THE FAILURE OF FOSAMINE AND GLYPHOSATE TO GIVE LONG-TERM CONTROL OF BLACKBERRY IN NORTHLAND

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SUMMARY

The performance of foxamine, glyphosate, and 2,4,5-T + picloram for the control of blackberry (*Rubus fruticosus*) has been assessed over a period of two years at a trial site and on numerous farms throughout Northland. Fosamine and glyphosate suppressed blackberry growth and gave apparent control for over 12 months. However, by 24 months extensive regrowth had occurred, with most rhizomes having produced new buds. 2,4,5-T + picloram eventually killed the rhizome when applied for a period of several years.

INTRODUCTION

In the autumn of 1979 there was considerable interest by farmers in Hokianga in the new blackberry sprays fosamine and glyphosate. Farmers were generally disappointed in the performance of the available blackberry sprays, and many had resorted to twice-yearly slashing as a means of controlling blackberry infestations and maintaining pasture production. The problem was most acute on dairy and beef farms, where it was not practical to control regrowth by mob stocking with sheep or goats.

In association with a local farmer we decided to evaluate all the available blackberry control methods. It was hoped to stimulate interest in a disillusioned group of farmers by assessing for ourselves, and demonstrating to farmers, the results that could be achieved in a farming situation rather than in small-scale trial plots.

The trial area in the first year covered approximately 15 ha and compared herbicide treatments and cultivation techniques. Although thorough cultivation in association with follow-up spraying gave by far the best results, this approach is not feasible on much of Northland's rolling and hill country. The results from a part of the trial will be described in detail here.

METHODS

The blackberry on the principal trial site was the green-leaved scrambling form of *Rubus fruticosus* (Williams 1977). Since the start of the trial three sprayings have been carried out: autumn 1979, autumn 1980, and autumn 1981. Blackberry on the trial areas had not been slashed for at least 2 years prior to the first spraying. Clumps of blackberry ranged from 1 to 1.75 metres in height.

Year 1:— All chemicals were applied at the manufacturers' recommended dilution rate through a hand gun using 500 litre tank and a P.T.O.-mounted diaphragm pump. Blackberry was sprayed to give complete coverage of canes and leaves, using a number 5 tip and a pressure of 1400 kPa. All paddocks were sprayed within 10 days of each other at the end of March and beginning of April, 1979. The chemicals applied to each paddock are detailed in Table 1. No attempt was made to monitor the chemical and water rates per hectare at the time of spraying. Records were kept of the amount of spray mix applied to each paddock, and water and chemical rates have been calculated from these figures (see Table 1).

Scrub Weeds

TABLE 1: Details of initial spraying (autumn 1979) on Omahuta blackberry trial site.

Chemical	Area of paddock ha	% Cover on blackberry	Dilution rate of chemical	Amount chemical used litres	Effective chemical rate/ha on blackberry kg/ha	Effective water rate /ha on blackberry litres/ha
Paddock 1 fosamine	2.5	30%	1:100	13	8.4	1750
Paddock 2 glyphosate*	2.5	30%	1:100	15	7.2	2000
Paddock 3 2,4,5-T + picloram	1	25%	1:75	5	4.0 + 1.0	1500

(* Note: Glyphosate was applied at twice the rate per hectare recommended by the manufacturer. Initially we were unable to obtain complete coverage of leaves and canes at the 3.6 kg/ha rate. It subsequently became apparent that spraying to wet the foliage alone gave equivalent results after one year.)

Because of the pasture damage caused by glyphosate, paddock 2 was oversown with a ryegrass/clover mix 4 weeks after spraying. None of the trial areas were slashed. *Year 2:* At a field day on 5th May, 1980 the results of the previous year's spraying were examined and discussed. Immediately after this, over a period of approximately one week, regrowth in the trial areas was resprayed. Paddocks 1 and 2 were resprayed with fosamine and required 1.7 and 2.0 litres of chemical respectively. Paddock 3 and resprayed with 2,4,5-T + picloram. Conditions of spraying were similar to year 1 except a number 4 tip was used and a pressure of 1000 kPa.

RESULTS

Visual assessment 12 months after initial spraying.

The degree of "kill" achieved in the paddocks sprayed with fosamine and glyphosate (paddocks 1 and 2), visually estimated 12 months after spraying, were assessed at 90% for both paddocks. This was confirmed by the amount of chemical required to spray the regrowth in the paddocks in year two of the spraying programme. Since fosamine and glyphosate appeared to be performing equally well in the trial area, the farmer elected to spray the regrowth in paddocks 1 and 2 with fosamine, to avoid the pasture damage and necessary oversowing associated with glyphosate.

Paddock 3, initially sprayed with 2,4,5-T + picloram, showed considerable regrowth. There were a few clumps that had no regrowth, but in most clumps the regrowth was so extensive that the presence of dead canes was the only indication that the clumps had been sprayed a year previously. The degree of "kill" was assessed at 20—30%. It required 5 litres of 2,4,5-T + picloram to spray the regrowth in paddock 3. This result is in line with the general trend in Northland, where the amount of chemical require in year two of a spraying programme involving 2,4,5-T + Picloram is usually 50—100% of the amount applied in year one.

Visual assessment 24 months after initial spraying.

Examination of paddocks 1 and 2 in March 1981 revealed the presence of considerably more blackberry regrowth than had been present 12 months after the initial spraying. The sites where the original clumps of blackberry had existed were occupied by a large number of vigorous plants up to 0.5 metres high and showing active lateral growth.

The extent of regrowth in paddock 3 was considerably reduced. At least one-third of the plants showed no regrowth at all. The degree of "kill" was assessed at 70%.

The effect of the chemicals on the rhizome.

Concern at the extent of the regrowth in paddocks 1 and 2 24 months after the

Scrub Weeds

initial spraying led us to excavate entire plants to determine the effect of the chemicals on the rhizomes.

Over 50 rhizomes were dug up at random in each of paddocks 1 and 2.

These included: (i) plants showing small stunted regrowth; (ii) plants showing vigorous regrowth; and (iii) apparently “dead” plants showing no regrowth. In all cases the rhizome showed extensive budding and root development both along the rhizome and in the region of the crowns. None of the plants dug in these two paddocks was scored as dead.

In contrast, apparently “dead” plants in paddock 3 (ie) plants showing no foliar regrowth after two years spraying, had rhizomes which were obviously dead and beginning to rot. Plants in paddock 3 which still showed some regrowth had a destroyed crown region and partially dead rhizome. Regrowth after two years spraying was generally from regions of the rhizome deeper in the soil, presumably still unaffected by the chemical.

DISCUSSION AND CONCLUSIONS

The appearance of fosamine and glyphosate on the market with the promise of almost complete control of blackberry in one year, roused the flagging interest of Northland farmers. However, our observations now indicate that sprayed plants are not killed but are suppressed, and are capable of active and vigorous growth in the second season following spraying. In contrast, plants sprayed annually with 2,4,5-T + picloram show death and break-down of the total rhizome in a large proportion of the plants after two years spraying.

The extent of the problem is only appreciated when plants are dug up and examined. The appearance of a typical rhizome two years after spraying with fosamine or glyphosate is shown diagrammatically in Fig. 1. The region of the rhizome which is

FIG 1: Diagrammatic representation of how regrowth occurs from a typical blackberry rhizome two years after spraying with fosamine or glyphosate.

Scrub Weeds

damaged by the chemical is limited to an area no greater than one or two centimetres around the base of the dead cane. New aerial shoots develop from regions very close to the damaged area and also at intervals along the length of the rhizome network.

Plants showing regrowth after two years' spraying with 2,4,5-T + picloram display extensive damage to the rhizome near to the surface. Regrowths occur from undamaged regions of the rhizome, often 30 cm or more below the surface.

These results are not confined to our trial area. We have dug up sprayed plants in many areas of Hokianga and also in other Northland Counties. Similar results have also been obtained with pale backed scrambling blackberry — the other common form of blackberry in Northland. The shortcomings of fosamine and glyphosate will become more obvious on a wider scale next year, as these chemicals were only used extensively in autumn 1980. Most farmers are still looking at first year results, which are impressive.

These findings indicate that previous methods for assessment of blackberry control must be re-examined and parameters for what constitutes long-term control evolved. In particular a more rigorous definition of "kill" needs to be established.

Future blackberry trials should either continue for a minimum of two years, or plants should be dug to determine the extent of destruction the chemical has caused to the rhizome. The following characteristics should all be observed if a plant is to be declared dead: no new bud or root development; epidermal layers on the rhizome can be sloughed off easily with the finger; the tissue under the epidermis has a waterlogged appearance; and the tissue of the rhizome changes from a pink or yellow-brown colour to dark brown or black.

The trial is being continued to establish whether the extensive regrowth on paddocks 1 and 2 can be eventually controlled with fosamine and glyphosate. Higher concentrations of fosamine and glyphosate have been applied to this regrowth in an attempt to overcome the problem of scant aerial growth supporting a large rhizome system. A preliminary observation of the third year's spraying was that increased amounts of fosamine and glyphosate were required to treat paddocks 1 and 2, with greatly increased application time, while a marked decrease in the quantity of 2,4,5-T + picloram applied to paddock 3 has occurred.

The outcome of these trials is of considerable concern to Northland farmers, many of whom have undertaken expensive blackberry spraying programmes, for which subsidy is only available for two consecutive years under the noxious plants subsidy scheme. I believe fosamine and glyphosate were insufficiently tested under Northland conditions before being granted registration as blackberry control chemicals, and that extravagant claims have been made for their efficacy by the manufacturers.

On the basis of these trials and assessment of other areas in Northland our current recommendation to farmers undertaking blackberry spraying programmes is to use 2,4,5-T + picloram, and accept that an area must be sprayed for at least three consecutive years.

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