TOLERANCE OF KIWIFRUIT SEEDLINGS AND ROOTED CUTTINGS TO RESIDUAL HERBICIDES

B.B. FISCHER*, T.I. COX, R.M. KERR

Horticultural Research Centre, MAF, Levin

Investigations of kiwifruit (*Actinidia deliciosa*) tolerance to residual herbicides have been conducted by Fischer and Browne (1977) in California, and Cox (1980) and Wilson (1980) in New Zealand. Further studies reported here evaluated the relative tolerance of kiwifruit cv. "Hayward" seedlings (Experiment 1) and rooted cuttings (Experiment 2) to a number of previously untested residual herbicides.

Experiment 1

When their first true leaves were 2 to 3 mm long, kiwifruit seedlings were transplanted into 5 cm diameter pots containing 50% Levin silt loam soil and 50% river sand. On 31 January 1986, when the seedlings had at least two fully developed true leaves, herbicides were applied as a soil drench in 30 ml of water per pot. The treatments were replicated four times in a randomised block design. The herbicides used and their rates of application are given in Table 1. The first evidence of phytotoxicity was observed on 9 February and evaluations of symptoms and vigour were made during the following weeks.

Experiment 2

Rooted cuttings were transplanted from 5 cm diameter pots to 12.5 cm pots on 19 November 1985 in a glasshouse. The roots and tops of the plants were severely pruned before planting in a soil mix consisting of 5% Levin silt loam soil and 95% washed river sand which resulted in an organic matter content of 0.5%. On 12 December 1985 when the new growth was 6 to 7.5 cm long the following herbicides were applied:—fluorochloridone, isoxaben, terbutryn, terbuthylazine and oxyfluorfen (Goal 23.5 EC). Rates of each were 1.1, 2.2, 4.4 and 8.9 kg ai/ha., applied as a soil drench in 115 ml water per pot. The first symptoms of herbicidal activity in some treatments were noted on 1 January 1986. Evaluations of damage symptoms and growth vigour were made on eight occasions until 15 March when two replicates of plants were cut and weighed and their roots washed, dried and weighed.

TABLE 1: Effect of soil-applied herbicides on kiwifruit seedlings.

Herbicide	Rate (kg ai/ha)	Injury				Vigour 24 Mar
		9 Feb	12 Feb	8 Mar	24 Mar	
fluorochloridone	0.55	1.5	3.2	3.7	4.0	1.8
(Racer 24EC)	1.1	1.5	3.0	4.5	5.7	3.0
isoxaben	0.55	0.5	1.5	3.5	4.2	5.5
(EL-107 75SC)	1.1	1.5	3.0	10.0	10.0	10.0
terbutryn	0.55	0.2	0.2	0	1.7	0.3
(Igran 50SC)	1.1	0.5	2.5	2.7	3.0	0.8
terbuthylazine	0.55	0	0	0.2	0.7	0
(Gardoprim 80WP)	1.1	0	2.5	7.5	8.2	7.5
pendimethalin	2.2	0.5	1.0	1.7	2.5	1.0
(Stomp 33EC)	4.4	0.5	0.7	0.5	3.7	4.0
metolachlor	2.2	0.2	0	0.5	0	0
(Dual 72EC)	4.4	0	0.7	0	1.2	0.3
untreated	—	0	0	0	0	0.3

Injury and vigour ratings scale: 0 = no effect, 10 = dead plants.

*Farm Adviser, University of California Co-operative Extension, on sabbatical leave.
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Kiwifruit seedlings exhibited good tolerance to metolachlor, and terbutryn (Table 1). Pendimethalin and fluorchloridone caused some damage, especially at the higher rates. Terbuthylazine had no effect at the low rate but was severely damaging at 1.1 kg ai/ha. Isoxaben severely reduced vigour at 0.55 kg ai/ha and killed the seedlings at the higher rate.

Fig. 1: Effect of soil-applied herbicides on kiwifruit rooted cuttings.

Rooted cuttings exhibited most tolerance to oxyfluorfen and least tolerance to isoxaben (Figure 1). Terbutryn and terbuthylazine each caused symptoms of veinal chlorosis. However, even at the high rate of 8.9 kg ai/ha only slight necrosis was evident on the leaves. Fluorchloridone caused veinal chlorosis, bleaching and purple discoloration of the petioles. At 4.4 and 8.9 kg ai/ha the interveinal areas became severely chlorotic and bleached white. The petioles became pink but necrosis was

minimal. Isoxaben did not cause chlorotic symptoms. At 1.1 and 2.2 kg ai/ha vigour was significantly reduced. At higher rates the plants became defoliated and died. Oxyfluorfen caused no damage apart from some reduction in vigour at 4.4 and 8.9 kg ai/ha. When the roots were washed, numerous dark brown, dead roots were apparent and the dried roots weighed 11 to 20% less than the roots of untreated plants.

With the exception of isoxaben, the soil-persistent herbicides evaluated on kiwifruit seedlings and rooted cuttings warrant evaluation in field trials. The safety of fluorochloridone is somewhat uncertain, but because of its effectiveness in controlling nut grass (*Cyperus spp.*) it should be further evaluated. Oxyfluorfen, as in an earlier study (Fischer and Browne, 1977), was tolerated by kiwifruit.

The soil persistence, relatively low cost and effectiveness of triazine herbicides in controlling a wide spectrum of weeds makes their use economical. In contrast to the situation in New Zealand, no triazine herbicide is yet registered in the U.S. for use in kiwifruit orchards.

Pendimethalin retarded kiwifruit seedling growth. However, it warrants further evaluation under field conditions, where its leaching into the root zone would be reduced by soil adsorption. Metolachlor may be useful because of its ability to control *Cyperus* and *Solanum spp.*

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