

CONTROL OF CHINESE SHRUB WITH TRICLOPYR/PICLORAM AND GLYPHOSATE BY HANDGUN APPLICATION

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Summary. Chinese shrub, *Cassinia arcuata* is a hardy native perennial evergreen that has spread widely in New South Wales and become a weed in many situations. Handgun foliage spray trials were conducted at Orange and Yass during 1989 and 1990 to determine the best herbicides and the most suitable time to control Chinese shrub. The two most cost-effective treatments were 1.5 g ae triclopyr + 0.5 g ae picloram/L of water + 0.2% v/v 600 g/L non ionic surfactant and 4.68 g ai/L glyphosate + 0.2% v/v 600g/L non ionic surfactant. Autumn application was superior to early summer.

INTRODUCTION

Chinese shrub (biddy bush or sifton bush) grows mostly on infertile, acid, stony soils but has recently spread to more fertile soils where pasture competition has been weakened. A heavy infestation of Chinese shrub can reduce stock carrying capacity by 90%. In 1977, 93,000 ha in NSW was infested with the weed, over 23 shires (1) and by 1988 this had grown to 616,000 ha over 31 shires, the heaviest infestations being in the central and southern tablelands and slopes. Control measure have included chipping, pulling, brush cutting, burning, slashing and herbicide application.

Experiments were established in co-operation with the Department of Agriculture at Orange in central NSW and Yass in Southern NSW to evaluate high volume (handgun) post-emergence herbicide spraying in non-arable situations.

METHODS

Treatments were in randomised complete blocks with 3 replications. Plot size was 20x4 m at Orange and 10x4 m at Yass. High volume application was by handgun with D6 orifice at a pressure of 550 kPa. Both sites had two application timings, the first was in early summer 1989 and the second was in autumn 1990. At Orange both timings included triclopyr (butoxyethyl ester), fluroxypyr (methyl heptyl ester), 2,4-D amine + picloram, glyphosate and hexazinone and tebuthiuron pellets were included in the autumn treatment. Plants were 0.1-2.0 m high and pre-flowering in early summer and 1.5-2.0 m high and flowering in autumn. Plant density was 2.5-3.5 per 1x1 m.

Pasture competition is important in the control program. Four kg/ha of Woogenellup subterranean clover was hand broadcast with 125 kg/ha Mo superphosphate onto the bottom 10 m of each plot 5 months after application (maa).

At Yass Chinese shrub was regrowth after slashing and in early summer was 0.5-1.5 m high (pre-flowering), 31 plants per 1x1 m and in autumn was 0.5-2.0 m (post-bloom), 10 plants per 1x1 m.

Herbicides varied with the time of treatment and pasture was not sown. In early summer herbicides included triclopyr + picloram, clopyralid (amine), glyphosate, hexazinone and

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metsulfuron-methyl and in autumn included triclopyr, triclopyr + picloram, clopyralid, fluroxypyr, tebuthiuron, glyphosate and hexazinone. Results were based on visual ratings and plant counts at Orange and visual ratings only at Yass. Results were analysed in Statgraphics by anova and mean separation was by Tukey h.s.d.

RESULTS AND DISCUSSION

Orange, early summer application. Most of the treatments gave promising brownout 2 months after application (maa) but vigorous regrowth occurred. At 11 maa 4.2 g/L fluroxypyr (66% control), 0.83 g/L hexazinone (51%) and 0.5 g picloram + 1.5 g triclopyr/L (Grazon* DS) + 0.2% v/v non-ionic surfactant (Agral# 600) with 40% control were the only 3 treatments out of 17 which gave more than 25% control.

Subterranean clover counts 1.5 months after seeding ranged from 15-69 per 1x1 m but there was no significant differences for clover establishment with herbicides compared to untreated which was 40 per 1x1 m, based on 95% Tukey h.s.d.

Orange, autumn application. This timing provided better results. The two most commercially viable treatments at 6 and 12 maa were 0.5 g picloram + 1.5 g triclopyr/L alone (91% control), or + 0.2% v/v Agral 600 (94%) and 4.68 g glyphosate/L + 0.2% v/v Agral 600 (92%). Picloram 0.7 g + 2.1 g triclopyr/L gave 97% control of Chinese shrub. There was no advantage in adding oil/wetter or organo-silicone surfactant to glyphosate or oil/wetter to Grazon DS.

Sub-clover counts 2 months after seeding ranged from 15-45 per 1x1 m and the untreated was 19 per 1x1 m. There was no significant difference in counts between treatments (95% Tukey h.s.d.). Clover flowered in early October 1990 in the untreated, glyphosate, fluroxypyr and triclopyr treatments. Clover did not flower in triclopyr + picloram or hexazinone plots.

There was no significant re-invasion of plots by Chinese shrub seedlings with triclopyr + picloram and hexazinone but there was in glyphosate plots.

Yass, early summer application. At 11 maa control with 0.42 g/L and 0.83 g/L hexazinone + oil 0.5% v/v was 98-100%, 0.5g picloram + 1.5g triclopyr/L + Agral 600 0.2% v/v gave 94% control and 3.6 g/L glyphosate + 0.2% v/v organo-silicone surfactant (Pulse®) gave 90% control of Chinese shrub. These treatments were significantly better than others (95% Tukey h.s.d.). The above rate of glyphosate with 0.2% v/v Agral 600 gave 81% control. Metsulfuron-methyl gave no control of Chinese shrub.

Results at Yass for this timing were better than at Orange, perhaps due to the older and more variable Chinese shrub population at Orange.

Yass, autumn application. All treatments gave excellent control of Chinese shrub with 0.5 g/L clopyralid + 0.5% v/v oil showing the lowest control at 87%, 13 maa. Glyphosate 3.6 g/L + adjuvants at 0.2% v/v gave quick brownout and better kill with this spray timing. Organo-silicone and oil/wetter adjuvants improved brownout but not the level of control of Chinese shrub which was 99% 13 maa.

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Grazon DS + 0.2% v/v Agral 600 was slower than glyphosate at 1 and 3 maa but gave similar control (99%) at 6 and 13 maa with both 0.35 g picloram + 1.05 g triclopyr/L and 0.5g picloram + 1.5 g triclopyr/L.

Hexazinone at 0.42 g and 0.83 g/L + oil/wetter gave almost complete brownout 6 maa and 100% control 13 maa. Clopyralid 0.5 g and 1.0 g/L + oil gave 85% and 99% control respectively and 2.4 g/L triclopyr + 0.2% v/v Agral 600 gave 92% control of Chinese shrub 13 maa.

Autumn results at Yass were better than those obtained at Orange, perhaps because the Chinese shrub at Yass was even height (0.5-2 m) regrowth and less mature than at Orange. A summary of results with picloram/triclopyr (Grazon DS) and glyphosate) Roundup with adjuvants is shown in Table 1.

Table 1. The effect of picloram/triclopyr and glyphosate on Chinese shrub at Orange and Yass.

| Herbicide | g/L | Adjuvant % v/v | % Control | | | |
|--------------------|-------------|-------------------|------------------|------------------|------------------|------------------|
| | | | Orange | | Yass | |
| | | | Summer 11 maa | Autumn 12 maa | Summer 11 maa | Autumn 13 maa |
| picloram/triclopyr | 0.35 + 1.05 | 0 | 5 | 67 | - | - |
| " | " | 0.2 ^a | - | - | 68 | 99 |
| " | 0.50 + 1.50 | 0.2 ^a | 24 | 91 | - | - |
| " | " | 0.2 ^a | 40 | 94 | 94 | 99 |
| " | " | 2.0 ^b | 33 | 94 | - | - |
| " | " | 0 | 40 | 97 | - | - |
| " | 0.70 + 2.10 | 0.2 ^a | - | - | 70 | 99 |
| glyphosate | 3.60 | 0.5 ^c | - | - | 70 | 99 |
| " | " | 0.2 ^d | - | - | 90 | 99 |
| " | " | 0.2 ^d | 12 | 92 | 82 | 98 |
| " | 4.68 | 2.0 ^b | 18 | 94 | - | - |
| " | " | 0.2 ^d | 21 | 76 | - | - |
| clopyralid | 0.50 | 0 | - | - | 8 | 87 |
| " | 1.0 | 0 | - | - | 33 | 99 |
| fluroxypyr | 2.1 | 0 | 18 | 56 | - | - |
| " | 4.2 | 0 | 66 | 89 | - | - |
| hexazinone | 0.42 | 0 | 6 | 6 | 98 | 96 |
| " | 0.83 | 0 | 51 | 14 | 100 | 100 |

^a non-ionic surfactant (Agral 600).

^b oil/surfactant (D-C-Trate).

^c oil (Caltex).

^d organo-silicone surfactant (Pulse).

-, not used.

Despite good results with both times of spray at Yass and similar results in a separate experiment on 0.25-1 m high Chinese shrub at Mullion Creek where the best treatments (Grazon DS, glyphosate and hexazinone, all with adjuvants) gave similar results with December 1989 and

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March 1990 handgun spraying (B. Milne, pers. comm., 1990), general use recommendations for Grazon DS will promote autumn application for handgun spraying of Chinese shrub.

The two most cost-effective herbicides for Chinese shrub control from this series of trials were 0.5 g picloram + 1.5 g triclopyr/L (Grazon DS 1 L/100L) + 0.2% v/v Agral 600. Glyphosate is the most compatible treatment if legume pasture sowing is to occur soon after spraying. Glyphosate killed competitive ground cover and a high level of re-invasion of Chinese shrub seedlings occurred.

Grazon DS retards the growth of legume pasture and prevents re-establishment for a period after spraying but grasses are left to compete with invading weed seedlings, significantly reducing the population of Chinese shrub. Registration of Grazon DS was obtained in 1992.

Mechanical methods referred to in the introduction are also important in controlling Chinese shrub along with management of livestock. Brush-cutting as close to the soil surface as possible and tearing plant stems rather than evenly cutting and slashing plants more than 2 years old and more than 1 m high have been effective, especially when soil moisture is low however stumps cause costly punctures to rubber tyres in the short term (R. Gammie, pers. comm., 1990). Burning is effective on larger plants but there can be seedling invasion and bushfire risk.

ACKNOWLEDGEMENTS

Experiments were in co-operation with R.L. Gammie, Orange and I.J. McGowen, Yass, Dept. Agr. NSW.

REFERENCES

1. McGowen, I.J., Campbell, M.H. and Milne, B.R. 1990. NSW Agriculture and Fisheries, Agfact P7.6.49.