CARROT RUST-FLY CONTROL AT PUKEKOHE

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Summary

Commercially available chemicals were tested in a January sown carrot trial for control of carrot rust-fly (*Psila rosae*). Outstanding control under severe rust-fly infestation was obtained with both fensulfothion and disulfoton at 2.2 kg/ha applied as granules banded before carrot sowing. Untreated control plots had 88% of roots badly infested. Aldrin as a pre-sowing treatment and aldrin followed by dieldrin sprays failed to provide protection with 77% and 84% infestation respectively. Diazinon as a pre-sowing granule application followed by three foliar sprays of diazinon also gave poor control.

INTRODUCTION

Over a period of 10 years from 1960 dieldrin and aldrin became the commonly accepted control chemicals for carrot rust-fly (*Psila rosae*) in the Pukekohe district. In 1971 several reports were received from commercial growers of inadequate rust-fly control with dieldrin. At the Pukekohe Horticultural Research Station an overall pre-emergence spray of dieldrin to the soil in a 1971 nutrition trial also failed to control rust-fly attack.

The trial reported here compared the efficiency of rust-fly control in the field using chemicals readily available to the commercial grower. It appeared likely that carrot rust-fly had developed resistance to dieldrin and a high rate was tested. Diazinon was also included in the trials, following the work of Tate (1970 a).

EXPERIMENTAL METHODS

Treatments are shown in Table 1; fensulfothion, disulfoton, aldrin and diazinon were all applied as granules at 2.2 kg/ha in narrow bands, below and prior to sowing the carrot seed. Diazinon granule application was followed by three early season sprays as recommended by the Ministry of Agriculture and Fisheries. The older recommendation of seed dusting was also tested using lindane at 1% of the bare seed weight. This initial dusting was followed by three early season diazinon sprays.

In an attempt to establish whether carrot rust-fly had developed resistance to dieldrin a pre-sowing granule application of aldrin at 2.2 kg/ha was followed by three dieldrin sprays each at 0.5 kg/ha. Trichloronat sprayed on the surface and soil incorporated was included in the comparison as a possible alternative for commercial use where equipment is not available for banding granules.

A gang of five Planet Junior seeders was calibrated for accurate placement of the granules below the seeded rows. Pelleted carrot seed, cultivar "Touchon", was sown on 22 January 1973 two days after the granule placement.

Each plot, 5.2 x 1.5 m contained five double rows of carrots sown with a Stanhay precision seeder. Treatments with post-emergence foliar

sprays were commenced six weeks after sowing when the young carrots were 5 to 6 cm high and the two repeat sprays made at 14 day intervals.

Yield recordings from the inner three rows of each plot were made at early crop maturity in late May. Between 330 and 380 roots were harvested per plot, washed to record rust-fly infestation and total root yield. Weight of the foliage from the carrots was recorded separately.

RESULTS

Table 1 clearly shows the high level of control obtained with both fensulfothion and disulfoton compared with all other treatments. Results for these two materials were therefore not analysed. Control in all other treatments was considered inadequate. In the untreated control plots over 60 percent of carrot roots had more than two visible areas of rust-fly tunnelling damage. Many of the roots were very severely attacked however as 40 percent had rust-fly damage which discoloured over half of the root surface (Fig. 1).

Fig. 1: Carrot samples at top from fensulfothion treatment. Untreated control at bottom showing root distortion and rust-fly damage.

An assessment after the carrots were well established in late March showed that no chemical treatment caused any stand reduction. Two months after sowing obvious differences became apparent in the foliage growth of treatments. Control plots had a high percentage of stunted or sickly plants, whereas growth in the fensulfothion and disulfoton plots looked healthy and vigorous. At this early stage carrots sampled from the guard areas showed rust-fly larvae mining in the roots mostly at a depth of 8 to 10 cm.

Early damage caused by rust-fly larvae reduced yields of both foliage and roots (Table 1). Fensulfothion and disulfoton treatments resulted in significantly higher foliage and root weights than in all other treatments. There was no evidence of nematode damage in the crop at harvest time.

Insect Pests

DISCUSSION

Failure to control carrot rust-fly with aldrin and dieldrin suggests local resistance to these chemicals, though further trials would be required to confirm this. Effective alternative chemicals in this district include fensulfothion and disulfoton both applied as granules banded beneath the seed along the rows at a rate of 2.2 kg/ha.

The unsatisfactory control obtained with diazinon in the current trial confirms previous work at Levin (Tate 1970 a). The Levin trials showed that diazinon granule application performed well when soil temperatures remained predominantly below 16°C (autumn, winter or spring sowings) but was not satisfactory in a summer sown crop. Under these conditions disulfoton and phorate were more effective than diazinon (Tate 1970 b), with fensulfothion also giving good results. The Pukekohe carrots emerged and grew under warm soil temperatures (means for February, March, April 1973 at 20 cm depth were 19.7, 18.6 and 15.2°C) in a dry season requiring regular irrigation. These conditions would have favoured rapid loss of diazinon activity.

Foliage spraying with diazinon is of questionable value since the three sprays following lindane or diazinon treatment at sowing time did not provide protection. This may have been because timing of the sprays did not coincide with the major flight periods of the rust-fly. Supplementary sprays were not warranted in the case of fensulfothion or disulfoton in this trial.

TABLE 1. EFFECTS OF INSECTICIDE TREATMENTS ON CARROT RUST-FLY INFESTATION AND CROP YIELDS

<i>Treatments kg/ha</i>	<i>Percentages Infested Roots</i>	<i>Foliage kg/ha</i>	<i>Total Root Yield kg/ha</i>
fensulfothion 2.2 (granules)	0.6	13.1 aA	59.4 aA
disulfoton 2.2 "	1.4	12.7 aA	59.2 aA
aldrin 2.2 "	77.3 bcAB	8.7 cC	39.7 cdDE
aldrin 2.2 "	84.5 abA	9.8 bcBC	41.7 cCD
+ 3 dieldrin sprays			
diazinon 2.2 "	72.2 cdBC	9.8 bcBC	45.6 bBC
+ 3 diazinon sprays			
lindane (seed dusting)	68.3 deBC	10.5 bB	47.5 bB
+ 3 diazinon sprays			
trichloronat 2.2 (pre-sowing incorp.)	61.2 eC	1.4 bB	46.1 bBC
untreated control	87.0 aA	8.7 cC	36.7 dE
cv%	9.4	8.7	6.0

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