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Screening of Pesticides for side-effects on leafminer parasites

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SCREENING OF PESTICIDES FOR SIDE-EFFECTS ON LEAFMINER PARASITES Dacnusa sibirica AND Diglyphus isaea.

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Introduction

Integrated pest management (IPM) programmes are becoming more widely used in protected horticulture. *Dacnusa sibirica* and *Diglyphus isaea* are important leafminer parasites on a range of edible and ornamental crops. Adult flies were exposed to pesticide residue and mortality assessed with time. Twenty six pesticides (9 insecticides, 11 fungicides and 6 acaricides) were evaluated against both parasites.

Methods

Adult parasites were supplied throughout the trial by Koppert UK as "Minusa" (*Dacnusa sibirica*) and "Miglyphus" (*Diglyphus isaea*) in polythene bottles each containing 250 flies. A source of food was provided in the lid of each bottle in the form of a felt pad soaked in honey:water solution. Adults delivered thus were comparable to those supplied to growers and could survive for over 1 week in the container.

The insects were anaesthetized with CO_2 and collected by aspirator into 7 ml plastic bijou bottles (15-20 per bottle) the lids of which were covered with a fine mesh. Leaf discs (22 mm Dia.) were cut from pesticide-free chrysanthemum plants and placed abaxial surface uppermost on wet filter paper. These were then sprayed with 0.2 ml of 50:50 honey:water solution per replicate, through a Potter tower (3).

Pesticides were prepared at 10 X the manufacturers highest concentration and diluted to 1 X and 1/10 X in tap water. Pesticide (2 ml) was applied to the leaf discs for each replicate through a Potter tower. This is equivalent to 6.38 mg fluid per leaf disc (2.9 mg fluid cm^{-2}). Controls were similarly sprayed with tap water. Treated leaf discs were left to dry at 20 °C for 30 minutes before the test cages (2) were assembled. The insects were once again anaesthetized with CO_2 by gassing through the meshed lid of the bijou bottle before release into the test cage. An assessment of initial handling mortality was taken some 30 minutes later, further mortality was assessed at 24 and 48 h after caging the parasites. Control mortalities were consistently between 0 - 6% and accounted for by the use of Abbott's correction formula (1).

Results

The results are given in Table 1 and are expressed as one of four categories; 1 (Safe) = <30% mortality, 2 (Slightly harmful) = 30 - 79% mortality, 3 (Moderately harmful) = 80 - 99% mortality and 4 (Harmful) = >99% mortality. They are taken from the mean of the 4 replicates at 1 X pesticide concentration at 48 h after caging. The categories correspond with those of the International Organisation for Biological Control working group 'Pesticides and Beneficial Organisms' initial laboratory screening tests.

Discussion

Most of the fungicides with the exception of pyrazophos were safe to both species, similarly with the acaricides (except avermectin). The insecticides diflubenzuron, teflubenzuron and *B. thuringiensis* were all safe, others caused some mortality.

Table 1. Side-effects of pesticides on *Diglyphus isaea* and *Dacnusa sibirica*.

Pesticide	Trade name	Manufacturer	Rate of use mg a.i./l (@ 1x conc^{n})	*D. isaea*	*D. sibirica*
INSECTICIDES					
Bacillus thuringiensis	Thuricide* 16,000 IUP/mg	Sandoz	1.6×10^{7} IUP/l	1	1
diazinon	Diazinon 16% e.c.	DowElanco	160	4	4
diflubenzuron	Dimilin 25% w.p.	ICI	125	1	1
heptenophos	Hostaquick 55% e.c.	Hoechst	412.5	4	3
nicotine	XL-All Insecticide 7% e.c.	Synchemicals	1120	4	2
pirimicarb	Pirimor 50% w.p.	ICI	250	1	3
pyrethrins + resmethrin	Pynosect 30% e.c.	Mitchell Cotts	91+588	3	4
teflubenzuron	Nemolt 15% s.c.	Fargro	75	1	1
trichlorphon	Dipterex 80% w.p.	Bayer	1200	4	3
FUNGICIDES					
benomyl	Benlate 50% w.p.	Du Pont	500	1	1
bupirimate	Nimrod 25% e.c.	ICI	312.5	2	1
chlorothalonil	Repulse 50% s.c.	ICI	1100	1	1
dichlofluanid	Elvaron 50% w.p.	Bayer	500	1	2
fenarimol	Rubigan 12% s.c.	DowElanco	216	1	1
imazalil	Fungaflor 20% e.c.	Hortichem	100	1	1
propamocarb hydrochloride	Filex 72.2% e.c.	Fisons	1083	1	1
propiconazole	Tilt 25% e.c.	Ciba-Geigy	100	1	1
pyrazophos	Afugan 30% e.c.	Hoechst	150	3	4
sulphur	Thiovit 80% m.g.	PBI	1600	2	1
triforine	Saprol 19% e.c.	Promark	237.5	1	1
ACARICIDES					
avermectin	Dynamec 1.8% e.c.	MSD Agvet	4.5	3	2
dienochlor	Pentac 48% e.c.	DowElanco	312	1	1
fenbutatin oxide	Torque 50% w.p.	ICI	250	1	1
petroleum oil	Spraying oil 71% e.c.	Hortichem	7100	1	1
quinomethionate	Moristan 25% w.p.	Hortichem	125	1	1
tetradifon	Tedion 8% e.c.	Hortichem	120	1	1

* 16,000 International Units of Potency per mg of product as determined against *Trichoplusia ni*

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