Generation of Residue Data for Vegetable Minor-use Permit Applications - 2009 - Agrisearch

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GENERATION OF RESIDUE DATA FOR PESTICIDE MINOR-USE PERMIT APPLICATIONS IN VEGETABLE CROPS 2009 - STUDIES CONDUCTED BY AGRISEARCH SERVICES PTY LTD AUSTRALIA, 2009-2011

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This Final Report provides details of studies undertaken to generate pesticide residue data in a range of vegetable crops to support minor-use registration applications to the Australian Pesticides and Veterinary Medicines Authority (APVMA).

This project was funded by Horticulture Australia Limited using the vegetable levy and matched funds from the Australian Government.

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April 2011

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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, 9 studies were conducted on 8 different fungicides, herbicides and insecticides. These studies were conducted at 22 different field sites in New South Wales, Queensland, Victoria, South Australia and Western Australia on the crops; greenhouse and hydroponic grown eggplants and cucumbers and field grown cucumber, cauliflower, broccoli, Brussels sprouts, beans, shallots, spring onions, pak choy, red mustard, celeriac and sweet corn.

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

Nine studies were conducted on 8 different fungicides, herbicides and insecticides. These studies were conducted at 22 different field sites in New South Wales, Queensland, Victoria, South Australia and Western Australia on the crops; greenhouse and hydroponic grown eggplants and cucumbers and field grown cucumber, cauliflower, broccoli, Brussels sprouts, beans, shallots, spring onions, pak choy, red mustard, celeriac and sweet corn. 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:

- TALSTAR 100 EC INSECTICIDE/MITICIDE - 100 g/L bifenthrin as the active
- NIMROD SYSTEMIC FUNGICIDE - 250 g/L bupirimate
- CROP CARE SECURE 360 SC INSECTICIDE-MITICIDE - 360 g/L chlorfenapyr
- HY-MAL INSECTICIDE - 1150 g/L maldison (malathion)
- DUAL GOLD HERBICIDE - 960 g/L S-metolachlor
- NUFARM PROMETRYN 900DF HERBICIDE - 900 g/kg prometryn
- TILT 250 EC SYSTEMIC FUNGICIDE - 250 g/L propiconazole

The studies conducted were as follows:

- HAL/GLP/09/05; Determination of bifenthrin residues in cucumbers - Study AVG1067
- HAL/GLP/09/13; Determination of bifenthrin residues in broccoli, Brussels sprouts and cauliflower - Study AVG1067
- HAL/GLP/09/14; Determination of bifenthrin residues in beans - Study AVG1067
- HAL/GLP/09/15; Determination of bupirimate residues in eggplant - Study HAL1807
- HAL/GLP/09/16; Determination of chlorfenapyr residues in spring onions and shallots - Study AVG521
- HAL/GLP/09/17; Determination of maldison residues in cucumber - Study AVG1035
- HAL/GLP/09/18; Determination of S-metolachlor residues in red mustard and pak choy - Study AVG1049
- HAL/GLP/09/19; Determination of prometryn residues in celeriac - Study HAL1547
- HAL/GLP/09/20; Determination of propiconazole residues in sweet corn foliage - Study AVG704

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. 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, herbicides 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 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 Study Report for each of the eight 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

Nine studies were conducted on 8 different fungicides, herbicides and insecticides. These studies were conducted at 22 different field sites in New South Wales, Queensland, Victoria, South Australia and Western Australia on the crops; greenhouse and hydroponic grown eggplants and cucumbers and field grown cucumber, cauliflower, broccoli, Brussels sprouts, beans, shallots, spring onions, pak choy, red mustard, celeriac and sweet corn. 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).

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

The trial was conducted under Horticulture Australia Limited project VG09140 Agrisearch Projects HAL/GLP/09/05,13-20.

4. MATERIALS AND METHODS

4.1 Individual Study Details

Nine 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/09/05; Determination of bifenthrin residues in cucumbers - Study AVG1067 – Four sites; three in protected structures on cucumbers and one site in field grown cucumbers. Sites located in South Australia, Queensland, Victoria, and New South Wales.

HAL/GLP/09/13; Determination of bifenthrin residues in broccoli, Brussels sprouts and cauliflower - Study AVG1067 – three sites; one site in broccoli, one site in Brussels sprouts and one site in cauliflower. Sites located in Victoria and two in New South Wales.

HAL/GLP/09/14; Determination of bifenthrin residues in beans - Study AVG1067 – one site in field grown beans in Queensland.

HAL/GLP/09/15; Determination of bupirimate residues in eggplant - Study HAL1807 – two sites in protected structures on eggplants. Sites located in South Australia and New South Wales.

HAL/GLP/09/16; Determination of chlorfenapyr residues in spring onions and shallots - Study AVG521 – three sites; one site in shallots and two sites in spring onions. Sites located in South Australia, Victoria, and New South Wales.

HAL/GLP/09/17; Determination of maldison residues in cucumber - Study AVG1035 – three sites; two in cucumbers grown in protected structures and one site in field grown cucumbers. Sites located in South Australia, Queensland and Victoria.

HAL/GLP/09/18; Determination of S-metolachlor residues in red mustard and pak choy - Study AVG1049 – two sites; one in pak choy and in red mustard. Both sites located in Western Australia.

HAL/GLP/09/19; Determination of prometryn residues in celeriac - Study HAL1547 – two sites in celeriac. Sites located in South Australia and Queensland.

HAL/GLP/09/20; Determination of propiconazole residues in sweet corn foliage - Study AVG704 – two sites in sweet corn. Sites located in Queensland and New South Wales.

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. 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 Australian 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:

TALSTAR 100 EC INSECTICIDE/MITICIDE - an emulsifiable concentrate formulation containing 100 g/L bifenthrin as the active. The sample was supplied by FMC Australasia Pty Ltd.

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

CROP CARE SECURE 360 SC INSECTICIDE-MITICIDE - an emulsifiable concentrate formulation containing 360 g/L chlorfenapyr as the active constituent. The sample was supplied by Crop Care.

HY-MAL INSECTICIDE – a liquid concentrate formulation containing 1150 g/L maldison (malathion) as the active constituent. The sample was supplied by Nufarm Australia Limited.

DUAL GOLD HERBICIDE – an emulsifiable concentrate formulation containing 960 g/L S-metolachlor as the active constituent. The batch number of the test item used was SMO51488 with a date of analysis of 12 Jan 2006. The sample was supplied by Syngenta Crop Protection.

NUFARM PROMETRYN 900DF HERBICIDE – a water dispersible granule formulation containing 900 g/kg prometryn as the active constituent. The sample was supplied by Nufarm Australia Ltd.

TILT 250 EC SYSTEMIC FUNGICIDE - an emulsifiable concentrate formulation containing 250 g/L propiconazole as the active constituent. The sample was supplied by Syngenta Crop Protection 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 ensure even and thorough coverage, 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.

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 Agrisearch Analytical Pty Ltd. 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 nine studies.

5. RESULTS AND DISCUSSION

Summaries of the nine studies are presented below.

5.1 HAL/GLP/09/05; Determination of bifenthrin residues in cucumbers - Study AVG1067 – Four sites; three in protected structures on cucumbers and one site in field grown cucumbers. Sites located in South Australia, Queensland, Victoria, and New South Wales

This study was conducted to determine the tissue residue profile of bifenthrin when applied to field grown and protected grown cucumbers. The study consisted of 4 field sites at Bundaberg Qld, Virginia SA, Lara Vic and Peats Ridge NSW, Australia.

The test item was as follows:

TALSTAR 100 EC INSECTICIDE/MITICIDE - an emulsifiable concentrate formulation containing 100 g/L bifenthrin as the active. The sample was supplied by FMC Australasia Pty Ltd.

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

The treatments and sampling times for Trial 090599, Virginia SA are presented in the table below:

Treatment	Rate Applied (Actual*)	Number of Applications (and Intervals)*	Sampling Times
1. Untreated control	--	-	3 DAT 2
2. TALSTAR +	800 (807) mL/ha	2 (at 6 days)	0, 3, 5, 7 DAT 2

+ SYNERGY at 400 mL/ha
*Averaged over all applications
DAT - days after treatment

The treatments and sampling times for Trial 090560, Lara Vic are presented in the table below:

Treatment	Rate Applied (Actual*)	Number of Applications (and Intervals)*	Sampling Times
1. Untreated control	--	-	3 DAT 2
2. TALSTAR +	800 (823) mL/ha	2 (at 7 days)	0, 3, 5, 7 DAT 2

+ SYNERGY at 400 mL/ha
*Averaged over all applications
DAT - days after treatment

The treatments and sampling times for Trial 090560, Peats Ridge NSW are presented in the table below:

Treatment	Rate Applied (Actual*)	Number of Applications (and Intervals)*	Sampling Times
1. Untreated control	--		3 DAT 2
2. TALSTAR +	800 (793) mL/ha	2 (at 7 days)	0, 3, 5, 7 DAT 2

+ SYNERGY at 400 mL/ha
*Averaged over all applications
DAT - days after treatment

The treatments and sampling times for Trial 090562, Bundaberg Qld are presented in the table below:

Treatment	Rate Applied (Actual*)	Number of Applications (and Intervals)*	Sampling Times
1. Untreated control	--		3 DAT 2
2. TALSTAR +	800 (799) mL/ha	2 (at 9 days)	0, 3, 5, 7 DAT 2

+ SYNERGY at 400 mL/ha
*Averaged over all applications
DAT - days after treatment

The treatments were applied in a manner that simulated best commercial practice for the application of TALSTAR 100EC INSECTICIDE/MITICIDE in field and protected grown cucumber crops. Treatments were applied by boom spray using application volume of 537 L/ha to 821 L/ha to ensure even and thorough coverage of all parts of each plant.

At least 12 cucumbers were sampled from 12 individual cucumber plants (except samples 090562-1 to 090562-5) of each treatment for each sample. The samples were taken from all parts of the plot, however the ends 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, except for trial no. 090562.

Bifenthrin residues were determined according to:

> *"Determination of Multi-Pesticide Residues in Plant Using DSPE" AATM-S-60.1, Revision 1, Agrisearch Analytical Pty Ltd, 18 May 2010"*

In all trials, two applications of TALSTAR 100EC INSECTICIDE (100 g/L bifenthrin) were made at 800 mL/ha (80 g ai/ha) at an interval of 6-9 days. Samples for residue analysis were taken 0, 3, 5 and 7 days after the last application.

5.2 HAL/GLP/09/13; Determination of bifenthrin residues in broccoli, Brussels sprouts and cauliflower - Study AVG1067 – three sites; one site in broccoli, one site in Brussels sprouts and one site in cauliflower. Sites located in Victoria and two in New South Wales.

This study was conducted to determine the tissue residue profile of bifenthrin when applied to field grown broccoli, Brussels sprouts, and cauliflower. The study consisted of 3 field sites at Mangrove Mountain NSW, Coldstream Victoria, and Bathurst NSW, Australia.

The test item was as follows:

TALSTAR 100 EC INSECTICIDE/MITICIDE - an emulsifiable concentrate formulation containing 100 g/L bifenthrin as the active constituent. The sample was supplied by FMC Australasia Pty Ltd.

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

The treatments and sampling times for Trial 090681, Mangrove Mountain NSW are presented in the table below:

Treatment	Rate Applied (Actual*)	Application Times DBFS	Sampling Times DALA
1. Untreated control			7 DAT2
2. TALSTAR + SYNERGY	600 (652.2)mL/ha + 400 (434.8)mL/ha	2 (at 7 days)	0, 3, 7, 10 DAT2

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

The treatments and sampling times for Trial 090682, Coldstream Vic are presented in the table below:

Treatment	Rate Applied (Actual*)	Application Times DBFS	Sampling Times DALA
1. Untreated control			7 DAT2
2. TALSTAR + SYNERGY	600 (599.8) mL/ha + 400 (399.9) mL/ha	2 (at 7 days)	0, 3, 7, 10 DAT2

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

The treatments and sampling times for Trial 090683, Bathurst NSW are presented in the table below:

Treatment	Rate Applied (Actual*)	Application Times DBFS	Sampling Times DALA
1. Untreated control			7 DAT2
2. TALSTAR + SYNERGY	600 (622.5) mL/ha + 400 (415) mL/ha	2 (at 7 days)	0, 3, 7, 10 DAT2

*Averaged over all applications

The treatments were applied in a manner that simulated best commercial practice for the application of TALSTAR 100EC INSECTICIDE/MITICIDE in field grown broccoli, Brussels sprouts, and cauliflower crops. Treatments were applied by boom spray in an application volume of 318-1006 L/ha to ensure even and thorough coverage of all parts of each plant.

At least 12 broccoli infloresecences with stem were sampled from 12 individual broccoli plants (except samples 090681-5 & 090681-10) of each treatment for each sample. The samples were taken from all parts of each plot, however the ends 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.

At least 1 kg of Brussels sprouts were sampled from 12 individual Brussels sprouts plants of each treatment for each sample. The samples were taken from all parts of each plot, however the ends 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.

At least 12 cauliflower heads were sampled from 12 individual cauliflower plants with a minimum weight of 2 kg of each treatment for each sample. The samples were taken from all parts of each plot, however the ends 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.

Bifenthrin residues were determined according to:

> *"Determination of Multi-Pesticide Residues in Plant Using DSPE" AATM-S-60.1, Revision 1, Agrisearch Analytical Pty Ltd, 18 May 2010"*

In all trials, two applications of TALSTAR 100EC INSECTICIDE (100 g/L bifenthrin) were made at 600 mL/ha (60 g ai/ha) at an interval of 7 days. Samples for residue analysis were taken 0, 3, 7 and 10 days after the last application.

5.3 HAL/GLP/09/14; Determination of bifenthrin residues in beans - Study AVG1067 – one site in field grown beans in Queensland.

This study was conducted to determine the tissue residue profile of bifenthrin when applied to a field grown bean crop. The study consisted of 1 field site at Lowood Queensland.

The test item was as follows:

TALSTAR 100 EC INSECTICIDE/MITICIDE - an emulsifiable concentrate formulation containing 100 g/L bifenthrin as the active constituent. The sample was supplied by FMC Australasia Pty Ltd.

The pyrethroid synergist SYNERGY INSECTICIDE SYNERGIST, a liquid formulation containing 800 g/L piperonyl butoxide, was applied in tank mixture with the test item.

An un-replicated large plot design was used at the field test site.

The treatments and sampling times for Trial 090685, Lowood Queensland are presented in the table below:

Treatment	Rate Applied (Actual*)	Number of Applications (and Intervals)	Sampling Times DALA
1. Untreated control			2 DAT2
2. TALSTAR + SYNERGY	600 (593) mL/ha + 400 (395) mL/ha	2 (at 7 days)	0, 1, 2, 5 DAT2

*Averaged over all applications
DALA – days after the last application
DAT2 - days after the second application of treatment 2

The treatments were applied in a manner that simulated best commercial practice for the application of TALSTAR 100EC INSECTICIDE/MITICIDE in field grown bean crops. Treatments were applied in good weather conditions by boom spray in sufficient water to ensure even and thorough coverage of all parts of each plant. Beans were sampled from at least 12 individual plants with a weight of between 280 g to 670 g from each treatment for each sample, rather than the 1 kg per sample required in the study plan (see deviation). The samples were taken from all parts of the plot, however the ends 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.

Bifenthrin residues were determined according to an analytical method developed by Agrisearch Analytical Pty Ltd:

> *"Determination of Multi-Pesticide Residues in Plant Using DSPE" AATM-S-60.1, Revision 1, Agrisearch Analytical Pty Ltd, 18 May 2010"*

In the field trial two applications of TALSTAR 100EC INSECTICIDE (100 g/L bifenthrin) were made at 600 mL/ha (60 g ai/ha) at an interval of 7 days. Samples for residue analysis were taken 0, 1, 2 and 5 days after the last application.

5.4 HAL/GLP/09/15; Determination of bupirimate residues in eggplant - Study HAL1807 – two sites in protected structures on eggplants. Sites located in South Australia and New South Wales.

This study was conducted to determine the tissue residue profile of bupirimate when applied to hydroponically grown eggplants in protected structures. The study consisted of 2 field sites at Rossmore NSW, and Virginia SA.

The test items were as follows:

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

An unreplicated large plot design was used at each test site.

The treatments and sampling times for Trial 090687, Rossmore NSW are presented in the table below:

Treatment	Rate Applied (Actual*)	Application Times DBFS	Sampling Times DALA
1. Untreated control			1 DAT3
2. NIMROD	600 (604) mL/ha	13, 7, 0	0, 1, 3, 5 DAT3

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

The treatments and sampling times for Trial 090688, Virginia SA are presented in the table below:

Treatment	Rate Applied (Actual*)	Application Times DBFS	Sampling Times DALA
1. Untreated control			1 DAT3
2. NIMROD	600 (607) mL/ha	14, 7, 0	0, 1, 3, 5 DAT3

*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 NIMROD SYSTEMIC FUNGICIDE in eggplants grown in protected structures. Treatments were applied by a hand held lance or hand held boom in sufficient water to ensure even and thorough coverage of all parts of each plant.

At least 12 fruit were sampled from 12 individual plants each weighing a minimum of 2 kg from each treatment for each sample (except for some samples in Trial 090688). The samples were taken from all parts of the plot, however the ends 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.

Bupirimate residues were determined according to:

> *"Determination of Multi-Pesticide Residues in Plant Using DSPE" AATM-S-60.1, Revision 1, Agrisearch Analytical Pty Ltd, 18 May 2010"*

In both trials, three applications of NIMROD SYSTEMIC FUNGICIDE (250 g/L bupirimate) were made at 600 mL/ha (150 g ai/ha) at an interval of 6-7 days. Samples for residue analysis were taken 0, 1, 3 and 5 days after the last application.

5.5 HAL/GLP/09/16; Determination of chlorfenapyr residues in spring onions and shallots - Study AVG521 – three sites; one site in shallots and two sites in spring onions. Sites located in South Australia, Victoria, and New South Wales.

This study was conducted to determine the tissue residue profile of chlorfenapyr when applied to field grown shallots and Spring onions. The study consisted of 3 field sites at Gatton Qld, Waterloo Corner SA and Clyde Vic, Australia.

The test items were as follows:

CROP CARE SECURE 360 SC INSECTICIDE-MITICIDE - an emulsifiable concentrate formulation containing 360 g/L chlorfenapyr as the active constituent. The sample was supplied by Crop Care.

An unreplicated large plot design was used at each test site.

The treatments and sampling times for Trial 090690, Gatton Qld, are presented in the table below:

Treatment	Rate Applied (Actual*)	Application Times DBFS	Sampling Times DALA
1. Untreated control			7 DAT3
2. SECURE	400 (399) mL/ha	3 (at 3 days)	0, 3, 7, 10 DAT3

*Averaged over all applications
DBFS - days before first sampling
DALA - days after last application
DAT3 - days after the third application

The treatments and sampling times for Trial 090691, Waterloo Corner SA, are presented in the table below:

Treatment	Rate Applied (Actual*)	Application Times DBFS	Sampling Times DALA
1. Untreated control			7 DAT3
2. SECURE	400 (399) mL/ha	3 (at 3 days)	0, 3, 7, 10 DAT3

*Averaged over all applications
DBFS - days before first sampling
DALA - days after last application
DAT3 - days after the third application

The treatments and sampling times for Trial 09069, Clyde Vic, are presented in the table below:

Treatment	Rate Applied (Actual*)	Application Times DBFS	Sampling Times DALA
1. Untreated control			7 DAT3
2. SECURE	400(421) mL/ha	3 (at 3 and 4 days)	0, 3, 7, 10 DAT3

*Averaged over all applications
DBFS - days before first sampling
DALA - days after last application
DAT3 - days after the third application

The treatments were applied in a manner that simulated best commercial practice for the application of SECURE 360 SC in field grown spring onions and shallots. Treatments were applied by boom spray, application volume ranged from 341 to 491 L/ha to ensure even and thorough coverage of all parts of each plant.

At least 2 kg of stems were sampled from at least 24 individual spring onion plants, and a minimum of 0.35 kg of shallots were sampled from 12 plants for each sample. The samples were taken from all parts of the plot, however the ends 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.

Chlorfenapyr residues were determined according to:

> *"Determination of Multi-Pesticide Residues in Plant Using DSPE" AATM-S-60.1, Revision 1, Agrisearch Analytical Pty Ltd, 18 May 2010"*

In all trials, three applications of SECURE 360 SC INSECTICIDE-MITICIDE (360 g/ chlorfenapyr) were made at 400 mL/ha (144 g ai/ha) at an interval of 3-4 days. Samples for residue analysis were taken 0, 3, 7 and 10 days after the last application.

5.6 HAL/GLP/09/17; Determination of maldison residues in cucumber - Study AVG1035 – three sites; two in cucumbers grown in protected structures and one site in field grown cucumbers. Sites located in South Australia, Queensland and Victoria.

This study was conducted to determine the tissue residue profile of maldison (malathion) when applied to field grown and protected grown cucumbers. The study consisted of three field sites at Lara in Victoria, Virginia in South Australia and Bundaberg in Queensland, Australia.

The study co-ordination was conducted by Agrisearch Services Pty Ltd at West Gosford and Reservoir and the analytical component was conducted at Agrisearch Analytical Pty Ltd, 1/48 Victoria Rd, Rozelle, NSW. The study was conducted under the OECD Principles of Good Laboratory Practice (GLP).

The test item was as follows:

HY-MAL INSECTICIDE – a liquid concentrate formulation containing 1150 g/L maldison (malathion) as the active constituent. The sample was supplied by Nufarm Australia Limited.

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

The treatments and sampling times for Trial 090694, Lara Vic are presented in the table below:

Treatment	Rate Applied	Number of Applications (and Intervals)*	Sampling Times
1. Untreated control			3 DAT 4
2. HY-MAL + AUTOLISATE YEAST	435 mL/100 L + 2 L/100 L	4 (at 7 days)	0, 1, 3, 5, 7 DAT 4

DAT - days after treatment

The treatments and sampling times for Trial 090695, Virginia SA are presented in the table below:

Treatment	Rate Applied	Number of Applications (and Intervals)*	Sampling Times
1. Untreated control			3 DAT 4
2. HY-MAL + AUTOLISATE YEAST	435 mL/100 L + 2 L/100 L	4 (at 6-8 days)	0, 1, 3, 5, 7 DAT 4

DAT - days after treatment

The treatments and sampling times for Trial 090696, Bundaberg Qld are presented in the table below:

Treatment	Rate Applied	Number of Applications (and Intervals)*	Sampling Times
1. Untreated control			3 DAT 4
2. HY-MAL + AUTOLISATE YEAST	435 mL/100 L + 2 L/100 L	4 (at 7-9 days)	0, 1, 3, 5, 7 DAT 4

DAT - days after treatment

The treatments were applied in a manner that simulated best commercial practice for the application of HY-MAL INSECTICIDE in field and protected grown cucumber crops. Treatments were applied by boom spray in sufficient water to ensure even and thorough coverage of all parts of each plant.

At least 12 cucumbers were sampled from 12 individual cucumber plants (except samples 090696-1 to 090696-12) of each treatment for each sample. The samples were taken from all parts of the plot, however the ends 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.

Maldison (malathion) residues were determined according to:

> *"Determination of Multi-Pesticide Residues in Plant Using DSPE" AATM-S-60.1, Revision 1, Agrisearch Analytical Pty Ltd, 18 May 2010"*

In all trials, four applications of HY-MAL INSECTICIDE (1150 g/L maldison) were made at 435 mL/100 L at an interval of 7 to 9 days. Samples for residue analysis were taken 0, 1, 3, 5 and 7 days after the last application

5.7 HAL/GLP/09/18; Determination of S-metolachlor residues in red mustard and pak choy - Study AVG1049 – two sites; one in pak choy and in red mustard. Both sites located in Western Australia.

This study was conducted to determine the tissue residue profile of S-metachlor residues in red mustard and pak choy following a post transplant application of DUAL GOLD HERBICIDE. The study consisted of 2 field sites at Manjimup Western Australia.

The study co-ordination was conducted by Agrisearch Services Pty Ltd at West Gosford and Melbourne and the analytical component was conducted at Agrisearch Analytical Pty Ltd, 1/48 Victoria Rd, Rozelle, New South Wales. The study was conducted under the OECD Principles of Good Laboratory Practice (GLP).

The test items were as follows:

DUAL GOLD HERBICIDE – an emulsifiable concentrate formulation containing 960 g/L S-metachlor as the active constituent. The batch number of the test item used was SMO51488 with a date of analysis of 12 Jan 2006. The sample was supplied by Syngenta Crop Protection.

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

The treatments and sampling times for Trial 090698 and Trial 090699, Manjimup Western Australia are presented in the table below:

Treatment	Rate Applied (Actual)	Application Number*	Sampling Interval from Application Number
1. Untreated control	-	-	Commercial harvest
2. DUAL GOLD	2.0 (1.94) L/ha	1	Commercial harvest

* The treatments were applied on one occasion immediately post-transplant

The treatments were applied in a manner that simulated best commercial practice for the application of DUAL GOLD HERBICIDE in field grown pak choy and red mustard crops. Treatments were applied by boom spray in sufficient water to ensure even and thorough coverage of all parts of each plant.

At least 2 kg of pack choy leaves and stem with roots removed were sampled from 12 individual plants from each treatment for each sample. The samples were taken from all parts of the plot, however the ends 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.

At least 0.5 kg of red mustard leaves and stem with roots removed were sampled from at least 24 individual plants from each treatment for each sample. The samples were taken from all parts of the plot, however the ends 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.

S-metachlor residues were determined according to:

> *"Determination of Multi-Pesticide Residues in Plant Using DSPE" AATM-S-60.1, Revision 1, Agrisearch Analytical Pty Ltd, 18 May 2010"*

In both trials, a single application of DUAL GOLD HERBICIDE (960 g/LS-metachlor) was made at 2.0 L/ha (1920 g ai/ha) at transplanting when plants were approximately at the 2 leaf stage. Samples for residue analysis were taken at commercial harvest.

5.8 HAL/GLP/09/19; Determination of prometryn residues in celeriac - Study HAL1547 – two sites in celeriac. Sites located in South Australia and Queensland.

This study was conducted to determine the tissue residue profile of prometryn when applied to field grown celeriac. The study consisted of 2 field sites at Gooburrum in Queensland and Currency Creek in South Australia, Australia.

The test items were as follows:

NUFARM PROMETRYN 900DF HERBICIDE – a water dispersible granule formulation containing 900 g/kg prometryn as the active constituent. The sample was supplied by Nufarm Australia Ltd.

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

The treatments and sampling times for Trial 090701, Gooburrum Qld are presented in the table below:

Treatment	Rate Applied (Actual)	Application Number	Sampling Times DALA*
1. Untreated control			Commercial harvest
2. PROMETRYN	1.2 (1.21)kg/ha	1	Commercial harvest

DALA = Days After Last Application

The treatments and sampling times for Trial 090702, Currency Creek SA are presented in the table below:

Treatment	Rate Applied (Actual*)	Application Number*	Sampling Times DALA**
1. Untreated control			Commercial harvest
2. PROMETRYN	1.2 (1.25)kg/ha	1	Commercial harvest

DALA = Days After Last Application

The treatments were applied in a manner that simulated best commercial practice for the application of NUFARM PROMETRYN 900DF HERBICIDE in field grown celeriac crops. Treatments were applied by boom spray, application volume ranged from 138 to 156 L/ha to ensure even and thorough coverage of all parts of each plant.

At least 2 kg (except for samples no 090701-1 to 090701-4) of celeriac roots were sampled from 12 individual plants from each treatment for each sample. The samples were taken from all parts of the plot, however the ends 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.

Prometryn residues were determined according to the method:

> *"Determination of Multi-Pesticide Residues in Plant Using DSPE" AATM-S-60.1, Revision 1, Agrisearch Analytical Pty Ltd, 18 May 2010"*

In both trials, a single application of PROMETRYN 900DF HERBICIDE (900 g/kg prometryn) were made at 1.2 kg/ha (1008 g ai/ha) at 5 leaf stage of the crop. Samples for residue analysis were taken at commercial harvest.

5.9 HAL/GLP/09/20; Determination of propiconazole residues in sweet corn foliage - Study AVG704 – two sites in sweet corn. Sites located in Queensland and New South Wales.

This study was conducted to determine the tissue residue profile of propiconazole in sweet corn foliage when applied to field grown sweet corn. The study consisted of 2 field sites at The Lagoon in New South Wales and Mulgowie in Queensland, Australia.

The study co-ordination was conducted by Agrisearch Services Pty Ltd at West Gosford and Melbourne and the analytical component was conducted at Agrisearch Analytical Pty Ltd, 1/48 Victoria Rd, Rozelle, NSW, Australia. The study was conducted under the OECD Principles of Good Laboratory Practice (GLP).

The test items were as follows:

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

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

The treatments and sampling times for Trial 090704, The Lagoon NSW are presented in the table below:

Treatment	Rate Applied (Actual*)	Application Number*	Sampling Times DALA**
1. Untreated control			28 DAT2
2. TILT	500 (505)mL/ha	2 (at 14 days)	14, 28 DAT2

*The second application of Treatment 2 was approximately 28 days before the time of optimum commercial harvest
** 28 DAT2 - 28 days after the second application of Treatment 2

The treatments and sampling times for Trial 090705, Mulgowie Qld are presented in the table below:

Treatment	Rate Applied (Actual*)	Application Number*	Sampling Times DALA**
1. Untreated control			28 DAT2
2. TILT	500 (515.5) mL/ha	2 (at 14 days)	14, 28 DAT2

*The second application of Treatment 2 was approximately 28 days before the time of optimum commercial harvest
** 28 DAT2 - 28 days after the second application of Treatment 2

The treatments were applied in a manner that simulated best commercial practice for the application of TILT 250 EC SYSTEMIC FUNGICIDE in field grown sweet corn crops. Treatments were applied by boom spray in sufficient water to ensure even and thorough coverage of all parts of each plant. Volume of application ranged from 176.99 L/ha to 322.4 L/ha.

At least 2 kg (except for samples 090705-1, 090705-2, 090705-3, 090705-4, 090705-5, 090705-6) of foliage was sampled from 12 individual plants from each treatment for each sample. The samples were taken from all parts of the plot, however the ends 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.

Propiconazole residues were determined according to:

> *"Determination of Multi-Pesticide Residues in fruit and Vegetable Using DSPE" AATM-S-60.1, Revision 1, Agrisearch Analytical Pty Ltd, 18 May 2010"*

In both trials, two applications of TILT 250 EC SYSTEMIC FUNGICIDE (250 g/L propiconazole) were made at 500 mL/ha (125 g ai/ha) at an interval of 14 days. Samples for residue analysis were taken 14 and 28 days after the last application.

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.