application rate. Using mistblower with the 'Micron' attachment set at the second aperture would achieve this.

Triclopyr showed promise in controlling woolly nightshade but more work needs to be done on rates, alone and in combination with additives such as picloram before firm recommendations can be made.

Glyphosate and 2,4,5-T (with and without dicamba) failed to kill a sufficiently high percentage of the plants. Cutting alone allowed regrowth of the stumps. The stem injection technique proved to be difficult to use and failures were probably due to the inability to inject an adequate amount of chemical into the plant.

These results verify overseas and local claims on control of woolly nightshade. However, the use of 2,4,5-T alone needs further qualification in that only small plants, less than 0.5 m, were controlled by 2,4,5-T. As woolly nightshade in New Zealand usually occurs in near pure stands of mixed age and sizes, 2,4,5-T alone cannot be regarded as a suitable herbicide.

CONCLUSION

Results of these trials show that there are several suitable ways of controlling this weed and the choice of a particular method should be determined according to the local circumstances. For large infestations with poor access ULV spraying with 2,4,5-T/picloram or 2,4-D/picloram can be used. In areas with better access high volume spraying of these chemicals is an alternative. For scattered infestations and for plants on bush margins or near sensitive crops there is the choice of cut stump painting or basal treatment with 2,4,5-T/diesel and soil injection with hexazinone.

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