QUEENSLAND DEPARTMENT OF LANDS

THE ALAN FLETCHER RESEARCH STATION BULLETIN No. 3

CHEMICAL CONTROL OF AFRICAN BOXTHORN LYCIUM FEROCISSIMUM

By A. N. LEE, B.AGR.SC.

SUMMARY

Five chemicals were tested for control of African boxthorn *Lycium ferocissimum* (Miers). Three replications of ten treatments were set out in a randomised plot design on 600 mature plants in a field infestation at Millmerran. Counts were made of the dead and surviving plants 12 months after treatment.

Glyphosate applied at 0.3% a.i. in water as a high-volume overall spray, and 2,4,5-T ester applied at 2.0% a.i. in diesel oil as a basal-bark spray, both gave 100% control. Hexazinone achieved 81% control when 0.5 g a.i. was applied in aqueous solution to the ground under the plant. An overall high-volume spray of a mixture of 0.1% a.i. picloram and 0.4% a.i. 2,4-D gave 65% control. Also an overall, high-volume spray of fosamine at 0.84% a.i. gave 12% control.

I. INTRODUCTION

African boxthorn is an erect, thorny shrub that grows up to 4 m tall in Queensland. It has become a pest of grazing land on the Darling Downs and other parts of southern Queensland by its habit of forming impenetrable thickets. Mechanical control measures with slashers, bulldozers etc. have been successful if followed by chemical treatment of the cut-stump or young regrowth. Chemical control of mature plants is effective with only a few herbicides (Orchard 1957; Parsons 1973), though results achieved in the field, particularly by less experienced operators, are often variable.

A common recommendation for chemical control of mature African boxthorn is basal-bark treatment with 2,4,5–T ester (Matthews 1962; Diatloff 1971). However, after recent Queensland legislation (Agricultural Chemicals Distribution Control Act, Amendments of 1973), the use of ester formulations of 2,4,5–T (and others), is restricted in two "hazardous areas" in southern Queensland. Chemical alternatives to 2,4,5–T for African boxthorn control would be desirable.

This experiment describes the application of five herbicides to mature plants; three herbicides were applied as overall sprays, one by ground application under the plant, and one as a basal-bark spray.

II. MATERIALS AND METHODS

The trials were set out in an African boxthorn infested paddock at Millmerran, Queensland. The soil-type was a brown cracking clay. The original timber was brigalow-belah, but this had been cleared. The trials were commenced in March 1977, after the wet season brought the plants into a healthy condition.

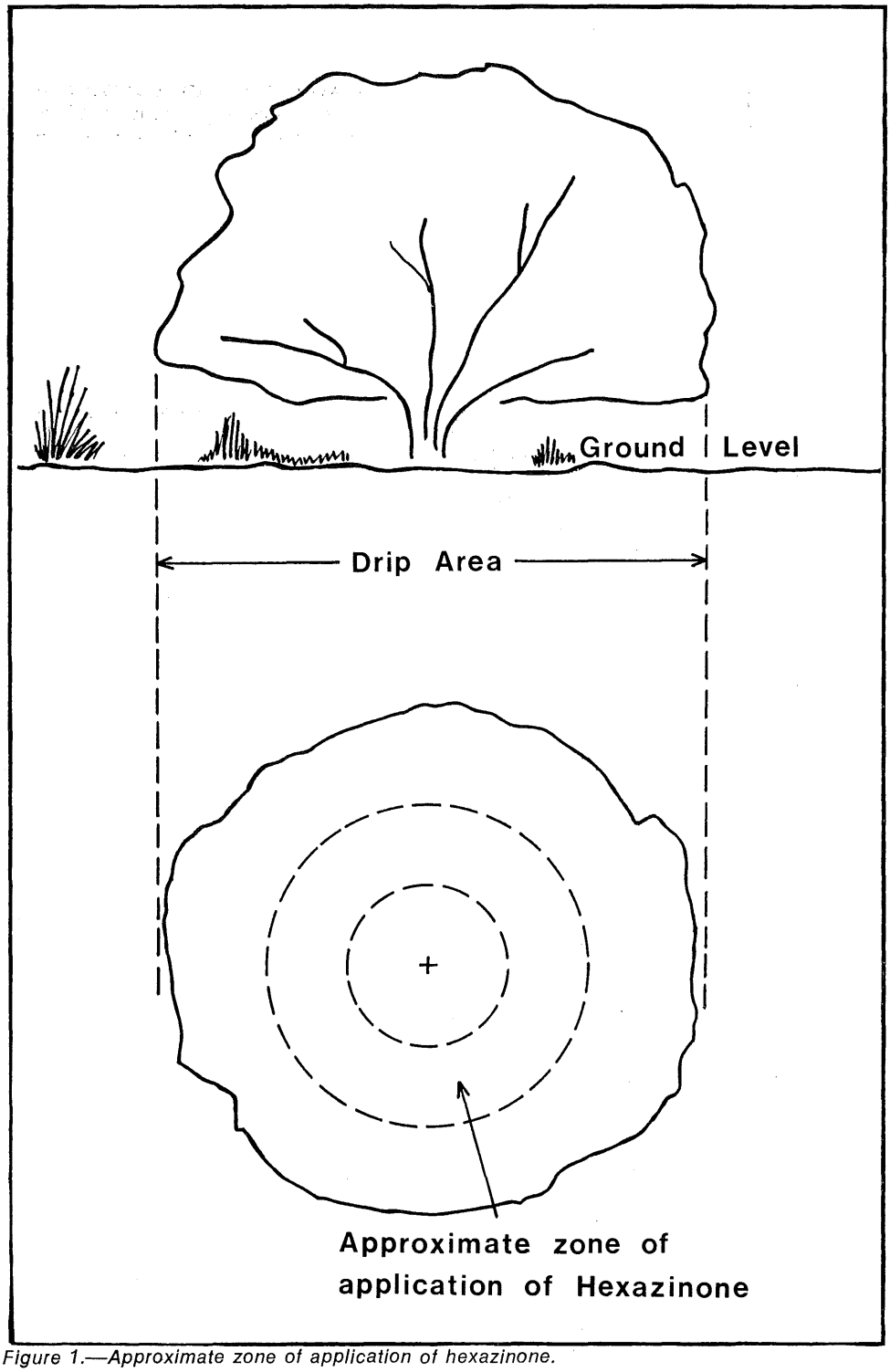

Figure 1.—Approximate zone of application of hexazinone.

A completely randomised design was used with ten treatments (see table 1) replicated three times. Each plot consisted of 20 plants about 2 m tall. Individual plants were indentified by a numbered, metal tag.

A stock solution of hexazinone (3-cyclohexyl-6-(dimethylamino)-1- methyl-1,3,5-triazine 2,4 (1H, 3H)-dione) was made by adding 70 g (63 g a.i.) of the wettable powder to 5 *l* of water. An automatic refillable syringe that delivered a maximum of 5 ml per stroke was used to deliver varying quantities (10, 20 and 40 ml) of the stock solution to the ground in the drip-zone under each plant after the style of Perry and Mears (1962) (see figure 1).

High volume overall sprays of fosamine (ammonium ethylcarbamoyl-phosphonate), glyphosate (N-(phosphonomethyl) glycine), and a picloram (4-amino,3,5,6-trichloropicolinic acid) and 2,4-D (2,4-dichlorophenoxyacetic acid) mixture were applied using a power spray and hand-gun. An average volume of about one litre of the spray solutions was applied per plant.

Basal-bark application of 2,4,5-T (2,4,5-trichlorophenoxyacetic acid, butyl/isobutyl esters) in diesel oil consisted in spraying all stems for about 30 to 40 cm up from ground level. Any grass obscuring the base of the plants was removed with a brush-hook. An average of about 150 ml of spray solution was applied per plant using a knapsack sprayer.

After treatment, the plots were checked every 1 to 2 months and the progressive effects of herbicides noted. Counts were made of the dead and surviving plants 12 months after treatment. Plants were counted as "dead" only after an internal examination of the stems showed them to be brown and hard.

TABLE 1

HERBICIDE TREATMENTS, RATES AND APPLICATION METHOD

Chemical	Chemical Concentration (a.i.)	Carrier	Wetting Agent Concentration (%)	Application Method
Control	..	..	..	..
*hexazinone ..	0·125 g/plant	Water	..	Ground application
hexazinone	0·25 g/plant	Water	..	Ground application
hexazinone	0·50 g/plant	Water	..	Ground application
†fosamine	0·42%	Water	¶0·1	Overall spray
fosamine	0·84%	Water	..	Overall spray
‡glyphosate	0·1%	Water	..	Overall spray
glyphosate	0·3%	Water	..	Overall spray
§picloram	0·1%	Water	¶0·1	Overall spray
2,4-D amine mixture	0·4%	..	..	..
2,4,5-T ester ..	2·0%	Diesel oil	..	Basal-bark spray

* Velpar^{R}, Du Pont.
† Kreniter^{R}, Du Pont.
‡ Roundup^{R}, Monsanto.
§ Tordon 50D^{R}, Dow.
¶ Nonidet WK^{R}, Shell Chemicals.

III. RESULTS

The results are presented in table 2 as the number of dead and surviving plants, and percentage kill.

IV. DISCUSSION

Ground application of hexazinone with an automatic syringe (or modified drench gun) was a relatively fast method of treatment, and required the lowest labour input. Only a minimal amount of equipment was needed and preparation of the solution was easy. The lowest solution volume applied per plant (10 ml) gave poor control, although a more satisfactory kill (81%) was obtained with the highest volume, 40 ml per plant. In denser infestations, where the root systems over-lap under the zone of application, a greater efficiency can be gained as a single dose of the ground-applied chemical may kill more than one plant.

Although hexazinone is a broad spectrum herbicide, the overall effect on surrounding grasses was minimal. Only those grasses immediately under the target plants (and hence normally unavailable to stock) were killed, and these were replaced within a few months. An erosion problem was unlikely. Hexazinone is not recommended for use on African boxthorn growing under desirable trees.

Fosamine was ineffective against African boxthorn at the rates applied.

Glyphosate was very effective on the weed at the rate of 0·3% a.i. It worked quickly, and effects were visible within a few weeks. Subsequent field work has indicated that the chemical is equally effective at the lower concentration of 0·25%.

TABLE 2

NUMBERS OF DEAD AND SURVIVING PLANTS AFTER TREATMENT, AND PERCENTAGE KILL

Treatment	Replicates						Total of Replicates		% Kill
	1		2		3				
	Dead	Survive	Dead	Survive	Dead	Survive	Dead	Survive	
Control	0	20	0	20	0	20	0	60	0
hexazinone—									
0·125 g ..	2	18	3	17	9	11	14	46	23·3
0·25 g	17	3	14	6	(a)	(a)	31	9	77·5
0·50 g	14	6	19	1	16	4	49	11	81·7
fosamine—									
0·42%	0	20	0	20	(a)	(a)	0	40	0·0
0·84%	2	18	0	20	5	15	7	53	11·7
glyphosate—									
0·1%	5	15	1	19	2	18	8	52	13·3
0·3%	20	0	20	0	20	0	60	0	100·0
picloram 2,4-D mix	15	5	15	5	9	11	39	21	65·0
2,4,5-T	20	0	20	0	20	0	60	0	100·0

(a) Missing data due to accidental retreatment of plots.

The picloram 2,4-D mixture gave 65% control. It is known to be more effective on smaller plants and young regrowth after mechanical clearing.

The ester formulation of 2,4,5-T applied as a basal-bark spray was confirmed to be an effective control method. Provided any grass obscuring the base of the plant is cleared, and the stem base is thoroughly sprayed, this method is useful for clearing all mature plants. The labour content is sometimes higher with basal-bark treatment, as the base of the stems of large mature plants can be inaccessible owing to the covering mass of upper branches.

V. ACKNOWLEDGEMENTS

The author is grateful to Mr and Mrs J. Sharp of Millmerran for their co-operation in the use of their property, and to Mr K. Kay and Mr P. van Haaren of the Alan Fletcher Research Station, Lands Department, for their invaluable advice and assistance.

REFERENCES

DIATLOFF, G. (1971).—African boxthorn and its control. Technical Bulletin, Alan Fletcher Research Station, Queensland Department of Lands.

MATTHEWS, L. J. (1962).—Weed control with substituted benzoic acids. *New Zealand Journal of Agriculture* 105: 507-509.

ORCHARD, H. E. (1957).—South African boxthorn *Lycium ferrocissimum* (Miers). *Agricultural Journal of South Australia* 61: 31-32.

PARSONS, W. T. (1973).—'Noxious Weeds of Victoria' (Inkata Press, Melbourne).

PERRY, T. R., AND MEARS, A. D. (1964).—Controlling African boxthorn with Fenuron^{R}. *Agricultural Gazette of New South Wales* 75: 1201-1203.

(Received for publication 25 September 1978)

The author is an Agronomist at the Alan Fletcher Research Station, Department of Lands, Sherwood, Q., 4075.

87740—S. R. HAMPSON, Government Printer, Queensland