WEED CONTROL IN BLUEBERRIES

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Summary

A number of herbicides were tested for weed control in blueberries (*Vaccinium* spp) on a Rukuhia peat in the Waikato. Annual applications of dichlobenil at 22 kg/ha proved the most effective in terms of weed control and increased yield. The biannual applications of 2,2-DPA plus atrazine, whilst giving excellent weed control, decreased production. Paraquat plus diuron gave a slight increase in production from a biannual application as did terbacil with annual and biannual applications but weed control with these two chemical treatments was not as good.

INTRODUCTION

Blueberries are a crop of increasing interest in New Zealand. They have three peculiar advantages to which this can be attributed. Firstly they thrive on peat and sandy high organic matter soils (Toleman 1968). Secondly, the few pests, apart from birds, that attack blueberries in New Zealand are possible to control with existing measures. Thirdly, and perhaps most importantly, blueberries have a potentially large market in North America as an out of season fruit.

Weed control in blueberries is difficult. The blueberry roots form a dense mat directly under the ground surface. This allows only shallow cultivation for weed control which is not effective against deep rooted or rhizomatous perennials. Other weed control methods used at present are mowing, hand weeding and mulching. Each method has disadvantages and all are expensive in terms of labour. If blueberries are to become an export crop low labour inputs will be required. Weeds are also aesthetically displeasing and hinder harvesting. For these reasons a trial was initiated to determine the necessity for weed control and to investigate suitable herbicides to achieve the required degree of weed control for maximum berry yield and plant vigour.

METHOD

The trial commenced in 1975 at Lake Cameron, on a Rukuhia peat soil which had 52.6% organic matter as determined by loss on ignition. Three year old bushes, arranged in rows, and consisting of three different varieties ('Dixie', 'Burlington' and 'Atlantic') were used. Up to the start of the trial weed control had consisted of inter-row mowing and hand weeding around the bushes. No fertiliser was applied during the duration of the trial.

The experiment was a randomised block design with four replicates; blocked on variety. The herbicides (Table 1) were applied either with a hand held granule applicator or with a precision sprayer applying 380 litres/ha at 200 kPa. All herbicides were applied within the dripline.

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Vegetation in inter-row areas was controlled throughout the year by mowing.

Treatment effects were measured by total harvest weight, 50 berry weights and changes in plant height. Weed control was assessed visually. Over the first 2 years of the trial a wide variety of herbicides were tested. In the third season (1977-1978) the best of these herbicides were tested annually and biannually.

RESULTS

Berry yield

Only dichlobenil (22 kg/ha) gave a significantly higher yield than control (Table 1). The twice yearly application of dichlobenil (a total of 44 kg/ha) however gave significantly less production than annual applications at a total of 22 kg/ha.

TABLE 1: The effect of treatments on blueberry production.

Treatment	Rate (kg/ha/year)	Wet weight of berries g/plot
no weed control	-	1185 b
mowing	-	984 b
2,2-DPA + atrazine	7.0 + 5.0	1454 b
2,2-DPA + atrazine*	14.0 + 10.0	426 c
paraquat + diuron	0.5 + 2.0	1064 b
paraquat + diuron*	1.0 + 4.0	1670 ab
terbacil	1.5	1560 ab
terbacil*	3.0	1570 ab
dichlobenil	22.0	2585 a
dichlobenil*	44.0	1480 b
CV%		37

herbicide treatments were applied on 16.3.77.

* treatments applied biannually on 16.3.77 and 26.8.77.

Repeat applications of 2,2-DPA plus atrazine gave significantly lower yields than any other treatment despite the excellent weed control. Observations in the field indicated some herbicidal effect on the blueberries with leaf rolling being noted on all bushes following this treatment.

Paraquat plus diuron and terbacil gave slightly increased production compared with controls.

Weed scores

The weed scores on the first two dates show that the first treatment was effective over the autumn and early winter (Table 2). The slower acting herbicides, 2,2-DPA plus atrazine and dichlobenil showed better weed control at the three month than at the one month scoring. However they gave control equal to that of paraquat plus diuron in the first month. Terbacil was the least effective herbicide at the one month scoring leaving a number of grass and composite weeds. Paraquat plus diuron then showed significantly less control of weeds than 2,2-DPA plus atrazine and dichlobenil at the second scoring. Here the breakdown was due to the emergence of plantain (*Plantago*) and composite species.

New Crops

TABLE 2: Visual weed scores to evaluate herbicide effectiveness.

Treatment	kg/ha/yr	Visual weed score and date scored			
		5.4.77	27.6.77	11.10.77	15.12.77
no weed control		0.5 c	0 c	0 e	0 f
mowing				0 e	0 f
2,2-DPA + atrazine	7.0 + 5.0	7.6 a	9 a	4 cd	4 cd
2,2-DPA + atrazine*	14.0 + 10.0			9.5 a	7 bc
paraquat + diuron	0.5 + 2.0	6.6 a	5 b	1.7 cd	1 e
paraquat + diuron*	1.0 + 4.0			5.3 b	3.5 de
terbacil	1.5	4.4 b	4.3 b	1.0 de	0.5 ef
terbacil*	3.0			5.0 b	3.5 d
dichlobenil	22	6.6 a	9.2 a	8.7 a	7.5 ab
dichlobenil*	44			9.7 a	9.0 a
CV%		35	34	31	37

Herbicides applied 16.3.77 and (biannual) 26.8.77.

0 equals no weed control; 10 equals complete weed control

* biannual applications of herbicide

Fifty berry weights and plant height

No significant differences could be determined between treatments for either of these criteria.

DISCUSSION

Dichlobenil proved the most suitable herbicide for weed control in blueberries on peat soils. A single application of 22 kg/ha gave good weed control for a long period and the highest berry yield. Work in the USA (Devlin *et al* 1968) substantiates these results. The trial suggests however that care must be taken in deciding on the rate of dichlobenil to be applied because high rates (44 kg/ha) cause depression in yield and possibly also in other plant components. This may be compounded by slow leaching (Miller *et al* 1965), slow breakdown (Montgomery *et al* 1972) and adsorption by organic matter of the herbicide allowing the possibility of maintaining residues in the soil. Consequently repeated annual applications of dichlobenil could lead to phytotoxic levels in the soil. However if dichlobenil accumulates in the soil, requirements for weed control may reduce with time; thereby decreasing weed control costs. Further work on dichlobenil rates, effects and feasibility of biannual applications at lower rates should be done.

A breakdown in weed control for most single herbicide applications occurred in the spring. Single application of dichlobenil, however, maintained a high degree of control throughout. The second application of paraquat plus diuron and terbacil led to mediocre but significant increases in weed control while reapplication at 2,2-DPA plus atrazine improved weed control considerably. A second application of dichlobenil did not show significant improvement over the single application.

The final weed score was conducted immediately prior to the first blueberry harvest. Dichlobenil gave the best control at both the single and double application. All other treatments gave poor weed control with single applications of paraquat plus diuron and terbacil giving only marginal control.

New Crops

Paraquat plus diuron and terbacil did not affect the blueberries neither did they give significantly good weed control or increased yield. These results differ from a previous years data which showed that single applications of these herbicides did give significant increases in yield over untreated plots. However they still gave significantly lower yields than dichlobenil. Whether this difference between years was due to a delayed herbicidal effect on the blueberries or whether the need for weed control is climate dependent cannot be determined from the results. Long term studies will be required to explain this point. A change in emphasis from year round to seasonal weed control for limited periods such as berry set and harvesting may suit these herbicides. Again further work is required on rates and time of application before firm recommendations can be made.

2,2-DPA plus atrazine, despite providing excellent weed control depressed yields. Therefore this combination is unsuitable for use in blueberries.

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