WEED CONTROL IN PEACH SEEDLINGS

M.J. HARTLEY and D.L. LOADER

Hastings Horticultural Research Station, P.O. Box 85, Hastings

SUMMARY

In trials conducted over three years in Hawkes Bay Golden Queen peach seedlings (*Prunus persica*) showed good tolerance to trifluralin, oxadiazon and oxyfluorfen applied pre-planting and to oryzalin, chlorthal-dimethyl, clopyralid and nitrofen sprayed over the seedlings. Oxadiazon, oxyfluorfen, linuron, diuron, terbutryn, alachlor and methabenzthiazuron were also tolerated as directed sprays. Best weed control and peach seedling growth resulted from trifluralin (1.0 kg ai/ha) soil-incorporated before planting, followed by oxyfluorfen (1.0 kg ai/ha) or oxadiazon (2.0 kg ai/ha) surface applied before planting, or as a directed spray after planting.

INTRODUCTION

Weed control in established peach orchards presents little problem but there is a shortage of information on safe, effective herbicides for new plantings and seedlings, a stage when weed control is particularly important. Some work was done at Levin Horticultural Research Centre 1969-70 (T.I. Cox unpublished). Since then a number of new herbicides have become available.

This paper reports 3 years work on weed control in transplanted Golden Queen peach seedlings. Trials were conducted in Hawkes Bay at Pattullos Nursery on Hastings silt loam and at Hastings Horticultural Research Station (HHRS) on Hastings clay loam.

METHOD

Golden Queen peach stones were germinated in sand and transplanted in October, 20 cm apart in rows 1.2 m apart. All seedling roots were dipped in a suspension of *Agrobacterium radiobacter* (Dygal) for crown gall control. At Pattullos Nursery seedlings were also sprayed with beta pinene (Yates Wilt Proof) before lifting. Planting was by mechanical planter at Pattullos Nursery and by hand at HHRS.

Herbicides were applied by precision sprayer in 220 litres/ha at 230 kPa. Plots were single rows 2-4m long with at least 10 seedlings per plot. Trifluralin was incorporated by hand raking at Pattullos Nursery and by rotary hoe at HHRS. Other herbicides were applied either pre-planting (keeping subsequent soil disturbance to a minimum), post-planting directly over the seedlings or as a direct spray to the base of the seedlings.

In the 1982-83 pilot trials at Pattullos Nursery, irrigation was applied during spray application to wash the herbicide off the foliage.

In 1983-84 promising treatments (Table 1) were tested further in a four replicate incomplete block trial. Post-planting treatments were delayed to allow peach seedlings to gain height before treatment. Plants were not washed during treatment. A further screening trial was also conducted to test peach seedling tolerance to other herbicides, some of which might be of use against specific weeds and to examine further the effect of washing plants at the time of treatment. In 1984-85 the better treatments (Table 2) were tested in a split plot four replicate trial on a high weed density site at HHRS.

In all trials herbicides were applied to moist soil and irrigated within a few days if it was considered that insufficient rain had fallen to activate the herbicides. Herbicides used are shown in the tables.

In 1982/83 weeds were assessed visually during the season and left *in situ*. In subsequent years weeds were counted and removed monthly. Peach seedlings were assessed visually for vigour at intervals and measured for height and diameter at 5 cm above the ground.

Proc. 38th N.Z. Weed and Pest Control Conf.

TABLE 1: Weed numbers and peach seedling size 1983-84 trial Patullos Nursery.

Treatment‡ (kg ai/ha)	No. Weed/m ²		Peach seedling size (mm) 14/6/84	
	B'leaf	Grass	Height	Stem dia.
hand weeded	37.5	28.0	823	12.8
trifluralin (1.0) ppsi	11.8	1.3	914	14.2
trifluralin + methabenzthiazuron (1.5) pp	7.2	2.2	902	13.4
trifluralin + oxadiazon (2.0) OS	1.0	2.0	715*	11.5
trifluralin + oxyfluorfen (1.0) OS	0	0.8	617*	10.1*
trifluralin + chlorthal-dimethyl (10.0) OS	1.8	1.0	908	14.6
trifluralin + oxadiazon (2.0) dir	0.3	2.3	905	13.3
trifluralin + oxyfluorfen (1.0) dir	1.0	0.7	856	13.4
simazine (1.5) pp	13.7	3.0	846	12.5
simazine + oxadiazon (2.0) OS	0	8.0	804	12.7
simazine + oxyfluorfen (1.0) OS	0	9.8	739	10.1*
simazine + chlorthal-dimethyl (10.0) OS	2.0	9.0	801	12.1
simazine + oryzalin (4.0) OS	4.5	3.0	798	11.8
LSD 5%			97	1.9

‡ ppsi = pre-plant soil incorporated 1.11.83;

pp = pre-plant 1.11.83;

OS = sprayed over the seedlings 14.12.83;

dir = directed to base of seedlings 14.12.83

Peaches planted 2.11.83

* Effect significantly different from hand weeded at 5% level.

RESULTS

1982-83 Pilot Trial

Peach seedlings showed good tolerance to trifluralin (Treflan) (2.0 kg ai/ha), oryzalin (Surflan) (4.0 kg ai/ha), oxadiazon (Ronstar) (3.0 kg ai/ha), oxyfluorfen (Goal) (1.0 kg ai/ha) and simazine (Simazol 4A) (1.5 kg ai/ha) applied before planting. Oxadiazon and oxyfluorfen applied post-planting killed all growing tips but had little effect on final seedling growth. Metribuzin (Sencor) + methabenzthiazuron (Tribunil) gave good weed control and was tolerated by peach seedlings at 0.75 + 1.5 kg ai/ha but the double rate was damaging. Terbumeton + terbuthylazine (Caragard) and terbacil (Sinbar) were too damaging to peach seedling at rates adequate for weed control. Except for herbicides showing definite toxicity, peach seedling growth tended to be affected more by poor weed control than specific herbicides.

1983-84 Trial

Weed numbers and peach seedling height and stem diameter are shown in Table 2. Trifluralin gave good control of summer grass (*Digitaria sanguinalis*), worthwhile control of broad leaf weeds (mainly wild portulaca (*Portulaca oleracea*), black nightshade (*Solanum nigrum*) and some speedwell (*Veronica* sp) and fathen (*Chenopodium album* agg)) and resulted in good peach seedling growth. Simazine alone gave similar weed control, though weaker on grasses. However simazine produced initial yellowing of the peach seedlings and a general unthriftiness which persisted throughout the season. Most combination treatments gave good weed control but the low weed numbers made comparison between treatments unreliable. Application of oxadiazon and oxyfluorfen over the seedlings caused severe damage to peach seedlings. This affected subsequent growth, especially with oxyfluorfen but also with oxadiazon when pre-treated with trifluralin.

The screening trial indicated that peach seedlings would tolerate clopyralid (Versatill) (0.2 kg ai/ha) or nitrofen (Tok E-25) (4.0 kg ai/ha) applied over the seedlings. Linuron (Linuron 50) (2.0 kg ai/ha), diuron (Diuron 80) (2.0 kg ai/ha), nitrofen (8.0 kg ai/ha), terbutryn (Igran) (1.0 kg ai/ha), alachlor (Lasso) (4.0 kg ai/ha)

TABLE 2: Weed number and peach seedling size 1984-85 trial HHRS.

Treatment‡ (kg ai/ha)	No. Weed/m ²	Peach seedling size (mm)			
		Height		Stem diameter	
		Jan	March	Jan	March
hand weeded trifluralin	742	624	974	7.8	14.6
(1.0) alone ppsi	337*	681	1009	9.8*	16.7*
LSD 5%		67	70	1.1	1.6
Main effects					
no second treatment	540	653	992	8.8	15.6
oxadiazon (2.0) pp	20	726*	1082*	10.5*	18.0*
oxadiazon (2.0) OS	31	609	987	8.5	16.2
oxadiazon (2.0) dir	70	661	1026	9.1	17.0*
oxyfluorfen (1.0) pp	14	674	1041*	9.7*	17.7*
oxyfluorfen (1.0) OS	4	551*	948	7.9*	15.6
oxyfluorfen (1.0) dir	5	636	1004	9.3	17.0*
chlorthal-dimethyl (10.0) OS†	161	635	1007	8.9	17.2*
oryzalin (4.0) OS‡	36	673	1032	8.8	16.1
LSD 5%	#	47	49	0.8	1.2
Main effect					
no trifluralin	137	644	1011	8.8	16.7
trifluralin	59*	649	1016	9.3	16.7
LSD 5%		109	74	1.8	0.9

‡ ppsi = pre-plant soil incorporated 28.9.84;

pp = pre-plant 1.10.84;

OS = sprayed over the seedlings 16.11.84;

dir = directed to base of seedlings 30.11.84

Peaches planted 2-15.10.84 (those of oxadiazon and oxyfluorfen OS planted 15.11.84)

† Retreated 10.1.85

* Effect significantly different from corresponding "no herbicide" at 5% level.

Analysed on log transformed data oxyfluorfen significantly better than oxadiazon which equal to oryzalin and better than chlorthal-dimethyl for weed control.

and methabenzthiazuron (3.0 kg ai/ha) were tolerated as directed sprays or pre-plant applications. Washing immediately after oxyfluorfen application did not prevent damage to the peach seedlings. This was found also with oxadiazon in another auxiliary trial.

1984-85 Trial

Weed numbers and seedlings height and stem diameter are shown in Table 2. Dominant weeds were redroot (*Amaranthus powellii*), black nightshade, speedwell, prostrate amaranthus (*A. deflexus*) and white clover (*Trifolium repens*). Trifluralin alone gave useful control of all weeds except black nightshade and white clover. Oxyfluorfen was so effective alone that the addition of trifluralin made little difference whereas oxadiazon required the addition of trifluralin for the control of speedwell. Chlorthal-dimethyl (Dacthal) and oryzalin did not give adequate weed control so applications were repeated after the January weed removal. The two applications of oryzalin alone, gave reasonable weed control but chlorthal-dimethyl needed trifluralin for redroot control. It also failed on white clover.

Oxadiazon, pre-planting, gave the best peach seedling growth. Both oxadiazon and oxyfluorfen applied over the seedlings the day after planting caused initial growth check and tip kill but no significant growth reduction by March. Relative to monthly hand weeding, final height and diameter were increased by oxadiazon and oxyfluorfen applied pre-planting. Diameter was also increased by the same treatments as directed sprays, by two applications of chlorthal-dimethyl and by trifluralin.

None of the treatments had any noticeable effect on the ease with which the bark would lift at budding in March.

DISCUSSION

Peach seedling growth was severely affected by uncontrolled weeds. Trifluralin was well tolerated by peach seedlings and gave good control of summer grass, redroot, wild portulaca, speedwell and fathen. Though not affecting the number of black nightshade plants it did weaken their root systems, thus rendering them less competitive and easier to remove mechanically (P.R. Pattullo pers comm). This makes it a cheap and useful base treatment. Though simazine-treated seedlings were not significantly smaller at the end of the season, their less healthy appearance precludes a recommendation of this treatment.

Both oxadiazon and oxyfluorfen applied before hand and machine planting gave good weed control. Both herbicides are reported to give weed control by killing seedlings as they emerge through an undisturbed herbicide layer on the soil surface, in the presence of light (Manufacturing Companies promotional literature) and therefore reduced activity might be expected from pre-plant application. The technique was tested because the mechanical planter did not appear to cause much soil disturbance. However the technique was also successful with careful hand planting so disturbance of the soil shortly after herbicide application may not seriously affect weed control. Both oxadiazon and oxyfluorfen applied over the peach seedlings killed the growing points and immediate washing did not reduce the damage significantly. Applied the day after planting, the tip kill caused only a temporary check as a lateral bud soon replaced the leader. When application of these herbicides was delayed, to allow seedlings to gain more height (1983-84 trial), the damage was very severe affecting half to three quarters of the seedling length. Simazine treated plants that were under stress when treated were damaged less by oxadiazon and oxyfluorfen than trifluralin treated plants that were growing well. It appears the seedlings can "tolerate" such treatment when in post-planting shock or under stress but not when actively growing. As directed basal sprays, neither herbicide was detrimental, regardless of time from planting.

Chlorthal-dimethyl and oryzalin were both "safe" on peach seedlings but not as reliable as oxadiazon or oxyfluorfen for weed control.

The most promising candidate from the second screening trial was clopyralid as this herbicide has activity on weed in the composite and legume families.

Oxadiazon and oxyfluorfen produced peach seedling growth well in excess of hand weeding. Either peach seedlings (20-30 cm high) were very sensitive to a few weeks weed growth or these herbicides actually stimulated seedling growth as suggested by Arnold and Aldrich (1980) for oxadiazon. The way seedlings recovered from overhead treatment with oxadiazon and oxyfluorfen suggests the latter possibility.

ACKNOWLEDGEMENTS

We would like to thank Peter Pattullo for allowing us to work on his nursery and Dr Rob Pringle for advice on statistical analysis.

REFERENCES

Arnold, C.E., and Aldrich J.H., 1980. Herbicidal effects on peach seedling growth and weed control. *Hort. Sci.* 15. 293-294.