Generation of Pesticide Residue Data for Vegetable Minor-Use Permit Applications- Agrisearch

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GENERATION OF PESTICIDE RESIDUES IN VEGETABLES TO SUPPORT MINOR USE PERMITS.

STUDIES CONDUCTED BY AGRISEARCH SERVICES PTY LTD, AUSTRALIA, 2006-2007.

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1. 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 vegetable crops are too small individually 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 and data submitted that verifies that the permitted use will be effective and will not have any harmful effects on humans, the crops or the environment.

In this project, 7 studies were conducted on 6 different fungicides and insecticides. These studies were conducted at 24 different field sites in New South Wales, Queensland, Victoria and South Australia on the crops; greenhouse and hydroponic grown capsicums, cucumbers and leafy lettuce and field grown chillies, spring onions, radishes, sweet potatoes and leafy lettuce.

The studies involved one or multiple applications of the pesticides on the target crops, sampling the crops at or around the normal commercial harvest time, and then analysing the sampled plant parts for residues of the target pesticide. Detailed study reports on the field and analytical components were prepared and these were used as part of the permit applications to the APVMA.

The major outcome of this project is that pesticides that could not be legally used by vegetable growers will now be available. This project has been part of a larger programme of research that has been conducted over the past few years. Although the outcomes of this project have been met there is an ongoing need for growers to have access to newer and better pesticides and so similar projects should be planned and conducted in the future.

2. TECHNICAL SUMMARY

Seven studies were conducted on 6 different fungicides and insecticides. These studies were conducted at 24 different field sites in New South Wales, Queensland, Victoria and South Australia on the crops; greenhouse and hydroponic grown capsicums, cucumbers and leafy lettuce and field grown chillies, spring onions, radishes, sweet potatoes and leafy lettuce. The study co-ordination was conducted by Agrisearch Services Pty Ltd at Orange, New South Wales and the analytical component was conducted at Agrisearch Analytical Pty Ltd at Rozelle, New South Wales. The studies were conducted under the OECD Principles of Good Laboratory Practice (GLP).

The test substances and their active ingredients were as follow;

NUFARM FILAN FUNGICIDE - 500 g/kg boscalid
NIMROD SYSTEMIC FUNGICIDE - 250 g/L bupirimate
BRAVO WEATHER STIK FUNGICIDE - 720 g/L chlorothalonil
TILT 250 EC SYSTEMIC FUNGICIDE - 250 g/L propiconazole
ADMIRAL INSECT GROWTH REGULATOR - 100 g/L pyriproxyfen
FLINT 500 WG FUNGICIDE - 500 g/kg trifloxystrobin

The studies conducted were as follows;

Boscalid and bupirimate in chillies and bupirimate in greenhouse grown capsicums - AVG869, AVG1282
Chlorothalonil in greenhouse grown cucumbers - AVG1386
Chlorothalonil in spring onions - AVG143
Propiconazole in radishes - AVG1174
Pyriproxyfen in sweet potatoes - AVG1456
Pyriproxyfen in leafy lettuce - AVG1419
Trifloxystrobin in greenhouse hydroponic grown capsicums and cucumbers - AVG1431

Field sites were selected at locations where the nominated crop was commonly grown. Specific site details and requirements were as per the approved Study Plan and the Standard Operating Procedures (SOPs) of Agrisearch Services Pty Ltd. More than one study may have been conducted at a particular site, as detailed in the specific Study Plan. Treatment application timing and sampling was according to Good Agricultural Practice and locally accepted procedures.

Each trial within a study was established using an unrandomised and unreplicated large block design.

The pesticide treatments were applied in a manner, which simulated best commercial practice for the application of fungicides and insecticides to the target crops. The method used replicated how the co-operator farmer typically grows and sprays the crop.

Sampling was carried out according to documented Standard Operating Procedures relevant to crop and plant portion to be sampled and analysed.

Plant samples that were collected from each field site were sent frozen to Agrisearch Analytical Pty Ltd and the samples were analysed as per the Study Plan with the laboratory report sent to the Study Director for inclusion in a composite Study Report for each of the eleven studies.

The data generated from the studies have been included or will be included in submissions to the Australian Pesticides and Veterinary Medicines Authority. These submissions are for permit applications, pesticide label extensions or for inclusion in complete pesticide registration applications.

3. INTRODUCTION

Seven studies were conducted on 6 different fungicides and insecticides. These studies were conducted at 24 different field sites in New South Wales, Queensland, Victoria and South Australia on the crops; greenhouse and hydroponic grown capsicums, cucumbers and leafy lettuce and field grown chillies, spring onions, radishes, sweet potatoes and leafy lettuce. The study co-ordination was conducted by Agrisearch Services Pty Ltd at Orange, New South Wales and the analytical component was conducted at Agrisearch Analytical Pty Ltd at Rozelle, New South Wales. The study was conducted under the OECD Principles of Good Laboratory Practice (GLP).

This report contains the experimental methods used and presents the results obtained.

The trial was conducted under Horticulture Australia Limited project VG05098 Agrisearch Project HAL/GLP/06/02.

4. MATERIALS AND METHODS

4.1 Individual Study Details

Seven studies were conducted according to approved Study Plans that had been prepared as per the OECD GLP Guidelines. Each Study Plan number and title and summary details of the individual studies were as follows:

HAL/GLP/06/02-1; Residues of boscalid and bupirimate in chillies and bupirimate in greenhouse grown capsicums after applications of NUFARM FILAN FUNGICIDE and NIMROD SYSTEMIC FUNGICIDE – Studies AVG869 and AVG1282 – Six sites; Bundaberg region Queensland, Shepparton region Victoria, Melbourne region Victoria, Gosford region New South Wales and two separate locations in Adelaide region South Australia.

HAL/GLP/06/02-2; Residues of chlorothalonil in greenhouse grown cucumbers after applications of BRAVO WEATHER STIK FUNGICIDE – Study AVG1386 – Two sites; two separate locations in the Adelaide region South Australia.

HAL/GLP/06/02-3; Residues of chlorothalonil in spring onions after applications of BRAVO WEATHER STIK FUNGICIDE – Study AVG143 – Two sites; Adelaide region South Australia, Melbourne region Victoria.

HAL/GLP/06/02-4; Residues of propiconazole in radishes after applications of TILT 250 EC SYSTEMIC FUNGICIDE – Study AVG1174 – Two sites; Adelaide region South Australia, Melbourne region Victoria.

HAL/GLP/06/02-5; Residues of pyriproxyfen in sweet potatoes after applications of ADMIRAL INSECT GROWTH REGULATOR – Study AVG1456 – Two sites; Bundaberg region Queensland, Innisfail region Queensland.

HAL/GLP/06/02-6; Residues of pyriproxyfen in leafy lettuce after applications of ADMIRAL INSECT GROWTH REGULATOR – Study AVG1419 – Six sites; one field study in Adelaide region South Australia, one field, two one hydroponic and two greenhouse studies in separate locations in Melbourne region Victoria, one hydroponic study in Toowoomba region Queensland.

HAL/GLP/06/02-7; Residues of trifloxystrobin in greenhouse hydroponic grown capsicums and cucumbers after applications of FLINT 500 WG FUNGICIDE – Study AVG1431 – Four sites; one capsicum study in Gosford region New South Wales, one capsicum and one cucumber study in Adelaide region South Australia, one cucumber study in Bundaberg region Queensland.

4.2 Trial Sites

Field sites were selected at locations where the nominated crop was commonly grown. Specific site details and requirements were as per the approved Study Plan and the Standard Operating Procedures (SOPs) of Agrisearch Services Pty Ltd. More than one study may have been conducted at a particular site, as detailed in the specific Study Plan. Treatment application timing and sampling was according to Good Agricultural Practice and locally accepted procedures.

4.3 Trial Design

Each trial within a study was established using an unrandomised and unreplicated large block design. The individual plot sizes generally ranged between 10-20 m^2 in area. Larger plot sizes were used if it was deemed necessary to obtain the required sample sizes. Each plot size was sufficient to produce duplicate, fresh-weight samples of produce on multiple occasions after the last application of each treatment, in sufficient quantity and number to satisfy international sampling requirements.

The untreated plots were situated as up-slope and as up-wind from each treated plot as practical, to prevent contamination of the untreated plot. Each plot was marked to completely and uniquely identify it by its geometry, trial number and treatment number. Test plots were considered as restricted access areas with measures taken to exclude unauthorised persons from the test area.

4.4 Formulations

The pesticide formulations used in the studies were as follows:

NUFARM FILAN FUNGICIDE - a water dispersible granule formulation containing 500 g/kg boscalid as the active constituent as marketed by Nufarm Australia Limited.

NIMROD SYSTEMIC FUNGICIDE - an emulsifiable concentrate formulation containing 250 g/L bupirimate as the active constituent. The sample was supplied by Makhteshim-Agan (Aust) Pty Ltd.

BRAVO WEATHER STIK FUNGICIDE - a suspension concentrate formulation containing 720 g/L chlorothalonil as the active constituent as marketed by Syngenta Crop Protection Australia.

TILT 250 EC SYSTEMIC FUNGICIDE - an emulsifiable concentrate formulation containing 250 g/L propiconazole as the active constituent as manufactured and supplied by Syngenta Crop Protection Pty Ltd.

ADMIRAL INSECT GROWTH REGULATOR - an emulsifiable concentrate formulation containing 100 g/L pyriproxyfen as the active constituent as marketed by Sumitomo Chemical Australia Pty Ltd.

FLINT 500 WG FUNGICIDE - a water dispersible granule formulation containing 500 g/kg trifloxystrobin as the active constituent as marketed by Bayer CropScience Pty Ltd.

4.5 Treatment Method

The pesticide treatments were applied in a manner, which simulated best commercial practice for the application of fungicides and insecticides to the target crops. The method used replicated how the co-operator farmer typically grows and sprays the crop.

Pre-harvest foliar treatments were generally applied on a field hectare basis spraying all parts of the plant foliage to just before the point of run-off using a motorised pump, hose and hand gun or lance or a pressurised tank, hose and hand gun or lance. A horizontal or vertical boom may have been used. A vertically held boom was generally used when the target crop was trellised. The inter-rows were not sprayed unless this was the typical method. Droppers may have been use to improve the coverage of the underside of leaves.

The total spray volume was typically a maximum of 1000 L/ha depending on plant size and growing density. Full application details were recorded in the individual study reports.

4.6 Sampling Procedures

Sampling was carried out according to documented Standard Operating Procedures relevant to the crop and plant portion to be sampled and analysed. In general, plant portions were collected from 12 locations or plants within each plot for each sample taken. The end plants of each plot were not sampled. Two samples were taken from each treatment on each sampling date with one being the Primary Sample and the other the Reserve Sample.

The Primary Samples were the samples that were sent to the laboratory for analysis. The Reserve Samples remain in the freezer for at least 12 months after the completion of each study after which time they are discarded.

4.7 Analysis of Samples

Plant samples that were collected from each field site were sent frozen to the nominated analytical laboratory, Agrisearch Analytical Pty Ltd, as per the Study Plan. The samples were analysed as per the Study Plan with the laboratory report sent to the Study Director for inclusion in a composite Study Report for each of the eleven studies.

5. RESULTS AND DISCUSSION

Summaries of the seven studies, including results and discussions, are presented below.

5.1 HAL/GLP/06/02-1; Residues of boscalid and bupirimate in chillies and bupirimate in greenhouse grown capsicums after applications of NUFARM FILAN FUNGICIDE and NIMROD SYSTEMIC FUNGICIDE – Studies AVG869 and AVG1282 – Six sites; Bundaberg region Queensland, Shepparton region Victoria, Melbourne region Victoria, Gosford region New South Wales and two separate locations in Adelaide region South Australia

This study was conducted to determine the tissue residue profile of boscalid and bupirimate in chillies and bupirimate in greenhouse grown capsicums after applications of NUFARM FILAN FUNGICIDE and NIMROD SYSTEMIC FUNGICIDE. The study consisted of six field sites; Bundaberg Queensland, Orrvale Victoria, Seville Victoria, Wallacia New South Wales, Saint Kilda South Australia and Virginia South Australia. The study co-ordination was conducted by Agrisearch Services Pty Ltd at Orange, New South Wales and the analytical component was conducted at Agrisearch Analytical Pty Ltd at Rozelle, New South Wales. The study was conducted under the OECD Principles of Good Laboratory Practice (GLP).

The test substances were as follows:

NUFARM FILAN FUNGICIDE - a water dispersible granule formulation containing 500 g/kg boscalid as the active constituent as marketed by Nufarm Australia Limited.

FARMOZ NIMROD FUNGICIDE - an emulsifiable concentrate formulation containing 250 g/L bupirimate as the active constituent as marketed by Farmoz Pty Ltd.

An unreplicated randomised single plot design was used at each test site.

The treatments and sampling times for Trial 6278, Bundaberg Queensland, are presented in the table below:

Number	Treatment	Rate Applied (Actual*)	Application Times DBFS	Sampling Times DALA
1.	Untreated control			0
2.	FILAN	1000 (1027) g/ha	7, 0	0, 3, 7, 10
3.	NIMROD	600 (613) mL/ha	7, 0	0, 1, 3, 5

*Averaged over all applications
DBFS - days before first sampling
DALA - days after last application

The treatments and sampling times for Trial 6279, Orrvale Victoria, are presented in the table below:

Number	Treatment	Rate Applied (Actual*)	Application Times DBFS	Sampling Times DALA
1.	Untreated control			0
2.	FILAN	1000 (982) g/ha	7, 0	0, 3, 7, 10
3.	NIMROD	600 (622) mL/ha	7, 0	0, 1, 3, 5

*Averaged over all applications
DBFS - days before first sampling
DALA - days after last application

The treatments and sampling times for Trial 6280, Seville Victoria, are presented in the table below:

Number	Treatment	Rate Applied (Actual*)	Application Times DBFS	Sampling Times DALA
1.	Untreated control			0
2.	FILAN	1000 (1019) g/ha	7, 0	0, 2, 6, 10

*Averaged over all applications
DBFS - days before first sampling
DALA - days after last application

The treatments and sampling times for Trial 6281, Wallacia New South Wales, are presented in the table below:

Number	Treatment	Rate Applied (Actual*)	Application Times DBFS	Sampling Times DALA
1.	Untreated control			0
2.	FILAN	1000 (1000) g/ha	7, 0	0, 3, 7, 10

*Averaged over all applications
DBFS - days before first sampling
DALA - days after last application

The treatments and sampling times for Trial 6282, Saint Kilda South Australia, are presented in the table below:

Number	Treatment	Rate Applied (Actual*)	Application Times DBFS	Sampling Times DALA
1.	Untreated control			0
2.	NIMROD	600 (597) mL/ha	7, 0	0, 1, 3, 5

*Averaged over all applications
DBFS - days before first sampling
DALA - days after last application

The treatments and sampling times for Trial 6283, Virginia South Australia, are presented in the table below:

Number	Treatment	Rate Applied (Actual*)	Application Times DBFS	Sampling Times DALA
1.	Untreated control			0
2.	NIMROD	600 (583) mL/ha	7, 0	0, 1, 3, 5

*Averaged over all applications
DBFS - days before first sampling
DALA - days after last application

The treatments were applied in a manner that simulated best commercial practice for the application of fungicides in chillies and greenhouse grown capsicums. Treatments were applied by boom spray in sufficient water to ensure even and thorough coverage of all parts of each plant. A horizontal boom was used when the chillies were field grown. A vertical boom was used when the chillies and capsicums were trellised.

At least 12 fruit and at least 2 kilograms of fruit were sampled from 12 individual capsicum plants of each treatment for each sample. At least 0.5 kilograms of fruit were sampled from 12 individual chilli plants of each treatment for each sample. Two samples were taken from each treatment on each sampling date with one being the Primary Sample and the other the Reserve Sample.

Boscalid and bupirimate residues were determined according to methods developed by Agrisearch Analytical:

“Determination of Multi-Residues in Fruit and Vegetables using DSPE”, AATM-S-60, Revision 5, Agrisearch Analytical Pty Ltd, 20 February 2006.

All of the treated samples of field grown and trellis grown chilli were found to contain quantifiable (>0.05 mg/kg) residues of boscalid after two applications of NUFARM FILAN FUNGICIDE made 7 days apart. Residues of boscalid ranged from 0.22-0.33 mg/kg at 2-3 DAT 2, 0.14-0.39 mg/kg at 6-7 DAT 2 to 0.12-0.32 mg/kg at 10 DAT 2.

Most of the treated samples of field grown chilli and greenhouse trellis grown capsicum were found to contain residues of bupirimate at detectable levels (>0.01 mg/kg) after two applications of FARMOZ NIMROD FUNGICIDE made 7 days apart. Residues of bupirimate ranged from 0.01-0.15 mg/kg at 1 DAT 2, 0.02-0.10 mg/kg at 3 DAT 2 to 0.01-0.12 mg/kg at 5 DAT 2.

5.2 HAL/GLP/06/02-2; Residues of chlorothalonil in greenhouse grown cucumbers after applications of BRAVO WEATHER STIK FUNGICIDE – Study AVG1386 – Two sites; two separate locations in the Adelaide region South Australia.

This study was conducted to determine the tissue residue profile of chlorothalonil in greenhouse grown cucumbers after applications of BRAVO WEATHER STIK FUNGICIDE. The study consisted of two field sites; Penfield South Australia and Virginia South Australia. The study co-ordination was conducted by Agrisearch Services Pty Ltd at Orange, New South Wales and the analytical component was conducted at Agrisearch Analytical Pty Ltd at Rozelle, New South Wales. The study was conducted under the OECD Principles of Good Laboratory Practice (GLP).

The test substance was as follows:

BRAVO WEATHER STIK FUNGICIDE - a suspension concentrate formulation containing 720 g/L chlorothalonil as the active constituent as marketed by Syngenta Crop Protection Australia.

An unreplicated randomised single plot design was used at each test site.

The treatments and sampling times for Trial 6285, Penfield South Australia, are presented in the table below:

Number	Treatment	Rate Applied (Actual*)	Application Times DBFS	Sampling Times DALA
1.	Untreated control			0
2.	BRAVO	2.5 (2.53) L/ha	21, 14, 7, 0	0, 1, 3, 7

*Averaged over all applications
DBFS - days before first sampling
DALA - days after last application

The treatments and sampling times for Trial 6286, Virginia South Australia, are presented in the table below:

Number	Treatment	Rate Applied (Actual*)	Application Times DBFS	Sampling Times DALA
1.	Untreated control			0
2.	BRAVO	2.5 (2.57) L/ha	21, 14, 7, 0	0, 1, 3, 7

*Averaged over all applications
DBFS - days before first sampling
DALA - days after last application

The treatments were applied in a manner that simulated best commercial practice for the application of fungicides in greenhouse grown cucumbers. Treatments were applied by boom spray in sufficient water to ensure even and thorough coverage of all parts of each plant. A vertical boom was used as the cucumbers were trellised.

At least 12 fruit and at least 2 kilograms of fruit were sampled from 12 individual cucumber plants of each treatment for each sample. Two samples were taken from each treatment on each sampling date with one being the Primary Sample and the other the Reserve Sample.

Chlorothalonil residues were determined according to methods developed by Agrisearch Analytical:

"Determination of Multi-Residues in Fruit and Vegetables using DSPE", AATM-S-60, Revision 5, Agrisearch Analytical Pty Ltd, 20 February 2006.

All of the treated samples of greenhouse trellis grown cucumber were found to contain residues of chlorothalonil at quantifiable levels (>0.05 mg/kg) after four applications of BRAVO WEATHER STIK FUNGICIDE made 7 days apart. Residues of chlorothalonil ranged from 1.0-1.2 mg/kg at 1 DAT 4, 0.76-1.0 mg/kg at 3 DAT 4 to 0.38-0.82 mg/kg at 7 DAT 4.

5.3 HAL/GLP/06/02-3; Residues of chlorothalonil in spring onions after applications of BRAVO WEATHER STIK FUNGICIDE – Study AVG143 – Two sites; Adelaide region South Australia, Melbourne region Victoria.

This study was conducted to determine the tissue residue profile of chlorothalonil in spring onions. The study consisted of two field sites; Saint Kilda South Australia and Pearcedale Victoria. The study co-ordination was conducted by Agrisearch Services Pty Ltd at Orange, New South Wales and the analytical component was conducted at Agrisearch Analytical Pty Ltd at Rozelle, New South Wales. The study was conducted under the OECD Principles of Good Laboratory Practice (GLP).

The test substance was as follows:

BRAVO WEATHER STIK FUNGICIDE - a suspension concentrate formulation containing 720 g/L chlorothalonil as the active constituent as marketed by Syngenta Crop Protection Pty Limited.

An unreplicated unrandomised single plot design was used at each test site.

The treatments and sampling times for Trial 6288, Saint Kilda South Australia, are presented in the table below:

Number	Treatment	Rate Applied (Actual*)	Application Times DBFS	Sampling Times DALA
1.	Untreated control			14
2.	BRAVO	2.3 (2.3) L/ha	21, 7	7, 14, 21

*Averaged over all applications
DBFS - days before first sampling
DALA - days after last application

The treatments and sampling times for Trial 6289, Pearcedale Victoria are presented in the table below:

Number	Treatment	Rate Applied (Actual*)	Application Times DBFS	Sampling Times DALA
1.	Untreated control			15
2.	BRAVO	2.3 (2.4) L/ha	20, 7	7, 15, 22

*Averaged over all applications
DBFS - days before first sampling
DALA - days after last application

The treatments were applied in a manner that simulated best commercial practice for the application of fungicides in spring onions. Treatments were applied by boom spray in sufficient water to ensure even and thorough coverage of all parts of each plant.

Greater than 2 kg of bulbs and shoots were sampled from at least 12 individual plants of each treatment for each sample. Two samples were taken from each treatment on each sampling date with one being the Primary Sample and the other the Reserve Sample.

Chlorothalonil residues were determined according to a method developed by Agrisearch Analytical:

"Determination of Multi-Residues in Fruit and Vegetables using DSPE", AATM-S-60, Revision 5, Agrisearch Analytical Pty Ltd, 20 February 2006.

All of the treated samples of spring onions were found to contain quantifiable (>0.05 mg/kg) residues of chlorothalonil after two applications of BRAVO WEATHER STIK FUNGICIDE made 13-14 days apart. Residues of chlorothalonil ranged from 1.4-2.1 mg/kg at 7 DAT 2 to 0.06-0.33 mg/kg at 21-22 DAT 2.

5.4 HAL/GLP/06/02-4; Residues of propiconazole in radishes after applications of TILT 250 EC SYSTEMIC FUNGICIDE – Study AVG1174 – Two sites; Adelaide region South Australia, Melbourne region Victoria.

This study was conducted to determine the tissue residue profile of propiconazole in field grown radishes after applications of TILT 250 EC SYSTEMIC FUNGICIDE. The study consisted of two field sites; Saint Kilda South Australia and Hastings Victoria. The study co-ordination was conducted by Agrisearch Services Pty Ltd at Orange, New South Wales and the analytical component was conducted at Agrisearch Analytical Pty Ltd at Rozelle, New South Wales. The study was conducted under the OECD Principles of Good Laboratory Practice (GLP).

The test substance was as follows:

TILT 250 EC SYSTEMIC FUNGICIDE - an emulsifiable concentrate formulation containing 250 g/L propiconazole as the active constituent as marketed by Syngenta Crop Protection Australia.

An unreplicated randomised single plot design was used at each test site.

The treatments and sampling times for Trial 6291, Saint Kilda South Australia, are presented in the table below:

Number	Treatment	Rate Applied (Actual*)	Application Times DBFS	Sampling Times DALA
1.	Untreated control			0
2.	TILT	500 (492) mL/ha	14, 7, 0	0, 3, 7, 10

*Averaged over all applications
DBFS - days before first sampling
DALA - days after last application

The treatments and sampling times for Trial 6292, Hastings Victoria, are presented in the table below:

Number	Treatment	Rate Applied (Actual*)	Application Times DBFS	Sampling Times DALA
1.	Untreated control			0
2.	TILT	500 (510) mL/ha	14, 7, 0	0, 2, 7, 10

*Averaged over all applications
DBFS - days before first sampling
DALA - days after last application

The treatments were applied in a manner that simulated best commercial practice for the application of fungicides in field grown radishes. Treatments were applied by a horizontal boom spray in sufficient water to ensure even and thorough coverage of all parts of each plant.

At least 2 kilograms of root bulbs were sampled from 12 individual radish plants of each treatment for each sample. Two samples were taken from each treatment on each sampling date with one being the Primary Sample and the other the Reserve Sample.

Propiconazole residues were determined according to methods developed by Agrisearch Analytical:

"Determination of Multi-Residues in Fruit and Vegetables using DSPE", AATM-S-60, Revision 5, Agrisearch Analytical Pty Ltd, 20 February 2006.

Most of the treated samples of field grown radish were found to contain residues of propiconazole at quantifiable levels (>0.05 mg/kg) after three applications of TILT 250 EC SYSTEMIC FUNGICIDE made 7 days apart. Residues of propiconazole ranged from 0.01-0.03 mg/kg at 2-3 DAT 3, <LOD-0.009 mg/kg at 7 DAT 3 to <LOD-0.007 mg/kg at 10 DAT 3.

5.5 HAL/GLP/06/02-5; Residues of pyriproxyfen in sweet potatoes after applications of ADMIRAL INSECT GROWTH REGULATOR – Study AVG1456 – Two sites; Bundaberg region Queensland, Innisfail region Queensland.

This study was conducted to determine the tissue residue profile of pyriproxyfen in sweet potatoes after applications of ADMIRAL INSECT GROWTH REGULATOR. The study consisted of two field sites; Moorlands Queensland and Mareeba Queensland. The study co-ordination was conducted by Agrisearch Services Pty Ltd at Orange, New South Wales and the analytical component was conducted at Agrisearch Analytical Pty Ltd at Rozelle, New South Wales. The study was conducted under the OECD Principles of Good Laboratory Practice (GLP).

The test substance was as follows:

ADMIRAL INSECT GROWTH REGULATOR - an emulsifiable concentrate formulation containing 100 g/L pyriproxyfen as the active constituent as marketed by Sumitomo Chemical Australia Pty Ltd.

An un-replicated randomised single plot design was used at each test site.

The treatments and sampling times for Trial 6301, Moorlands Queensland, are presented in the table below:

Number	Treatment	Rate Applied (Actual*)	Application Times DBFS	Sampling Times DALA
1.	Untreated control			7
2.	ADMIRAL	500 (521) mL/ha	14, 0	0, 3, 7, 14

*Averaged over all applications
DBFS - days before first sampling
DALA - days after last application

The treatments and sampling times for Trial 6302, Mareeba Queensland, are presented in the table below:

Number	Treatment	Rate Applied (Actual*)	Application Times DBFS	Sampling Times DALA
1.	Untreated control			7
2.	ADMIRAL	500 (510) mL/ha	14, 0	0, 3, 7, 14

*Averaged over all applications
DBFS - days before first sampling
DALA - days after last application

The treatments were applied in a manner that simulated best commercial practice for the application of insecticides in sweet potatoes. Treatments were applied by a horizontal boom spray in sufficient water to ensure even and thorough coverage of all parts of each plant.

At least 12 tubers and at least 2 kilograms of tubers were sampled from 12 individual sweet potato plants for each treatment for each sample. Two samples were taken from each treatment on each sampling date with one being the Primary Sample and the other the Reserve Sample.

Pyriproxyfen residues were determined according to methods developed by Agrisearch Analytical: "Determination of Multi-Residues in Whole plant and Vegetables using DSPE", AATM-S-60, Revision 5, Agrisearch Analytical Pty Ltd, 20 February 2006.

All of the treated samples of sweet potatoes were found to contain detectable residues of pyriproxyfen but below the quantifiable levels (>0.05 mg/kg) after two applications of ADMIRAL INSECT GROWTH REGULATOR made 14 days apart.

5.6 HAL/GLP/06/02-6; Residues of pyriproxyfen in leafy lettuce after applications of ADMIRAL INSECT GROWTH REGULATOR – Study AVG1419 – Six sites; one field study in Adelaide region South Australia, one field, two one hydroponic and two greenhouse studies in separate locations in Melbourne region Victoria, one hydroponic study in Toowoomba region Queensland.

This study was conducted to determine the tissue residue profile of pyriproxyfen in leafy lettuce after applications of ADMIRAL INSECT GROWTH REGULATOR. The study consisted of six field sites; Uraidla South Australia, Pearcedale Victoria, Lara Victoria, South Werribee Victoria, Geelong Victoria and Toowoomba Queensland. The Uraidla and Pearcedale trials were on field grown leafy lettuce, the Lara and South Werribee trials were on greenhouse grown leafy lettuce and the Geelong and Toowoomba trials were on hydroponic greenhouse grown leafy lettuce. The study co-ordination was conducted by Agrisearch Services Pty Ltd at Orange, New South Wales and the analytical component was conducted at Agrisearch Analytical Pty Ltd at Rozelle, New South Wales. The study was conducted under the OECD Principles of Good Laboratory Practice (GLP).

The test substance was as follows:

ADMIRAL INSECT GROWTH REGULATOR - an emulsifiable concentrate formulation containing 100 g/L pyriproxyfen as the active constituent as marketed by Sumitomo Chemical Australia Pty Ltd.

An un-replicated randomised single plot design was used at each test site.

The treatments and sampling times for Trial 6294, Uraidla South Australia, are presented in the table below:

Number	Treatment	Rate Applied (Actual*)	Application Times DBFS	Sampling Times DALA
1.	Untreated control			1
2.	ADMIRAL	500 (486) mL/ha	14, 0	0, 1, 5, 7

*Averaged over all applications
DBFS - days before first sampling
DALA - days after last application

The treatments and sampling times for Trial 6295, Pearcedale Victoria, are presented in the table below:

Number	Treatment	Rate Applied (Actual*)	Application Times DBFS	Sampling Times DALA
1.	Untreated control			2
2.	ADMIRAL	500 (515) mL/ha	14, 0	0, 2, 6, 7

*Averaged over all applications
DBFS - days before first sampling
DALA - days after last application

The treatments and sampling times for Trial 6296, Lara Victoria, are presented in the table below:

Number	Treatment	Rate Applied (Actual*)	Application Times DBFS	Sampling Times DALA
1.	Untreated control			1
2.	ADMIRAL	500 (510) mL/ha	14, 0	0, 1, 6, 7

*Averaged over all applications
DBFS - days before first sampling
DALA - days after last application

The treatments and sampling times for Trial 6297, South Werribee Victoria, are presented in the table below:

Number	Treatment	Rate Applied (Actual*)	Application Times DBFS	Sampling Times DALA
1.	Untreated control			1
2.	ADMIRAL	500 (500) mL/ha	14, 0	0, 1, 4, 7

*Averaged over all applications
DBFS - days before first sampling
DALA - days after last application

The treatments and sampling times for Trial 6298, Geelong Victoria, are presented in the table below:

Number	Treatment	Rate Applied (Actual*)	Application Times DBFS	Sampling Times DALA
1.	Untreated control			1
2.	ADMIRAL	500 (498) mL/ha	13, 0	0, 1, 5, 7

*Averaged over all applications
DBFS - days before first sampling
DALA - days after last application

The treatments and sampling times for Trial 6299, Toowoomba Queensland, are presented in the table below:

Number	Treatment	Rate Applied (Actual*)	Application Times DBFS	Sampling Times DALA
1.	Untreated control			1
2.	ADMIRAL	500 (500) mL/ha	14, 0	0, 1, 5, 7

*Averaged over all applications
DBFS - days before first sampling
DALA - days after last application

The treatments were applied in a manner that simulated best commercial practice for the application of insecticides in leafy lettuce. Treatments were applied by a horizontal boom spray in sufficient water to ensure even and thorough coverage of all parts of each plant.

At least 12 plants were sampled from each treatment for each sample with the roots removed. Two samples were taken from each treatment on each sampling date with one being the Primary Sample and the other the Reserve Sample.

Pyriproxyfen residues were determined according to methods developed by Agrisearch Analytical: "Determination of Multi-Residues in Whole plant and Vegetables using DSPE", AATM-S-60, Revision 5, Agrisearch Analytical Pty Ltd, 20 February 2006.

Most of the treated samples of leafy lettuce were found to contain residues of pyriproxyfen at quantifiable levels (>0.05 mg/kg) after two applications of ADMIRAL INSECT GROWTH REGULATOR made 13-14 days apart. Residues of pyriproxyfen in field grown leafy lettuce ranged from 0.13-2.1 mg/kg at 1 or 2 DAT 2 to 0.09-0.77 mg/kg at 7 DAT 2. Residues of pyriproxyfen in greenhouse grown leafy lettuce ranged from 0.94-3.1 mg/kg at 1 DAT 2 to 0.85-1.6 mg/kg at 7 DAT 2. Residues of pyriproxyfen in greenhouse hydroponic grown leafy lettuce ranged from 2.1-3.3 mg/kg at 1 DAT 2 to 0.97-2.5 mg/kg at 7 DAT 2.

5.7 HAL/GLP/06/02-7; Residues of trifloxystrobin in greenhouse hydroponic grown capsicums and cucumbers after applications of FLINT 500 WG FUNGICIDE – Study AVG1431 – Four sites; one capsicum study in Gosford region New South Wales, one capsicum and one cucumber study in Adelaide region South Australia, one cucumber study in Bundaberg region Queensland.

This study was conducted to determine the tissue residue profile of trifloxystrobin in greenhouse hydroponic grown capsicums and cucumbers after applications of FLINT 500 WG FUNGICIDE. The study consisted of four field sites; Glenorie New South Wales, Two Wells South Australia (two sites) and Coonarr Queensland. The study co-ordination was conducted by Agrisearch Services Pty Ltd at Orange, New South Wales and the analytical component was conducted at Agrisearch Analytical Pty Ltd at Rozelle, New South Wales. The study was conducted under the OECD Principles of Good Laboratory Practice (GLP).

The test substance was as follows:

FLINT 500 WG FUNGICIDE - a water dispersible granule formulation containing 500 g/kg trifloxystrobin as the active constituent as marketed by Bayer CropScience Pty Ltd.

An un-replicated randomised single plot design was used at each test site.

The treatments and sampling times for Trial 6561, Glenorie New South Wales, are presented in the table below:

Number	Treatment	Rate Applied (Actual*)	Application Times DBFS	Sampling Times DALA
1.	Untreated control			8
2.	FLINT	150 (153) g/ha	28, 0	0, 3, 8, 14

*Averaged over all applications
DBFS - days before first sampling
DALA - days after last application

The treatments and sampling times for Trial 6562, Two Wells South Australia, are presented in the table below:

Number	Treatment	Rate Applied (Actual*)	Application Times DBFS	Sampling Times DALA
1.	Untreated control			7
2.	FLINT	150 (150) g/ha	28, 0	0, 3, 7, 14

*Averaged over all applications
DBFS - days before first sampling
DALA - days after last application

The treatments and sampling times for Trial 6563, Coonarr, Queensland, are presented in the table below:

Number	Treatment	Rate Applied (Actual*)	Application Times DBFS	Sampling Times DALA
1.	Untreated control			7
2.	FLINT	150 (147) g/ha	31, 0	0, 3, 7, 14

*Averaged over all applications
DBFS - days before first sampling
DALA - days after last application

The treatments and sampling times for Trial 6564, Two Wells South Australia, are presented in the table below:

Number	Treatment	Rate Applied (Actual*)	Application Times DBFS	Sampling Times DALA
1.	Untreated control			7
2.	FLINT	150 (152) g/ha	28, 0	0, 3, 7, 14

*Averaged over all applications
DBFS - days before first sampling
DALA - days after last application

The treatments were applied in a manner that simulated best commercial practice for the application of fungicides in hydroponic grown capsicums and cucumbers. Treatments were applied by a horizontal or vertical boom spray in sufficient water to ensure even and thorough coverage of all parts of each plant.

At least 12 fruit and at least 2 kilograms of fruit were sampled from 12 individual plants of each treatment for each sample. Two samples were taken from each treatment on each sampling date with one being the Primary Sample and the other the Reserve Sample.

Trifloxystrobin residues were determined according to methods developed by Agrisearch Analytical:

“Determination of Multi-Residues in Fruit and Vegetables using DSPE”, AATM-S-60, Revision 5, Agrisearch Analytical Pty Ltd, 20 February 2006.

Most of the treated samples of hydroponic grown capsicums and cucumbers were found to contain residues of trifloxystrobin at detectable levels (>0.02 mg/kg) after two applications of FLINT 500 WG FUNGICIDE made 28-31 days apart. Residues of trifloxystrobin ranged from 0.02-0.03 mg/kg at 3 DAT 2, <LOD-0.05 mg/kg at 7-8 DAT 2 to <LOD-0.02 mg/kg at 14 DAT 2.

6. TECHNOLOGY TRANSFER

The data generated from the studies reported on here have been included or will be included in submissions to the Australian Pesticides and Veterinary Medicines Authority. These submissions are for permit applications, pesticide label extensions or for inclusion in complete pesticide registration applications. The results of the applications are disseminated on the APVMA website, the Government Gazette and by industry publications. There is also an ongoing rationalisation of pesticide permits and the transfer of permits to current pesticide labels.

7. RECOMMENDATIONS

The major outcome of this project is that pesticides that could not be legally used by vegetable growers will now be available, thus providing growers with a broader range of options in the control of diseases and insect pests from which their crops suffer.

This project has been part of a larger programme of research that has been conducted over the past few years. Although the outcomes of this project have been met there is an ongoing need for growers to have access to newer and better pesticides and so similar projects should be planned and conducted in the future.