

## PERSISTENCE OF SOME SOIL-APPLIED HERBICIDES FOR KIWIFRUIT

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### SUMMARY

The effective lives in the absence of crop of eight residual herbicide treatments were compared on two soil types. Periods of usefulness were 9-14 weeks on a Horotiu sandy loam and 8 to >25 weeks on a Patumahoe clay loam soil.

### INTRODUCTION

With the rapid expansion of kiwifruit (*Actinidia chinensis*) plantings in New Zealand there is a need to identify not only the safety of residual herbicides but also their weed control efficacy and period of effectiveness. Cox (1980) and Wilson (1980, 1982) have tested a range of potentially suitable herbicides for the crop. Trials reported by Wilson (1982) showed that it is desirable to separate crop tolerance studies from herbicide performance evaluations.

Eight herbicides were selected and applied to bare soil in the absence of kiwifruit to determine their persistence on Patumahoe clay loam at Pukekohe and Horotiu sandy loam at Hamilton.

### MATERIALS AND METHODS

Details of soil composition and rainfall relevant to the two trial sites are presented in Table 1. The herbicides, see Table 2, were tested at two or three rates and applied on 14.10.82 to newly cultivated soil. Doses were generally based on label recommendations and twice these rates. For napropamide (Devrinol 50% WP) and the terbuthylazine/terbumeton mixture (Caragard 50% SN) a half rate was also assessed. Treatments were applied in 350 or 400 litres/ha at 200 kPa in a randomised block design of four replications (Trial 1) or three replications (Trial 2). The plots varied from 5-6.5 m in length and 1.5-2 m in width.

**TABLE 1: Details of Trial sites**

Trial No.	Location	Soil type	% Sand	% Clay	% organic carbon	pH	Rainfall (mm) after spraying		
							4 wks	8 wks	16 wks
1	Pukekohe	Patumahoe clay loam	7	66	2.3	6.6	124	147	207
2	Hamilton	Horotiu sandy loam	55	17	9.5	5.1	92	144	278

The persistence of the herbicides was determined by recording the number of weeks for treatments to attain 50% weed cover. At that time the main weed species present in each treatment were noted. Assessment covered a period of 25 weeks and the trials were terminated in early April, 1983.

### RESULTS AND DISCUSSION

The period of persistence of herbicides on both sites is shown in Table 2. On Patumahoe clay loam the range was 8 to >25 weeks while on Horotiu sandy loam it was 9-14 weeks. On the clay loam five treatments persisted 25 weeks or more, while only two treatments lasted for more than 11 weeks on the sandy loam.

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**TABLE 2: Period of herbicide persistence (weeks to 50% weed cover) and main weed species.**

Treatment (Rate (kg/ha))	No. of weeks to 50% cover		Main weeds* at 50% cover	
	Trial 1	Trial 2	Trial 1	Trial 2
alachlor (2.0)	9	10	POav SOni CHal POpe	POpe PAdi COdi SOni
alachlor (4.0)	10	13	POav CHal SOni	PAdi
diuron (2.0)	13	9	ECcr PAdi POpe	PAdi PLLa POpe
diuron (4.0)	>25	9	—	PAdi
napropamide + simazine (2.0 + 1.0)	25	10	ECcr PAdi SOni	PAdi POcl AMpo POpe
napropamide + simazine (4.0 + 1.0)	>25	11	—	PAdi AMpo SOni
napropamide + simazine (8.0 + 1.0)	>25	14	—	AMpo SOni POol POpe
oryzalin (2.0)	8	9	SOni POav ECcr PAdi	PAdi COdi AMpo SOni
oryzalin (4.0)	10	11	SOni	PAdi AMpo POpe POol
oxyfluorfen (0.75)	12	9	ECcr PAdi SOni	PAdi
oxyfluorfen (1.5)	19	10	ECcr PAdi	PAdi
oxadiazon (1.5)	9	9	SOni ECcr PAdi POav	PAdi
oxadiazon (3.0)	11	11	SOni ECcr PAdi POav	PAdi
simazine (2.0)	13	9	ECcr PAdi	PAdi
simazine (4.0)	23	10	ECcr PAdi	PAdi
terbuthylazine/terbumeton (2.0)	19	—	ECcr PAdi	—
terbuthylazine/terbumeton (4.0)	>25	9	—	PAdi
terbuthylazine/terbumeton (8.0)	>25	10	—	PAdi
untreated	4	5	POav SOni ECcr PAdi AMpo CHal POpe	COdi SOni AMpo PAdi PLLa

\*key to weeds AMpo = redroot, CHal = fathen, COdi = twincrest, ECcr = barnyard grass, PAdi = smooth witchgrass, PLLa = narrow-leaved plantain, POav = wireweed, POol = portulaca (*Portulaca oleracea*), POpe = willow weed, SOni = black nightshade.

In the untreated controls of Trial 1 a rapid flush of seedling weeds (3450/m<sup>2</sup>) occurred within 4 weeks. The main weed species on this site and their populations were black nightshade (*Solanum nigrum*) 2100/m<sup>2</sup>, wireweed (*Polygonum aviculare*) 490/m<sup>2</sup>, barnyard grass (*Echinochloa crus-galli*) 226/m<sup>2</sup> and smooth witchgrass (*Panicum dichotomiflorum*) 198/m<sup>2</sup>.

In Trial 2 there was a slightly lower initial population at 4 weeks which was mainly twincrest (*Coronopus didymus*), black nightshade, redroot (*Amaranthus powelli*), smooth witchgrass and narrow-leaved plantain (*Plantago lanceolata*). Subsequently rapid weed growth took place and smooth witchgrass became the major problem weed species throughout the trial site about 2 months after herbicide application.

In Trial 1 the mixtures of napropamide + simazine (Simazol 5A 50% SN) 4 + 1 kg ai/ha or terbuthylazine/terbumeton 4 kg ai/ha performed equally well and provided good weed control for 6 months. When recording ceased, both treatments had a mean weed cover rating of 29% comprising mainly black nightshade and redroot in the napropamide + simazine plots, and grasses in the terbuthylazine/terbumeton plots. The low rate of napropamide + simazine gave effective control for 25 weeks. Diuron (Karmex 80% WP) at the high rate of 4 kg ai/ha also kept the weed population to under 50% cover for over 25 weeks in Trial 1. This chemical, however was not as effective in Trial 2, mainly due to the presence of narrow-leaved plantain and smooth witchgrass.

In Trial 2 the napropamide + simazine mixture at 8 + kg ai/ha gave the longest control (14 weeks) followed by alachlor (Lasso 50% EC) at 4 kg ai/ha (13 weeks). All

other treatments on this site were similar (9-11 weeks) and at 50% weed cover smooth witchgrass was the only weed species recorded (Table 2) in plots treated with oxyfluorfen (Goal 23.5% EC), oxadiazon (Ronstar 25% EC), simazine, and terbuthylazine/terbutometon.

The shorter period of effectiveness with oryzalin (Surflan 75% WP) in Trial 1 was due to inadequate control of the high population of black nightshade, and it is considered that the combination with simazine, as with napropamide, would give better results. The alachlor 2 kg ai/ha plots contained mainly wireweed, willow weed (*Polygonum persicaria*) and fathen (*Chenopodium album*). At 50% weed cover, the problem weeds in the oxadiazon treatments of Trial 1 were barnyard grass, smooth witch grass, black nightshade and wireweed (Table 2). The herbicides which gave a medium period of effectiveness (oxyfluorfen, simazine and diuron) contained mainly grasses at 50% weed cover.

The generally shorter period of control on Horotiu sandy loam could be attributed primarily to the higher organic carbon level, higher sand content and the rapid invasion of smooth witchgrass. These results bring out the differences in persistence of herbicides due to location and the weed spectrum. It can be seen that while several herbicides have potential for long term weed control in kiwifruit, the choice of chemical must be made carefully taking location, soil type and weed spectrum into account.

#### REFERENCES

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