CONTROL OF GORSE: ADDITIVES FOR 2,4,5-T

I. C. LOGAN and W. T. McLAUGHLAN

ICI New Zealand Limited, Christchurch

Summary

The addition of dicamba ester to 2,4,5-T improved the level of control of gorse (*Ulex europaeus*) when compared to 2,4,5-T alone. The results achieved were equivalent to those obtained with a combination of picloram and 2,4,5-T. These results followed applications within and outside the accepted optimum season.

INTRODUCTION

The control of gorse (*Ulex europaeus*) has for many years been attempted, and often effected, with 2,4,5-T. In many instances a proportion of bushes regrow; sometimes reasons can be found such as coverage but often there is no satisfactory explanation. In some districts it is accepted that follow up applications of 2,4,5-T are necessary.

Taylor and Patterson (1969) stated that regrowth problems are solved not by raising the application rate of 2,4,5-T but more effectively by the addition of a second chemical. They found that the addition of dicamba (as the amine salt or free acid) to 2,4,5-T improved the control of gorse.

The advent of the methyl ester of dicamba renewed interest in the use of dicamba for scrub weed control.

It had been noted that the effectiveness of 2,4,5-T was often related to the vigour of gorse; thus if conditions limited growth, such as drought, results could be disappointing. Upritchard (1973) found, through an extensive series of trials, that 2,4,5-T was more reliable in 'Summer wet' areas than 'Summer dry'. Presumably photo-chemical degradation could also be a factor.

If some regrowth occurs after chemical application, particularly if the area consists of numbers of bushes densely packed, the adequacy of spray cover and distribution can often be questioned and problems related to this.

The trials, therefore, were established in an area of North Canterbury (Summer dry) known to have 'problem' gorse and individual bushes were selected for treatment so that variable chemical cover would not be a factor if regrowth occurred.

It was assumed that for the purposes of most users of gorse control chemicals prevention of regrowth through four growth seasons, i.e. two springs and two autumns, would be satisfactory. This belief allowed final decisions of effectiveness of chemicals to be made after such a period.

EXPERIMENTAL METHOD

Trial areas were selected so that individual bushes, 1 m to 2 m high could be isolated, tagged and sprayed from all sides. Thus each

Scrub Weeds and Forestry

plot consisted of a single bush and was replicated six times, although in the April trial one replicate was destroyed by a bulldozer. The treatments were as follows:

1. 2,4,5-T* 1.8 kg/1000 litres
2. 2,4,5-T* 0.9, 1.0 or 1.5 kg + dicamba ester 0.375, 0.5 or 1.0 kg/1000 litres
3. 2,4,5-T** 1.0 kg + picloram 0.25 kg/1000 litres

Application was by a standard hand-operated brush gun operated at 700 kPa and bushes were sprayed to the point of run off.

The trials were situated in North Canterbury on Ashley yellow grey to yellow brown soils. Average rainfall for the district is 780 mm and the area suffers summer droughts which extended into autumn the year the trial commenced.

Regular assessments were made by at least two observers and scores were given for each bush. The scoring system employed 0 for fully green healthy bushes; 1 to 6 to extent of regrowth, 6 depicting that some green shoots were just appearing; scores of 7 to 10 meant that there was no green growth whatsoever and differentiation relied on the colour and resilience of branches and twigs. Ten indicated a bush in a state of disintegration and collapse.

Once two springs and two autumns had elapsed since spraying bushes were judged to be either controlled or uncontrolled. Any sign of bud development or sap within twigs caused a bush to be labelled uncontrolled.

RESULTS

Figures 1 to 3 show the control obtained from the three treatments used.

Reference to the figures shows the higher level of gorse control obtained from the mixtures compared with 2,4,5-T alone. Results from the trials evaluating a range of ratios of 2,4,5-T and dicamba ester are shown in Table 1.

In this trial the best treatments were 1.5 kg 2,4,5-T + 1.0, 0.5 or 0.37 kg dicamba ester and 1.0 kg 2,4,5-T + 0.25 kg picloram.

TABLE 1: NUMBER OF CONTROLLED GORSE BUSHES AFTER 20 MONTHS (2 SPRINGS and 2 AUTUMNS)

<i>Time of chemical application Number of bushes/treatments</i>	<i>Aug 6</i>	<i>Dec 6</i>	<i>April 5</i>
<i>Treatment kg/1000 litres</i>			
2,4,5-T/1.8	3	5	1
dicamba ester 1.0 + 2,4,5-T 1.5	6		5
dicamba ester 1.0 + 2,4,5-T 0.9	5		1
dicamba ester 0.5 + 2,4,5-T 1.5	6	6	5
dicamba ester 0.5 + 2,4,5-T 1.2	5		
dicamba ester 0.5 + 2,4,5-T 0.9	4		1
dicamba ester 0.375 + 2,4,5-T 1.5		6	
dicamba ester 0.375 + 2,4,5-T 1.2	5	4	
picloram 0.25 + 2,4,5-T 1.0	6	6	4

* butyl ester

** iso-octylester

Scrub Weeds and Forestry

FIG 1 - AUGUST APPLICATION

FIG 2 - DECEMBER APPLICATION

FIG 3 - APRIL APPLICATION

Scrub Weeds and Forestry

It was noticed that during the spring and autumn periods immediately following application of dicamba mixtures some bushes produced distorted apical shoots which grew several centimetres before browning off. Similarly bud development did occur on main stems but they eventually turned brown and were easily brushed off the stem.

Following August and September applications bushes browned off rapidly but those treated in April were extremely slow, going through stages of yellow and brown, with hints of purple, before finally looking desiccated eight months later.

DISCUSSION

The trials confirm that 2,4,5-T alone will not reliably control gorse, even when thorough application of chemical is practised. Even during one of the preferred periods for application of 2,4,5-T one bush out of six survived. As an early spring application 2,4,5-T produced visually acceptable results for almost a year but the following spring regrowth commenced on some bushes and eventually half of them recovered. Late April spraying gave the poorest results from 2,4,5-T in that visually the effect was never satisfactory, there always being traces of green leaf on bushes. Finally five out of six bushes recovered.

These results from 2,4,5-T suggest that a combination of factors, not readily understood, affect the efficiency of the chemical. It is often observed that in areas of gorse which have been sprayed individual bushes appear unharmed whereas others around have succumbed to chemical and this cannot be explained as an application fault. It must be a possibility that physiological factors of some plants endow them with a level of resistance to 2,4,5-T activity.

The addition of 1.0, 0.5 and 0.375 kg dicamba ester or 0.25 kg picloram to 2,4,5-T produced mixtures which gave higher levels of gorse control compared with 2,4,5-T alone even when applied outside the recognised periods. These mixtures were particularly impressive in the autumn trial where the control rate increased from 20% for 2,4,5-T up to 100% with the dicamba ester mixture. The trials also confirmed that the level of 2,4,5-T required in combination with dicamba ester must be at least 1.5 kg/1000 litres of water.

Experience from field useage has shown that the two additives increase the reliability of 2,4,5-T only if properly applied and do not compensate for incorrect application. Although there is some movement within the plant this will not always make up for inadequate coverage and some branches may survive.

Although the addition of dicamba ester or picloram to 2,4,5-T effectively improves the control of gorse, Upritchard's (1973) appeal for a study of the plant's physiology is supported together with investigations into chemical application and the efficacy of penetration and distribution within the plant.

ACKNOWLEDGEMENTS

The authors wish to express their gratitude to the co-operating farmers who for the purposes of our work allowed some of the pestilence gorse to remain for a prolonged period.

REFERENCES

- Taylor, R. L. and Patterson, J., 1969. Control of scrub weeds with 2,4,5-T plus dicamba. *Proc. 22nd N.Z. Weed and Pest Control Conf.*: 178-9.
- Upritchard, E. A., 1973. Formulations of picloram/2,4,5-T for long term control of gorse (*Ulex europaeus*). *Proc. 26th N.Z. Weed and Pest Control Conf.*: 17-22.
- Proc. 27th N.Z. Weed and Pest Control Conf.*