LOW-VOLUME APPLICATION OF HERBICIDES FOR CONTROL OF RUBBER VINE

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Summary. The following herbicides were studied for control of rubber vine, *Cryptostegia grandiflora*: MCPA, 2,4-D, 2,4,5-T, triclopyr, picloram, clopyralid, dicamba, fosamine and hexazinone. All treatments were applied as low-volume applications, using either a misting machine or a sprinkler sprayer, with the exception of hexazinone which was applied as granules, or the liquid formulation using a Spotgun[R]. Picloram/2,4-D, dicamba and the various hexazinone formulations gave 100% control of rubber vine. Of the other chemicals, fosamine and 2,4-D performed best, while MCPA was ineffective.

INTRODUCTION

Rubber vine, *Cryptostegia grandiflora*, is a serious weed north of latitude 26°S in Queensland. A vigorous woody climber, it also grows in the open as a self-supporting, untidy shrub. The plant is toxic (2, 6) but the main economic loss and nuisance value are due to mustering difficulties and the restriction of access to water. Rubber vine is also of increasing concern to the Queensland National Parks and Wildlife Service because of its invasion and destruction of natural vegetation systems.

Rubber vine is suceptible to 2,4-D, 2,4,5-T, dicamba and picloram, but not so susceptible to dichlorprop or fenoprop (3, 4). However, since both 2,4-D and 2,4,5-T have attracted a great deal of public suspicion and buyer resistance, alternative chemicals must be found so the landholder can be offered an acceptable choice.

At the same time the method of herbicide application must be considered. Major rubber vine infestations are usually along creeks and rivers and often impede access to such waterways. Difficult and uneven terrain often precludes the use of vehicle-mounted equipment, making the use of manually carried back-pack equipment essential. Misting machines have traditionally been used for this type of work, but have, in recent years, been replaced by CDA, sprinkler-sprayers (10), and other equipment (9).

This paper reports the results of a trial to test a number of herbicides for rubber vine control using both misting machines and a sprinkler sprayer (1, 8) or, in the case of hexazinone, granules, Grid balls[R], or a liquid formulation applied with a Spotgun[R].

METHODS

Location. The trial was located at Guthalungra approximately 48 km north of Bowen. The area chosen was a sandy flat of low fertility immediately adjacent to the Elliott River. Rubber vine grew as separate plants, or clumps 1.5 to 2.5 m tall in the treated area, with much larger plants climbing into the trees on the river banks.

Experimental design. Herbicides listed in Table 1 were applied alone or in combination to give a total of 29 treatments. Five plants constituted a "plot", with four replications, making a total of 580 treated plants. Plots were grouped in a randomized block design.

Application. Most treatments were applied as 3% (w/v a.e) solutions or emulsions in water, using a mister fitted with a No. 40 nozzle orifice to give comparatively large (for a mister) droplets and less drift of spray solution at low engine speed. Plants were sprayed to visible wetness. Inspection showed that about 25% of leaves were wet to the point where spray collected at the leaf apex, 50% were wet with separated visible droplets, and about 25% of leaves were only lightly covered so that spray was barely or not visible. About 7 L of spray solution was sufficient for most treatments using the misting machine.

Sprinkler-sprayer were used to apply about 2 L of emulsions in water per treatment, designated as LV (low volume) in Table 1.

Hexazinone granules and Grid balls[R] were applied at 4 and 1.9 g a.i./plant. A Spotgun[R] was used to apply 1.25 g a.i./plant.

Rubber vine is most susceptible to autumn applications of herbicides (3), so all treatments were applied in late April.

Assessment. Plants were assessed 12 months after treatment. All plants were rated for injury according to the following scale: 1=0-20, 2=21-40, 3=41-60, 4=61-80, 5=81-95, and 6=96-100% reduction in growth.

RESULTS AND DISCUSSION

All treatments with a rating of 5.0 or more 12 months after treatment are considered to be very effective. However, only picloram/2,4-D, dicamba and all hexazinone treatments gave 100% control at 24 months. Plants treated with other chemicals recovered to varying degrees, indicating that some form of follow-up treatment, either with herbicides or burning, is required for effective control of rubber vine.

The hexazinone results are essentially the same as those of Rankine *et al.* (7) and this herbicide is acceptable for the treatment of isolated plants.

The results with triclopyr and 2,4,5-T are disappointing as basal bark application of picloram/2,4,5-T, triclopyr, and 2,4,5-T, or mixed 2,4-D/2,4,5-T esters all give >95% control. The fact that the others are less effective than 2,4-D ester in this trial may reflect differences in absorption and translocation of these chemicals, or simply differences in formulation. Oil carriers reduce herbicide effectiveness against rubber vine (3, 5), and it may be that differences in the herbicide formulation (i.e. the ratio of herbicide to solvent oil), are sufficient to account for the differences obtained. Indeed, the results for 2,4-D ester, where increasing the rate of herbicide (plus solvent oil) gives reduced control, support such as idea.

Similarly, the sprinkler-sprayer results may reflect the same problem. From the herbicide concentrations and the volumes of spray used, the amount of herbicide applied per plant was calculated as approximately 10.5 g/plant for th 3% solutions through the mister, 10 g/plant for the 10% sprinkler-sprayer solutions, and 5 g/plant for the 5% sprinkler-sprayer solutions. The relative ineffectiveness of the sprinkler sprayer may simply result from the higher solvent content of the spray solution in comparison to the misting application, rather than any inherent failure in the technique itself. If this is so the sprinkler-sprayer may be useful for applying concentrated solutions of the water-soluble amines, but this has not been tried.

Table 1. Effect of herbicides on rubber vine, 12 months after application

Herbicide	Formulation	Conc. (% w/v) or rate (g/plant)	Score[a] (*)
Picloram/2,4-D	Tordon 50-D[R]	3%	5.7
Dicamba	Banvel 200[R]	3%	5.7
Hexazinone	granules	4 g/plant	5.5
Picloram/2,4,5-T	Tordon 105[R]	3%	5.2
2,4-D	butoxyethyl ester	3%	5.0
2,4-D	butoxyethyl ester	4%	5.0
2,4-D	Farmco D-500[R]	3%	5.0
Fosamine ammonium	Krenite[R]	3%	5.0
Hexazinone	Gridballs[R]	1.875 g/plant	5.0
2,4-D	butoxyethyl ester	5%	4.7
Triclopyr/2,4-D, 1:4 (w/w)	butoxyethyl ester	3%	4.7
Hexazinone	Velpar[R]	1.25 g/plant	4.6
2,4,5-T	butyl/isobutyl esters	3%	4.2
2,4,5-T/2,4-D, 1:4 (w/v)	mixed esters	3%	3.7
Dicamba/2,4-D, 1:4 (w/w)	Vel 4092 + 2,4-D ester	3%	3.7
Dicamba/2,4,5-T, 1:4 (w/w)	Vel 4092 + 2,4,5-T ester	3%	3.7
Dicamba/MCPA, 1:4 (w/w)	Banvel 200[R] + MCPA,K^+ slat	3%	3.2
Triclopyr	Garlon 480[R]	3%	3.0
Picloram/2,4,5-T, LV	Tordon 1040[R]	10%	3.0
Triclopyr	triethylamine salt	3%	2.7
Triclopyr, LV	Garlon 480[R]	10%	2.7
Triclopyr, LV	Garlon 480[R]	5%	2.7
Picloram/2,4,5-T, LV	Tordon 1040[R]	5%	2.5
2,4,5-T	dimethylamine salt	3%	2.2
Clopyralid	Lontrel L[R]	3%	2.2
2,4,5-T, LV	butyl/isobutyl esters	5%	2.0
2,4,5-T, LV	butyl/isobutyl esters	10%	1.7
Picloram/2,4,5-T, LV	Tordon 1040[R]	5%	1.7
MCPA	K^+ salt	3%	1.2
l.s.d. (P = 0.05)		1.07	
l.s.d. (P = 0.01)		1.42	

[a] Values are the mean of 20 plants (5 plants in each of 4 replications)

In this trial, as in previous trial (3, 5), the ester formulations tended to be better than the amine formulations of the same herbicides (although many of the differences are not statistically significant).

On the question of alternative to 2,4-D and 2,4,5-T, triclopyr is an acceptable substitue for 2,4,5-T, but neither clopyralid no MCPA could be considered as an adequate replacement for 2,4-D.

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