

# Lettuce aphid (*Nasonovia ribisnigri*) resistance to insecticides

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## Introduction

Since the lettuce aphid was detected in New Zealand in March 2002, a number of lettuce growers have reported that the insecticides they were using were not controlling this new lettuce aphid in their lettuce crops. In Europe the lettuce aphid is known to have different levels of resistance to some insecticides. Vegfed therefore commissioned Crop & Food Research to test a number of insecticides in the laboratory to see what insecticides were effective on the strain of lettuce aphid that arrived in New Zealand.

## Method

Lettuce aphids were collected from outdoor lettuces in Canterbury and reared in a Crop & Food Research laboratory on spray-free lettuces. Sections of unsprayed Iceberg lettuce leaves were embedded in 1% agar in small Petri dishes. This prevented the aphids from crawling under the leaf. Five large lettuce aphids were added to each Petri dish and 10 replicates were used for each insecticide.

Thirteen insecticides were tested and the rates were calculated assuming application volumes of 500 litres/ha at recommended rates. Each Petri dish was placed, one at a time, under a Potter tower, where they were sprayed with 2 ml of formulated insecticide at 69 kPa. The Potter tower is a piece of laboratory equipment used worldwide that applies precise amounts of insecticides to plant material and insects. The Petri dishes were then placed in a temperature chamber at 18°C and the numbers of live and dead aphids were assessed after 24-48 hours. The chemicals used and the results obtained are presented in the table below.

Chemical group	Common name	Application rate	Rate/ litre	% Kill	
				24hr	48hr
Carbamate (Rx)	Pirimor*	250 g/ha	0.5 g	100	100
	Lannate*	2 litre/ha	4 ml	81.4	90.7
Organo-phosphate (Rx)	Diazinon 800*	1 litre/ha	2 ml	100	100
	Orthene*	800 g/ha	1.6 g	59.5	80.6
	Nuvos	800 ml/ha	1.6 ml	96	100
	Perfekthion	800 ml/ha	1.6 ml	100	100
Synthetic pyrethroid (Rx)	Karate Zeon	36 ml/ha	0.072 ml	100	100
	Decis	300 ml/ha	0.6 ml	100	100
	Ripcord	125 ml/ha	0.25 ml	100	100
	Fastac	200 ml/ha	0.4 ml	100	100
Organo-chloride	Thiodan	200 ml/100 litre	2 ml	100	100
Chloro-nicotinyl	Confidor	300 ml/ha	0.6 ml		100
Pyridine azomethrine	Chess	200 g/ha	0.4 g	6.4	27.3

(Rx) Known resistance or partial resistance to the lettuce aphid overseas.

\* Registered for lettuce in New Zealand.

## Conclusions

- Of the four registered insecticides for lettuce, two, Lannate and Orthene, did not kill 100% of the aphids after 48 hours. More dose response tests are needed for these two insecticides to see at what rate control failure occurs. At this point in time these two insecticides should be used sparingly, as overuse could help the lettuce aphid to build up resistance to the point where control failures in the field may occur.
- Chess did not kill many aphids. This was expected as it normally takes up to 5-7 days for the aphids to die, as the mode of action of Chess is to block the stylet, which means the aphid starves to death. In a previous test, we had 100% mortality after 5 days, but as the control had over 10% death, the Chess results were not used.
- All the other insecticides tested gave 100% control of the lettuce aphid as seen in the table above.
- All the insecticides in this test were applied directly to the aphids. In the field this is not always the case, as most of the aphids live in the centre of the lettuce and are protected from spray by the outer leaves.
- Water was used as a control for natural mortality. There was 4.2% mortality in the water after 48 hours, which is considered acceptable in this type of test.
- **The choice of insecticide used, its mode of action and the growth stage of the lettuce plant must all be taken into consideration if total control of this aphid is to be achieved.**