HERBICIDE TOLERANCE OF YOUNG CHERRY TREES

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SUMMARY

Trials conducted in Hawke's Bay over two years showed young sweet cherry (*Prunus avium*) trees were tolerant to a range of herbicides. Scion cultivars 'Bing', 'Dawson' and 'Rainier' on rootstocks 'Colt', 'Mahaleb' and 'Mazzard' were tested. Atrazine, diuron, methabenzthiazuron, linuron, oryzalin, oxadiazon, oxyfluorfen, simazine, terbacil, and terbuthylazine plus terbumeton applied directly over exposed dormant buds soon after transplanting did not damage the buds or the subsequent tree growth. Tree growth was affected by the level of weed control.

INTRODUCTION

There is very little published information on herbicide tolerance of sweet cherries but Fryer and Makepeace (1978) suggest they are less tolerant than apples and pears. The acceptance of one cultivar of cherry, 'Dawson', on the Japanese market in 1985 renewed interest in cherry production in New Zealand, and there was a need for information on herbicide tolerance.

In New Zealand most cherries are grown on one of the three rootstocks, viz., 'Colt' (*P. avium x P. pseudocerusus*), 'Mahaleb' (*P. mahaleb*) and 'Mazzard' (*P. avium*). As rootstock uptake could affect tree tolerance to herbicides, it was considered advisable to test all three rootstocks. Initial herbicide tolerance work was conducted in 1985/86 and 1986/87 on rootstocks, cuttings of Colt and seedlings of Mahaleb and Mazzard (unpublished). Colt showed good tolerance to a wide range of herbicides and this information gave a guide to suitable materials for use on dormant bud cherries.

Previous work with nectarines (Hartley 1987b) had indicated that residual herbicides could be applied directly over dormant buds without affecting them. This paper reports on both herbicide tolerance of young cherry trees and the effect on first year growth from dormant buds.

METHOD

Herbicide tolerance trials were conducted at Hawke's Bay Agricultural Research Centre in 1986 and 1987. The soil was a Mangateretere silt loam (pH 5.9; sand 26%, silt 42%; clay 32%; organic C 3.7%, CEC 21.4 me/100 g).

In 1986 the scions 'Bing' and 'Dawson' were used on rootstocks 'Colt' and 'Mahaleb'. In 1987 the scions 'Bing', 'Dawson' and 'Rainier' were used on rootstocks 'Colt', 'Mahaleb' and 'Mazzard'.

Trees were hand-planted in July each year in single row plots with 0.5 m between trees and 3 m between rows. There was a 1 m gap between plots in the rows and guard trees were planted at row ends. Three trees of each scion by rootstock combination were planted in each plot (total 12 trees per plot) in 1986 and two of each cultivar combination in 1987. Rootstocks were cut back to 10 mm above the scion bud soon after planting and the wound painted with 'Pruntect'. Herbicides (Tables 1 and 2) were applied by hand held precision sprayer through a 1.5 m boom delivering 200 litres/ha at 230 kPa to bare ground directly over newly planted dormant bud cherries. There were three replicates laid out in a randomised block design.

In 1986 weed cover was assessed visually as percent ground cover on October 2, and 'hand weeded' plots were kept weed-free thereafter. In 1987 all surviving weeds were spot treated with paraquat to keep all plots weed-free throughout. Tree height was

Proc. 43rd N.Z. Weed and Pest Control Conf. 1990: 87-89

measured as trunk extension above the graft and trunk diameter was measured 150 mm above the graft at the end of the first season's growth. The number of buds failing to grow was recorded. Data were analysed by analysis of variance.

RESULTS

Although there were significant differences in tree growth between the scions and the rootstocks, there was no significant interaction between cultivars and herbicides in either trial. Only mean growth for all cultivars is therefore presented in the tables. In the 1986 trial there were no differences in tree growth between 'hand weeded' and any of the treated plots. However, untreated trees were significantly depressed in both trunk extension and trunk diameter (Table 1). Excluding the untreated trees there was a weak (R^2 = 0.25) but significant ($P<0.05$) relationship between weed cover estimated in October and final trunk extension.

TABLE 1: Early weed control and first year tree growth following herbicide application over dormant buds of four cherry scion x rootstock combinations on August 6, 1986.

Treatment[1]	Rate (kg ai/ha)	% Bud failures	% Weed cover* 2-10-86	Trunk extension (m)	Trunk diameter (mm)
hand weeded**		13	72 (4.2)	1.44	17
untreated		23	91 (4.5)	0.71	8
atrazine	2	17	2 (0.3)	1.42	16
diuron + methabenzthiazuron	2+3	17	36 (3.4)	1.37	16
linuron	2	15	16 (2.7)	1.51	17
linuron + metribuzin	2+0.5	19	3 (0.2)	1.43	17
oryzalin	4	17	11 (2.3)	1.41	16
oxadiazon	2	21	31 (3.1)	1.35	15
oxyfluorfen	1	10	3 (0.7)	1.44	17
simazine	3	21	4 (1.4)	1.45	17
terbacil	1	10	5 (1.2)	1.42	17
terbuthylazine	4	17	4 (0.9)	1.48	18
terbuthylazine + terbumeton	2+2	15	3 (1.1)	1.44	17
LSD 5%		13	20 (1.15)	0.15	1.3

* Log_e weed cover in parenthesis

** Weeds removed after assessment, subsequently weed free.

[1] Herbicides used: atrazine — Gesaprim 500 FW; diuron — Karmex; linuron — Linuron 50; methabenzthiazuron — Tribunil; metribuzin — Sencor; oryzalin — Surflan; oxadiazon — Foresite; oxyfluorfen — Goal; simazine — Gesatop 500 FW; terbacil — Sinbar; terbuthylazine — Gardoprim 500 FW; terbuthylazine plus terbumeton — Caragard 50 FW.

Table 2 shows the mean herbicide tolerance of six cultivar combinations (Rainier on Colt, Mahaleb and Mazzard, Dawson on Colt and Mazzard and Bing on Colt) in the absence of weeds. Treatments had no significant effect on trunk diameter but terbacil and terbuthylazine resulted in increased trunk extension compared to hand weeded. On four treatments (handweeded, simazine, terbacil and terbuthylazine) two further cultivars (Dawson on Mahaleb and Bing on Mazzard) were included. Again there was no significant interaction between cultivars and herbicides and results were similar to those shown in Table 2.

An analysis of bud failures showed no differences between any herbicide treatments with untreated showing the most failures (Table 1). Oxyfluorfen and terbacil resulted in significantly less failures than untreated.

TABLE 2: First year tree growth following herbicide application over dormant buds of six cherry scion x rootstock combinations on August 4, 1987.

Treatment	Rate (kg ai/ha)	Trunk extension (m)	Trunk diameter (mm)
hand weeded		1.68	23
atrazine	3	1.73	25
linuron	2	1.72	24
oxyfluorfen	1	1.58	24
simazine	4	1.73	24
terbacil	1.5	1.88	25
terbuthylazine	4	1.93	24
LSD 5%		0.17	NS (2.4)

DISCUSSION

Over two years all tested combinations of cherry scions on rootstocks showed comparable tolerance to several herbicides. Since no significant interactions between cultivars and herbicides were shown it may be reasonable to expect other cherry cultivars to show similar herbicide tolerance.

A representative range of herbicides was used, especially in 1986, which suggests that cherries are tolerant to many herbicide groups. This work was conducted on a medium heavy soil and more caution may be needed on lighter soils. However, nectarines showed good tolerance to residual herbicides when tested on a light soil (Hartley 1987b; Mitchell 1987).

Weeds had a significant effect on cherry growth as has been found with apples (Hartley 1987a) and nectarines (Hartley 1987b). Both tree height and trunk diameter were halved by uncontrolled weeds. Although some check in cherry height extension may be desirable because of extreme natural vigour, a reduction in trunk diameter is not. Halving the trunk diameter reduces the trunk cross section volume to one quarter, resulting in a very weak tree frame.

The tolerance of the dormant cherry buds to direct contact of herbicides simplifies herbicide application. Because herbicides can be applied directly over dormant buds and stumps they should not be harmful through trunk contact in subsequent directed applications.

As cherries exhibited tolerance to most herbicides tested, the final choice would probably depend on the weed spectrum of the field and the cost of herbicide treatment.

ACKNOWLEDGEMENTS

I would like to thank Helen Dick for statistical analysis and John Burgmans for technical assistance.

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