THE ECONOMICS OF SWEET BRIER CONTROL

F. A. MEEKLAH and R. B. MITCHELL

*Field Research Section, Invermay Agricultural
Research Centre, M.A.F., Mosgiel*

Summary

The costs, time taken, and relative efficiency of 3 methods of control of sweet brier (*Rosa rubiginosa*) control are reported. Granular picloram was the most expensive, basal herbicide + diesel was considerably cheaper, but foliar applied picloram/2,4,5-T was the cheapest. The most efficient treatment in controlling sweet brier was picloram granules, but basal 2,4,5-T or picloram/2,4,5-T in diesel was acceptable. On a cost/efficiency basis, basal herbicide in diesel was the best treatment. Labour input showed no marked advantage for any treatment.

INTRODUCTION

SWEET brier (*Rosa rubiginosa*) is widespread throughout New Zealand, although in the North Island it is sporadic and not densely distributed as in the tussock grasslands of the South Island.

The ecology and biology of sweet brier in tussock grassland have been studied by Molloy (1964, Pers. Comm.) who concluded that "compared with the large amount of seed produced there is a general absence of a spate of vigorous seedlings. The field and experimental evidence proves that germination and seedling establishment are the critical phases in the life history of brier. From the practical viewpoint the most significant fact which emerges is that sweet brier seedlings are clearly vulnerable to conventional pasture improvement, whether it be by judicious management of resident vegetation, or by the more profitable method of over-sowing and topdressing."

Generally, informed opinion now considers a state of equilibrium to exist between sweet brier and other vegetation on most sites. The problem thus resolves to one of eradicating established bushes since chemical control is possible, Dingwall (1962), Meeklah (1969) and Upritchard (1969). It is now the prerogative of the run-holder to determine on the basis of a cost/benefit analysis what action to take, for which he needs an indication of the probable cost. This paper reports work done in Central Otago which indicates likely treatment costs.

MATERIALS AND METHOD

Commencing 1968, 3 separate sites in 3 consecutive years were divided into 0.004 hectare plots, discrete brier bushes counted, and the following materials applied at the appropriate time.

1. 2,4,5-T oil miscible concentrate (72% a.i.) in diesel oil. Basal spray, winter.

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2. Picloram 5% /2,4,5-T 20% a.i.* in diesel oil. Basal spray, winter.
3. Picloram granules (2% a.i.) at 1 gm a.i./15 cm basal stool diameter. Basal application, spring.
4. Picloram 7.5%/2,4,5-T 20% a.i. 1 part in 200 parts water. Foliage application, summer (late flowering stage).

Treatments were replicated 3 times in a randomised block design. Quantities of materials used and the time taken to apply them were recorded on each occasion.

All were agitated during mixing and application to minimise crystallisation.

Assessments of % dead wood per bush were taken up to 2 years after application to assess the regrowth potential. To assess total costs/hectare, the following item costs were used:

wages at \$1.36/hour, diesel at 4.1c/litre, and chemicals at current prices i.e. ester of 2,4,5-T (72% a.i.) at \$3.50 litre, picloram/2,4,5-T (25%) at \$2.90/litre, picloram 2% granules at \$1.20/kg.

RESULTS

Table I shows the number of bushes at each trial site, the quantities of materials used and the time taken to apply them, all estimated as means per hectare, plus the mean % dead wood per bush at 18/11/71.

The maximum amount of dead wood was frequently recorded in granular picloram treatments: the surviving sweet brier in these plots could usually be ascribed to insufficient herbicide applied, or from a small sucker that had been missed during application.

On the other hand it was noted on bushes treated basally with herbicide in diesel, that surviving canes frequently appeared to be fresh suckers emerging in the growing season immediately following treatment.

The amount of dead wood per bush was low where basal applications of 2,4,5-T and picloram/2,4,5-T were diluted at 1 part in 80 parts of diesel but reached a more satisfactory level when the dilution was reduced to 1 part in 40.

Live wood on bushes treated in full foliage with picloram/2,4,5-T generally appeared to be due to surviving canes rather than from increased suckering.

Granular application generally took slightly longer to apply than basal spraying with diesel + herbicide; occasionally foliar application took longer than other methods.

Fig. 1 illustrates the estimated total cost per hectare. Invariably picloram granules cost more than any other treatment, basal picloram/2,4,5-T in diesel was usually slightly more expensive than 2,4,5-T + diesel, while picloram/2,4,5-T was often the cheapest; (in this figure the concentration of basal diesel treatments was taken as 1 part 25% picloram/2,4,5-T or 72% 2,4,5-T to 40 parts diesel).

*Formulations varied each year as follows:

First year = picloram acid 5%/octyl ester 2,4,5-T 20%

Second year = octyl ester picloram 5%/octyl ester 2,4,5-T 20%

Third year = potassium salt picloram 5%/iso octyl ester 2,4,5-T 20%

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TABLE 1: No. OF BUSHES, MATERIALS APPLIED, QUANTITIES AND TIME TAKEN PER HECTARE, % DEAD WOOD AS AT 18/11/71

<i>No. of bushes per hectare</i>	<i>Basal 2,4,5-T + diesel</i>	<i>Basal picloram + 2,4,5-T + diesel</i>	<i>Picloram granules</i>	<i>Foliar picloram + 2,4,5-T + water</i>
14 800	710 litres* 27 hrs 98%	560 litres* 25 hrs 100%	270 kg 25 hrs 100%	710 litres 20 hrs 34%
1 300	90 litres* 7 hrs 88%	90 litres* 5 hrs 97%	60 kg 10 hrs 87%	180 litres 5 hrs 66%
20 000	480 litres* 9 hrs 94%	570 litres* 10 hrs 99%	200 kg 12 hrs 100%	700 litres 7 hrs 46%
4 600	340 litres** 30 hrs 16%	360 litres** 30 hrs 18%	210 kg 17 hrs 90%	850 litres 30 hrs 47%
6 200	180 litres** 10 hrs 45%	300 litres** 17 hrs 45%	240 kg 20 hrs 100%	770 litres 25 hrs 69%
7 300	320 litres** 20 hrs 26%	300 litres** 17 hrs 23%	280 kg 27 hrs 100%	620 litres 20 hrs 62%
10 700	450 litres*** 25 hrs 84%	450 litres*** 25 hrs 93%	270 kg 25 hrs 100%	1080 litres 35 hrs 82%
7 500	540 litres*** 20 hrs 68%	380 litres*** 17 hrs 92%	340 kg 30 hrs 95%	1160 litres 35 hrs 67%
4 100	280 litres*** 15 hrs 77%	250 litres*** 12 hrs 79%	230 kg 15 hrs 94%	740 litres 30 hrs 85%

N.B. Concentrations of the basal applications varied each year:

* 1 part herbicide in 20 diesel

** 1 part herbicide in 80 diesel

*** 1 part herbicide in 40 diesel

Fig 1 ESTIMATED COST PER HECTARE

DISCUSSION

Due regard must be paid to the fact that the inputs/hectare estimated in this paper can only be strictly related to the sites on which the studies were carried out, as no sweet brier stand is reproducible and these estimates must be extrapolated with some reserve.

Large numbers of bushes/hectare were often recorded, particularly at 2 sites, where many plants possessing only 1 or 2 small canes could not reliably be allied as suckers to neighbouring bushes. Sweet brier frequency was extremely variable leading to similar variability in both the amount of materials applied and time taken for application.

It is clear that the most biologically efficient treatment in this study was picloram granules but it was the most costly. However it had the physical advantage that the total weight of materials to be transported per hectare usually was less than that of the liquid mixtures particularly if the weight of spray machinery is added.

Basal application of herbicide + diesel was not quite as efficient in controlling sweet brier but would be considered acceptable by the authors. It was noticeable that regrowth frequently was from suckers; it is hoped that any run-holder who is to control sweet brier with chemicals would previously have undertaken a programme of pasture improvement. Emerging sweet brier suckers would then have to contend with severe pasture competition, plus grazing or trampling from more intensive stocking at critical growth stages.

Frequently there was better sweet brier control with picloram/2,4,5-T than with 2,4,5-T alone in diesel. Although slightly more expensive and with an added risk of crystallisation if not agitated once mixed with diesel, it is probably worth using this mixture since manual agitation of the knapsack is easy once it is on the operator's shoulders. Poorest control of sweet brier was shown by foliar application of picloram/2,4,5-T; it is

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probable that the poor control shown in this study was because insufficient chemical was applied to the foliage and stems. Analysis of costs indicates that as chemicals formed the lowest proportion of the total a considerable increase in strength, say to 1 part of 27.5% picloram/2,4,5-T to 100 parts water, is possible before the cost of treatment exceeds that of basal herbicide + diesel.

Note that labour costs here do not include the time spent mixing and filling materials used, this may be a factor both logistically and economically that needs added consideration in any cost/benefit analysis.

The above study gives an indication of the probable costs involved in controlling sweet brier, what is now required is an assessment of the losses caused by sweet brier i.e. in loss of pasture production, and by interference with grazing. Once the run-holder has this information only then can he carry out a cost/benefit analysis. Current indications are that stock losses are negligible while grazing is available over more of the area infested.

CONCLUSIONS

In this study of sweet brier control it was found that

- (a) The most efficient treatment was picloram granules, but control by basal 2,4,5-T or picloram/2,4,5-T in diesel was acceptable.
- (b) The most expensive in terms of chemical and application costs was granular picloram. Basal treatments of 2,4,5-T and of picloram/2,4,5-T in diesel were considerably cheaper than granular picloram. Foliar applied picloram/2,4,5-T was the cheapest.
- (c) On a cost/efficiency basis, basal herbicide in diesel was the best treatment.
- (d) On a logistical basis granular picloram weighed the least, but if clean water was available on site then foliar applied picloram would be more efficient.
- (e) Labour input showed no marked advantage for any treatment.

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