Residue, Efficacy and Crop Safety Data for Pesticide Minor-use Permit Applications in Vegetable Crops 2011

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VG11026 (19 June 2013)

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The purpose of the project was to generate pesticide residue, efficacy and crop safety data in vegetable crops to support minor-use permit applications to the Australian Pesticides and Veterinary Medicines Authority (APVMA).

"This project has been funded by HAL using the vegetable industry levy and matched funds from the Australian Government."

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Table of Contents

Media Summary

In Australia, before an agrochemical product can be sold or used, it first must be registered by the Australian Pesticides and Veterinary Medicines Authority (APVMA). In order for a manufacturer to register a product they are required to submit a comprehensive data package to the APVMA. The costs for generating and collating such data are high and unfortunately many crops are too small for agrochemical manufacturers to bear the high cost of registering products for use in those crops. As a result, vegetable growers are often placed in situations where they risk severe crop losses from insects, weeds and diseases because appropriate pesticides are not available. On the other hand, they risk buyers rejecting their produce and other penalties if they are detected using products that are not registered for that specific use.

The APVMA's National Permit System adds some flexibility to the lengthy registration process and legalises the availability of products for minor-use purposes, not specified on the product label. However, off-label permits issued by the APVMA still must be applied for along with information/data that verifies that the permitted use will be effective and will not have any harmful effects on humans, the crops or the environment. This project is of national importance because it goes some way towards addressing the above issues.

A total of 32 residue trials, 4 crop safety trial and 2 efficacy trials were conducted in specified regions throughout Australia to support minor-use permits applications for a range of pesticides on a variety of vegetable crops to improve the agro-chemical choices available for growers. These permits include:

• buprofezin in celery, cucumber, zucchini and eggplant (field & protected cropping);
• bifenazate and petroleum oil in lettuce (protected cropping);
• fenhexamid in snow peas and sugar snap peas;
• fludioxonil in broccoli;
• imidacloprid in rhubarb;
• iprodione in celeriac, chillies, paprika and carrots;
• mancozeb in shallots, leeks and Asian fruiting vegetables;
• methomyl in radish, swede and turnips;
• pendimethalin in brassica leafy vegetables and
• trifluralin in parsnips.

The field and analytical phases for these studies were completed during 2012-13. Data summaries have been submitted to the Australian Pesticides and Veterinary Medicines Authority (APVMA) with the relevant applications for permits or permit renewals. The major outcome of this project is that if the permit applications are approved, additional pesticide will be available for use by growers of these minor use vegetable crops. Although the outcomes of this project have been met there is an ongoing need for growers to continue to have access to newer and better pesticides in minor use vegetable crops and so similar projects should be planned and conducted in the future.

Technical Summary

This project generated pesticide residue, efficacy and crop safety data in a range of vegetable crops to support minor-use permit applications to the Australian Pesticides and Veterinary Medicines Authority (APVMA). All the pesticides used in the project are currently registered in Australia. The majority of the studies were for renewal of current or expired APVMA minor use permits. The formulations of the pesticides used in the studies are listed in table 1. A total of 32 residue trials, 4 crop safety trial and 2 efficacy trials were conducted in specified regions throughout Australia, sites were chosen according to where each crop is commonly grown. A summary of the trials conducted are detailed below (Table 2).

The study co-ordination was conducted by Peracto Pty Ltd at Devonport, Tasmania. The field investigation phases of the residue studies were conducted using Peracto Pty Ltd's Standard Operating Procedures, which comply with the OECD Principles of Good Laboratory Practice Number 1 (revised 1997), Paris 1998 and Number 13, June 2002, GLP Facility No: 14609. Specimens were analysed by GLP certified laboratories; Agrisearch Analytical, Bayer CropScience and the Australian Wine Research Institute. Specific site details, application and sampling requirements were as per the approved Study Plans and the Standard Operating Procedures (SOPs) of Peracto. Trials used unreplicated plot design and treatments were applied in a manner which simulated best commercial practice. Sampling was carried out according to documented Standard Operating Procedures relevant to plant portions to be sampled and analysed. Samples that were collected from each field site were sent frozen to the nominated analytical laboratory and the samples were analysed as per the Study Plan with the laboratory report incorporated into the final study report.

The data generated from this project is being used to support minor-use permit applications to the APVMA. The data could also be used for future permit applications, pesticide label extensions or for inclusion in complete pesticide registration applications.

Table 1: Pesticide formulations

Product name	Active ingredient	Concentration	Formulation	Source
Applaud 440 SC	buprofezin	440 g a.i./L	Suspension Concentrate	Dow AgroSciences Australia Limited
Acramite Miticide	bifenazate	480 g a.i./L	Suspension Concentrate	Chemtura Australia Pty Ltd
Teldor 500 SC	fenhexamid	500 g a.i./L	Suspension Concentrate	Bayer CropScience Pty Ltd
Maxim 100 FS	fludioxonil	100 g a.i./L	Suspension Concentrate	Syngenta Australia Pty Ltd
Confidor 200 SC	imidacloprid	200 g a.i./L	Suspension Concentrate	Bayer CropScience Pty Ltd
Rovral Aquaflo	iprodione	500 g a.i./L	Suspension Concentrate	Bayer CropScience Pty Ltd
Penncozeb 750 DF	mancozeb	750 g a.i./kg	Dry Flowable	Nufarm Australia Limited
Marlin	methomyl	225 g a.i./L	Aqueous Concentrate	Dupont Australia Ltd
Stomp 440	pendimethalin	440 g a.i./L	Emulsifiable Concentrate	Crop Care Australasia Pty Ltd
Yates White Oil	petroleum oil	820 g ai/L	Liquid	Yates Australia
Bayfidan	triadimenol	250 g a.i./L	Emulsifiable Concentrate	Bayer CropScience Pty Ltd
Triflux	trifluralin	480 g a.i./L	Emulsifiable Concentrate	Nufarm Australia Limited

Table 2: Trial details

Problem	Crop	Active	Trial type	No. Sites	Permit Application/ Renewal
Whiteflies	Cucumber (protected cropping & field) & celery	buprofezin	Residue	5	Renewal of PER9178 & PER10729
Two-spotted mite	Lettuce (protected cropping)	bifenazate	Residue – including storage stability study	4	Renewal of PER11651
Botrytis	Snow peas	fenhexamid	Residue	2	New permit application
Rhizoctonia	Broccoli	fludioxonil	Residue	2	Renewal of PER10735
Green peach aphid	Rhubarb	imidacloprid	Residue	2	Renewal of PER9894
Sclerotinia rot	Celeriac, capsicum & chillies	iprodione	Residue	5	Renewal of PER10946 & PER10747
Black rot	Carrots		Efficacy	2	Renewal of PER10964
Downy Mildew, purple blotch, Anthracnose, Alternaria	Shallots, spring onions, hairy melon & luffa	mancozeb	Residue	4	Renewal of PER10088 & PER10679
Cabbage white butterfly & western flower thrips	Radish & swede	methomyl	Residue	3	Renewal of PER7422
Weeds	Brassica leafy vegetables	pendimethalin	Residue	2	Renewal of PER9892
Jassids, leafhoppers, green vegie bug, grey cluster bug, Rutherglen bug, green mirid	Lettuce (protected cropping)	petroleum oil	Crop safety	4	Renewal of PER10335
Powdery mildew	Chillies & paprika	triadimenol	Residue	2	Use in peppers has full registration
Winter grass	parsnip	trifluralin	Residue	1	Renewal of PER8813

Introduction

The selective use of pesticides to control pests, weeds and diseases plays an important role in increasing production, improving the quality of Australia's horticultural crops and enabling growers to earn reasonable returns on their investments. At the same time, today's health conscious society is extremely sensitive to issues relating to chemical use and it is essential that consumers be protected by adequate regulations governing the use of agrochemicals.

The introduction of new and emerging crops, pesticide resistance, integrated pest management, the continual vigilance of horticultural industries for improved agrochemical choices and the disinclination of manufacturers to register for minor crops has led to the need for this project.

Horticultural produce must meet minimum standards relating to quality, safety and consumer expectation. To meet these exacting standards, the whole production process including agrochemical use, residues, and withholding periods require substantial rigorous data to justify the APVMA decision to issue a minor use permit.

The APVMA's National Permit System adds some flexibility to the lengthy registration process and legalises the availability of products for minor-use purposes, not specified on the product label. However, off-label permits issued by the APVMA still must be applied for along with information/data that verifies that the permitted use will be effective and will not have any harmful effects on humans, the crops or the environment. This project is of national importance because it goes some way towards addressing the above issues.

A total of 32 residue trials, 4 crop safety trial and 2 efficacy trials were conducted, during 2012-13, in specified regions throughout Australia. Data summaries from this project have been submitted to Growcom for submission to the APVMA together with the relevant Applications for Permits/Permit Renewals.

Materials and Methods

The study co-ordination was conducted by Peracto Pty Ltd at Devonport, Tasmania. The field investigation phases of the residue studies were conducted using Peracto Pty Ltd's Standard Operating Procedures, which comply with the OECD Principles of Good Laboratory Practice Number 1 (revised 1997), Paris 1998 and Number 13, June 2002, GLP Facility No: 14609. Specimens were analysed by GLP certified laboratories; Agrisearch Analytical, Bayer CropScience and the Australian Wine Research Institute. The crop safety and efficacy field trials were completed based on protocols developed following consultation with industry representatives.

Specific site details, application and sampling requirements were as per the approved Study Plans/protocols and the Standard Operating Procedures (SOPs) of Peracto Pty Ltd as relevant. Trials used unreplicated plot design and treatments were applied in a manner which simulated best commercial practice for the application of each pesticide to the relevant vegetable crop. Sampling was carried out according to documented Standard Operating Procedures relevant to crop and plant portions to be sampled and analysed. Samples that were collected from each field site were sent frozen to the nominated analytical laboratory and the samples were analysed as per the Study Plan with the laboratory report sent to the Study Director for inclusion in a composite Final Study Report.

The formulations of the pesticides used in the studies were as follows:

Product name	Active ingredient (ai)	Concentration of active ingredient	Formulation	Source
Applaud 440 SC	buprofezin	440 g a.i./L	Suspension Concentrate	Dow AgroSciences Australia Limited
Acramite Miticide	bifenazate	480 g a.i./L	Suspension Concentrate	Chemtura Australia Pty Ltd
Teldor 500 SC	fenhexamid	500 g a.i./L	Suspension Concentrate	Bayer CropScience Pty Ltd
Maxim 100 FS	fludioxonil	100 g a.i./L	Suspension Concentrate	Syngenta Australia Pty Ltd
Confidor 200 SC	imidacloprid	200 g a.i./L	Suspension Concentrate	Bayer CropScience Pty Ltd
Rovral Aquaflo	iprodione	500 g a.i./L	Suspension Concentrate	Bayer CropScience Pty Ltd
Penncozeb 750 DF	mancozeb	750 g a.i./kg	Dry Flowable	Nufarm Australia Limited
Marlin	methomyl	225 g a.i./L	Aqueous Concentrate	Dupont Australia Ltd
Stomp 440	pendimethalin	440 g a.i./L	Emulsifiable Concentrate	Crop Care Australasia Pty Ltd
Yates White Oil Insecticide	petroleum oil	820 g ai/L	Liquid	Yates Australia
Bayfidan	triadimenol	250 g a.i./L	Emulsifiable Concentrate	Bayer CropScience Pty Ltd
Triflux	trifluralin	480 g a.i./L	Emulsifiable Concentrate	Nufarm Australia Limited

The list of trials undertaken and completed is as follows:

Study ID	Problem	Crop	Product	Active	State	Trial type
AVG270, HAL1867, AVG191	Whiteflies	Celery	Applaud 440 SC	buprofezin	Vic	Residue
		Celery			Stanthorpe	
		Cucumber			SA	
		Cucumber			Bundaberg	
		Cucumber			Bowen	
HAL1433	Two-spotted mite	Lettuce (GH & hydroponics)	Acramite Miticide	bifenazate	Tas	Residue – including storage stability study
					Tas	
					SA	
					SA	
HAL1532	Botrytis	Snow peas (PC)	Teldor 500 SC	fenhexamid	Tas	Residue
		Snow peas (field)			WA	
HAL1632	Rhizoctonia	Broccoli	Maxim 100 FS	fludioxonil	Tas	Residue
					Bundaberg	
AVG943	Green peach aphid	Rhubarb	Confidor 200 SC	imidacloprid	Tas	Residue
					WA	
AVG1144, AVG1135	Sclerotinia rot	Celeriac	Rovral Aquaflo	iprodione	Tas	Residue
		Celeriac			Stanthorpe	
		Capsicum			Tas	
		Capsicum			SA	
		Chillies			Bundaberg	
AVG1102	Black rot	Carrots			SA	Efficacy
					SA	
AVG20, AVG1063	Downy Mildew, purple blotch, Anthracnose, Alternaria	Shallots	Penncozeb 750 DF	mancozeb	Bowen	Residue
		Spring Onions			WA	
		Luffa			Bowen	
		Hairy Melon			Bowen	
AVG387	Cabbage white butterfly & western flower thrips	Swede	Marlin	methomyl	Tas	Residue
		Radish			Stanthorpe	
		Swede			WA	
AVG718	Weeds	Pak Choy	Stomp	pendimethalin	Tas	Residue

Study ID	Problem	Crop	Product	Active	State	Trial type
		Wong Bok			WA	
HAL1464	Jassids, leafhoppers, green vegie bug, grey cluster bug, Rutherglen bug, green mirid	Lettuce (Protected cropping)	Yates White Oil Insecticide	petroleum oil	Tas	Crop safety
					Tas	
					SA	
					SA	
AVG822	Winter grass	parsnip	Triflurx	trifluralin	Tas	Residue
AVG1134	Powdery mildew	Chillies	Bayfidan	triadimenol	Tas	Residue
					Bundaberg	

Results and Discussion

For each residue study, a GLP compliant field trial report and analytical report, to GLP standard, was prepared. The results are summarised below.

AVG191, AVG270 & HAL1867 – Determination of residues of buprofezin in celery following two applications of Applaud Insecticide & in cucumbers (field and protected) following a single application of Applaud Insecticide

This study was conducted at five field sites; Werribee, Victoria, Virginia, South Australia, Amiens, Bundaberg and Bowen, Queensland.

The treatment information and sample timings for celery were as follows:

Treatment Number	Test Item	Active Ingredient	Rate of Active (g ai/100 L)	Application Timing	Sample Timing
T1	Untreated control	Nil	N/A	N/A	N/A
T2	Applaud 440 SC	buprofezin	26.4	17 & 3DBH	0, 1, 3 & 7DALA

DBH = Days Before Harvest
DALA = Days After Last Application

The treatment information and sample timings for cucumbers were as follows:

Treatment Number	Test Item	Active Ingredient	Rate of Active (g ai/ha)	Application Timing	Sample Timing
T1	Untreated control	Nil	N/A	N/A	N/A
T2	Applaud 440 SC	buprofezin	264	3DBH	0, 1, 3 & 7DALA

DBH = Days Before Harvest
DALA = Days After Last Application

Residues of buprofezin in the treated celery samples taken at 7DALA ranged from 0.764 to 0.266 mg/kg.

Residues of buprofezin in the cucumber samples taken at 7DALA ranged from 0.042 mg/kg to <LOQ (0.01 mg/kg).

HAL1433 – Determination of residues of bifenazate in lettuce (protected cropping) following a single application of Acramite Miticide

This study was conducted at four field sites; Tranmere, South Australia (2 sites) and Devonport, Tasmania (2 sites).

The treatment information and sample timings were as follows:

Treatment Number	Test Item	Active Ingredient	Rate of Active (g ai/100 L)	Application Timing	Sample Timing
T1	Untreated control	Nil	Nil	N/A	N/A
T2	Acramite Miticide	bifenazate	31.2	10DBH	0, 3, 5, 10 & 15DALA

DBH = Days Before Harvest
DALA = Days After Last Application

Residues of bifenazate in the lettuce samples taken at 15DALA ranged from 10.88 to 0.061 mg/kg.

HAL1532 – Determination of residues of fenhexamid in snow peas (field & protected cropping) following two applications of Teldor 500 SC

This study was conducted at two field sites; Northdown, Tasmania and Wanneroo, Western Australia.

The treatment information and sample timings were as follows:

Treatment Number	Test Item	Active Ingredient	Rate of Active (g ai/ha)	Application Timing	Sample Timing	
T1	Untreated control	Nil	Nil	N/A	N/A	
T2	Teldor 500 SC	fenhexamid	500*	8 & 1DBH	pods	0, 1, 3 & 7DALA
					foliage	1DALA

*Activator was also included at 125 mL/100 L
DBH = Days Before Harvest
DALA = Days After Last Application

Residues of fenhexamid in the snow pea pod samples taken at 7DALA ranged from 0.83 to 0.03 mg/kg. Residues of fenhexamid in the snow pea foliage samples taken at 1DALA ranged from 7.38 to 4.75 mg/kg.

HAL1433 – Determination of residues of fludioxonil in broccoli following seed treatment with Maxim 100 FS

This study was conducted at two field sites; Penguin, Tasmania and Bundaberg Queensland.

The treatment information and sample timings were as follows:

Treatment Number	Test Item	Active Ingredient	Rate of Active (g ai/100 kg seed)	Application Timing	Sample Timing
T1	Untreated control	Nil	Nil	N/A	N/A
T2	Maxim 100 FS	fludioxonil	5	Seed treatment	Commercial harvest

Residues of fludioxonil in the broccoli samples taken at commercial harvest were less than the limit of detection (0.005 mg/kg).

AVG943 – Determination of residues of imidacloprid in rhubarb following two applications of Confidor 200 SC

This study was conducted at two field sites; Latrobe, Tasmania and Carabooda, Western Australia.

The treatment information and sample timings were as follows:

Treatment Number	Test Item	Active Ingredient	Rate of Active (g ai/ha)	Application Timing	Sample Timing
T1	Untreated control	Nil	Nil	N/A	N/A
T2	Confidor 200 SC	imidacloprid	60	56 & 14 DBH	0, 7 & 14DALA

DBH = Days Before Harvest
DALA = Days After Last Application

Residues of imidacloprid in the rhubarb samples taken at 7DALA were less than the limit of quantitation (0.05 mg/kg).

AVG1144 & AVG1135 – Determination of residues of iprodione in celeriac following three applications of Rovral Aquaflo and chillies and capsicums (protected cropping) following two applications of Rovral Aquaflo

This study was conducted at five field sites; East Sassafras and Kindred, Tasmania, Applethorpe and Alloway, Queensland and Virginia, South Australia.

The treatment information and sample timings for celeriac were as follows:

Treatment Number	Test Item	Active Ingredient	Rate of Active (g ai/ha)	Application Timing	Sample Timing
T1	Untreated control	Nil	Nil	N/A	N/A
T2	Rovral Aquaflo	iprodione	500	29, 15 & 1DBH	0, 1 & 5DALA

DBH = Days Before Harvest
DALA = Days After Last Application

The treatment information and sample timings for capsicum & chillies were as follows:

Treatment Number	Test Item	Active Ingredient	Rate of Active (g ai/100 L)	Application Timing	Sample Timing
T1	Untreated control	Nil	Nil	N/A	N/A
T2	Rovral Aquaflo	iprodione	50	21 & 7DBH	0, 3, 7 & 10DALA

DBH = Days Before Harvest
DALA = Days After Last Application

Residues of iprodione in the celeriac samples taken at 5DALA were ranged from 0.161 to 0.103 mg/kg.

Residues of iprodione in the capsicum & chilli samples taken at 10DALA ranged from 1.186 to 0.498 mg/kg

AVG20 & AVG1063 – Determination of residues of mancozeb in shallots, spring onions and Asian fruiting vegetables following four applications of Penncozeb 750 DF

This study was conducted at four field sites; Karnup, Western Australia and Bowen, Queensland (3 sites).

The treatment information and sample timings for spring onions and shallots were as follows:

Treatment Number	Test Item	Active Ingredient	Rate of Active (g ai/ha)	Application Timing	Sample Timing
T1	Untreated control	Nil	Nil	N/A	N/A
T2	Penncozeb 750 DF	mancozeb	2625	28, 21, 14 & 7DBH	0, 3, 7 & 14DALA

DBH = Days Before Harvest
DALA = Days After Last Application

The treatment information and sample timings for luffa and hairy melon were as follows:

Treatment Number	Test Item	Active Ingredient	Rate of Active (g ai/ha)	Application Timing	Sample Timing
T1	Untreated control	Nil	Nil	N/A	N/A
T2	Penncozeb 750 DF	mancozeb	1650	28, 21, 14 & 7DBH	0, 3, 7 & 14DALA

DBH = Days Before Harvest
DALA = Days After Last Application

Residues of mancozeb in the spring onion and shallot samples taken at 14DALA ranged from 0.39 to 0.28 mg/kg.

Residues of mancozeb in the luffa and hairy melon samples taken at 14DALA ranged from 0.22 mg/kg to less than the limit of quantitation (0.2 mg/kg).

AVG387 – Determination of residues of methomyl in radish and swede following four applications of Marlin

This study was conducted at three field sites; West Pine, Tasmania, Amiens, Queensland and Wanneroo, Western Australia.

The treatment information and sample timings were as follows:

Treatment Number	Test Item	Active Ingredient	Rate of Active (g ai/ha)	Application Timing	Sample Timing
T1	Untreated control	Nil	Nil	N/A	N/A
T2	Marlin	methomyl	450	22, 15, 8 & 1 DBH	0, 1, 3 & 5DALA

DBH = Days Before Harvest
DALA = Days After Last Application

Residues of methomyl in the swede and radish samples taken at 7DALA ranged from 0.072 mg/kg to less than the limit of quantitation (0.01 mg/kg).

AVG718 – Determination of residues of pendimethalin in brassica leafy vegetables following a single application of Stomp 440 prior to transplanting

This study was conducted at two field sites; Forth, Tasmania and Wanneroo, Western Australia.

The treatment information and sample timings were as follows:

Treatment Number	Test Item	Active Ingredient	Rate of Active (g ai/ha)	Application Timing	Sample Timing
T1	Untreated control	Nil	Nil	N/A	N/A
T2	Stomp 440	pendimethalin	660	Within 2 days prior to planting;	Commercial harvest

Residues of pendimethalin in the Pak Choy and Wong Bok samples taken at commercial harvest were less than the limit of quantitation (0.005 mg/kg).

AVG822 – Determination of residues of trifluralin in parsnips following a pre-sowing application of TriflurX Selective Herbicide

This study was conducted at one field site; Merseylea, Tasmania

The treatment information and sample timings were as follows:

Treatment Number	Test Item	Active Ingredient	Rate of Active (g ai/ha)	Application Timing	Sample Timing
T1	Untreated control	Nil	Nil	N/A	N/A
T2	TriflurX	trifluralin	672	5 days prior to sowing	Commercial harvest

Residues of trifluralin in the parsnip samples taken at commercial harvest were less than the limit of detection (0.02 mg/kg).

AVG1134 – Determination of residues of triadimenol in chillies (protected cropping) following three applications of Bayfidan

This study was conducted at two field sites; Devonport, Tasmania and Alloway, Queensland

The treatment information and sample timings were as follows:

Treatment Number	Test Item	Active Ingredient	Rate of Active (g ai/100 L)	Application Timing	Sample Timing
T1	Untreated control	Nil	Nil	N/A	N/A
T2	Bayfidan	triadimenol	10	11, 6 & 1DBH	0, 1, 3 & 7DALA

DBH = Days Before Harvest
DALA = Days After Last Application

Residues of triadimenol in the chilli samples taken at 7DALA ranged from 0.94 to 0.30 mg/kg.

For each crop safety and efficacy study, a field trial report suitable for submission to the APVMA, was prepared. The results are summarised below.

HAL1464 Trial 1 - Crop safety of petroleum oil in leafy lettuce cv. Madrigon

At Devonport, Tasmania, in 2012 a trial was conducted to evaluate the crop safety of petroleum oil in leafy lettuce cv. Madrigon grown in a hydroponic greenhouse system. Treatments included Yates White Oil Insecticide at 820 g ai/100 L and 1640 g ai/100 L. These were compared to an untreated control.

Two dilute foliar applications just prior to the point of run off were applied at 11 and 3 days prior to harvest (11 and 3 DBH). Assessments for crop biomass and phytotoxicity were made at 0, 2, 3, 5 and 7 days after the first spray application and 2, 3 and 5 days after the second application.

At all assessment timings no phytotoxicity was observed. All treatments recorded equivalent plant biomass.

Yates White Oil Insecticide was safe to apply at up to 1640 g ai/100 L at 11 and 3 days before harvest.

HAL1464 Trial 2 - Crop safety of petroleum oil in leafy lettuce cv. Cazarai

At Devonport, Tasmania, in 2012 a trial was conducted to evaluate the crop safety of petroleum oil in leafy lettuce cv. Cazarai grown in a hydroponic greenhouse system. Treatments included Yates White Oil Insecticide at 820 g ai/100 L and 1640 g ai/100 L. These were compared to an untreated control.

Two dilute foliar applications just prior to the point of run off were applied at 11 and 3 days prior to harvest (11 and 3 DBH). Assessments for crop biomass and phytotoxicity were made at 0, 2, 3, 5 and 7 days after the first spray application and 2, 3 and 5 days after the second application.

At 5DAA2 chlorosis was observed on <1 % of the leaf area of lettuce leaves for Yates White Oil Insecticide at 1640 g ai/100 L. At all other assessment timings no phytotoxicity was observed and all treatments recorded equivalent plant biomass.

HAL1464 Trial 3 & 4- Evaluation of Yates White Oil insecticide to determine crop safety in lettuce cv. Red Ned and cv. Lollo Rosso

At Tranmere, South Australia, in 2012, Yates White Oil insecticide was evaluated to determine the crop safety of lettuce cv. Red Ned and Lollo Rosso in a greenhose hydroponics system.

All chemical treatments were applied twice with a 7 day interval, as a dilute spray applied to the point of run-off using a hand lance sprayer incorporating hollowcone DVP-5 nozzles at crop growth stages BBCH 45 and 48.

Crop safety was evaluated by assessing crop vigour and phytotoxicity In terms of chlorosis and necrosis.

All treatments in this trial were safe to lettuce varieties cv. Red Ned and cv. Lollo Rosso.

AVG1102 Trial 1: Evaluation of Rovral Aquaflo 500 SC applied alone and in combinations with Amistar 250 SC for the suppression of black rot (*Alternaria radicina*)

At Peebinga, South Australia, in 2013, Rovral Aquaflo 500 SC was evaluated when applied alone and in combinations with Amistar 250 SC for the suppression of black rot (*Alternaria radicina*) in carrots cv. Stefano. Three rates of Rovral Aquaflo were applied twice with a 7 day interval and compared with three application combinations at 7 and 9 day intervals of Amistar followed by Rovral Aquaflo then by Amistar and two applications of Rovral Aquaflo followed by Amistar.

The carrots were inoculated with black rot 13 days prior to the first application of treatments. All chemical treatments were applied in 400 L/ha of spray using a Makita powered spray unit incorporating Agrotop AI 110-03 nozzles commencing at crop growth stage BBCH 15.

No reduction in crop vigour and no phytotoxicity for any treatments or statistically significant reduction in tuber number and yield indicated that all treatments were safe to Stefano carrots.

Despite black rot (*Altenaria radicina*) inoculation prior to the trial commencing, levels of disease in the trial were very low and it was not detected on tubers until 29 days after application 3 (29DAA3).

At 29DAA3 all treatments significantly reduced the severity of infection on tubers compared to the untreated control except for two applications of Rovral Aquaflo followed by Amistar. The incidence of black rot on tubers at 29DAA3 was significantly lower than the untreated control in all treatments.

There were no significant differences between any treatments and the untreated control in terms of black rot incidence and severity on leaves at any assessment.

There was no rate response evident between the three rates of Rovral Aquaflo applied in two consecutive applications.

Application of Amistar followed by Rovral Aquaflo then by Amistar resulted in no black rot on tubers and the lowest incidence and severity of black rot on leaves.

Two applications of Rovral Aquaflo followed by Amistar was the least effective treatment in the trial compared to the untreated control.

AVG1102 Trial 2: Evaluation of Rovral Aquaflo 500 SC applied alone and in combinations with Amistar 250 SC for the suppression of black rot (*Alternaria radicina*)

At Peebinga, South Australia, in 2013, Rovral Aquaflo 500 SC was evaluated when applied alone and in combinations with Amistar 250 SC for the suppression of black rot (*Alternaria radicina*) in carrots cv. Travisio. Three rates of Rovral Aquaflo were applied twice with a 7 day interval and compared with three application combinations at 7 and 9 day intervals of Amistar followed by Rovral Aquaflo then by Amistar and two applications of Rovral Aquaflo followed by Amistar.

The carrots were inoculated with black rot 13 days prior to the first application of treatments. All chemical treatments were applied in 400 L/ha of spray using a Makita powered spray unit incorporating Agrotop AI 110-03 nozzles commencing at crop growth stage BBCH 15.

No reduction in crop vigour and no phytotoxicity for any treatments or statistically significant yield differences to the untreated control indicated that all treatments were safe to Travisio carrots.

Despite black rot (*Altenaria radicina*) inoculation prior to the trial commencing, levels of disease in the trial were very low. It was not detected on tubers until 29 days after application 3 (29DAA3) when there were no significant differences in incidence or severity between fungicide treatments and untreated control.

There were no significant differences in black rot incidence and severity on leaves between fungicide treatments and the untreated control at 9DAA2 or in incidence on leaves at 12DAA3. At 12DAA3 all treatments recorded significantly lower severity of black rot on leaves than the untreated control, except two applications of Rovral Aquaflo at 500 g ai/ha which had equivalent severity to the untreated control.

There was no rate response evident between the three rates of Rovral Aquaflo applied in two consecutive applications.

Application of Amistar followed by Rovral Aquaflo then by Amistar recorded the lowest black rot incidence and severity on tubers and leaves. Two applications of Rovral Aquaflo at 625 g ai/ha was the next most effective treatment.

Two applications of Rovral Aquaflo followed by Amistar was the least effective treatment in the trial in terms of black rot control on tubers.

Technology Transfer

The results from these trials have been submitted in permit applications/renewals to the APVMA as detailed below. AgAware Consulting Pty Ltd will notify the relevant interested parties upon issue/renewal of permits.

Problem	Crop	Product	Active	Permit Application/ Renewal
Whitefly	Celery, cucumber, zucchini & eggplant (field & PC)	Applaud 440 SC	buprofezin	Permit renewal – Category 20
Two spotted mite	Lettuce (GH hydroponics)	Acramite Miticide	bifenazate	Permit renewal – Category 20
Green peach aphid	Rhubarb	Confidor 200 SC	imidacloprid	Permit renewal – Category 20
Botrytis	Snow peas & sugar snap peas	Teldor 500 SC	fenhexamid	Permit application – Category 21
Rhizoctonia	Broccoli	Maxim 100 FS	fludioxonil	Permit renewal – Category 20
Cabbage white butterfly & western flower thrips	Radish, swede & turnip	Marlin	methomyl	Permit renewal – Category 20
Sclerotinia rot	Celeriac, chillies & paprika	Rovral Aquaflo	iprodione	Permit renewal – Category 20
Black rot	Carrots	Rovral Aquaflo	iprodione	Permit renewal – Category 20
Winter grass & other grasses	parsnip	Triflurx	trifluralin	Permit renewal – Category 20
Downy Mildew, purple blotch, Anthracnose, Alternaria	Shallots, leeks & Asian fruiting vegetables	Penncozeb 750 DF	mancozeb	Permit renewal – Category 20
Weeds	Brassica leafy vegetables	Stomp	pendimethalin	Permit renewal – Category 20
Jassids, leafhoppers, green vegie bug, grey cluster bug, Rutherglen bug, green mirid	Lettuce (Protected cropping)	Yates White Oil Insecticide	petroleum oil	Permit renewal – Category 20
Powdery mildew	Chillies & Paprika	Bayfidan 250 EC	triadimenol	Active now has full registration in peppers

Recommendations

None applicable at this time.

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