Generation of residue, efficacy and crop safety data for pesticide minor-use permit applications - AgriSolutions

Andrew Keats
AgriSolutions Australia Pty Ltd

Project Number: VG11029

VG11029

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HAL Project VG11029

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Generation of residue, efficacy and crop safety data for pesticide minor-use permit applications - AgriSolutions

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HAL Project VG11029

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This report provides an outline of trials from three studies that were undertaken to generate pesticide residue data in vegetables to support applications for minor-use permits in various vegetable crops to the Australian Pesticides and Veterinary Medicines Authority (APVMA).

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Media Summary:

Growers of minor vegetable crops are often left without viable methods of controlling pests in their crops. To assist these growers, the Australian Pesticides and Veterinary Medicines Authority (APVMA) issue minor use permits allowing the off label use of registered agrichemicals on specified crops under strict conditions. In order for minor use permits to be issued, residue data must be generated to show the level of pesticide residue in the crop following the proposed use pattern. These minor use permits are issued for a limited time and in order for them to be renewed, it is sometimes necessary for additional residue data to be generated.

The agricultural chemicals clethodim, abamectin and pirimicarb are important tools for vegetable growers to help them control pests in their crops. Clethodim is used to control various grass weeds, abamectin is used for the control of two spotted mites and pirimicarb is used to control aphids. These chemicals are registered in various products for use in many vegetable crops but due to the high cost of registering agrichemicals, are not registered in some minor crops.

Horticulture Australia Limited (HAL) project number VG11029 was established to fund trials to generate residue data on clethodim in carrots; abamectin in chillies, spring onions, shallots and sweetcorn; pirimicarb in spring onions, celery and sweetcorn. The data generated will be used to support applications for permit renewal and new permit applications that will be made to the APVMA.

In total, 19 field trials were conducted under this project spread between the Gippsland and Cranbourne region of Victoria, the Lockyer Valley, Moreton Bay and South Brisbane regions of Queensland and the Tweed Valley in New South Wales. This geographic distribution covered major growing regions with a variety of climatic conditions and differing crop production methods.

The APVMA establishes Maximum Residue Limits (MRLs) or Temporary Maximum Residue Limits (TMRLs) for all agrichemicals. MRLs are the highest amount of chemical residue that can be in a particular crop matrix without causing any harm to a consumer. MRLs are set for crop groups or individual crops . In all crop samples analysed from the 19 field trials, the residue levels were at or below the established MRLs or TMRLs. The data generated should therefore be suitable to support minor use permit applications and therefore allow the growers to continue to use clethodim, abamectin and pirimicarb in their production systems.

Technical Summary:

Australian vegetable growers rely heavily on agrichemicals that are only available to them under minor use permits issued by the Australian Pesticides and Veterinary Medicines Authority (APVMA). Several of these permits need to be renewed and growers have also expressed a need for new permits. This Horticultural Australia Limited (HAL) project – VG11029, was established to fund residue trials to generate the data required to support the permit applications.

Three residue studies were planned and conducted under Project VG11029. To differentiate between the three studies, each was given the Project Number VG11029 plus the active ingredient involved. Hence, the three project numbers were VG11029 clethodim, VG11029 abamectin and VG11029 pirimicarb.

Study VG11029 clethodim consisted of four field trials in carrots with clethodim. Two trials were conducted in Victoria, one in New South Wales and one in Queensland. This spread of sites covered different climatic conditions, different management practices and different carrot varieties. At each site, two separated plots were marked out and clearly identified. One plot was an untreated control plot and the other was the treated plot. Each treated plot received one application of Platinum 240 EC (240g ai/L clethodim) at a rate of 120g ai/ha at 28 days before harvest. The application was made with a constant pressure mini boom. The adjuvant Hasten was added at a rate of 1L/100L of water. Specimens were collected at 14 and 28 days after the application. Specimens were placed in labelled plastic sample bags, doubled bagged and placed in a freezer at $\leq$ -15^{o}C as soon as possible after collection.

Once all specimens had been collected, they were shipped to AgriSolutions Laboratory at Deception Bay, Queensland. Soon after receival at the laboratory, specimens were homogenised and an untreated sample from the first specimen to arrive was fortified for storage stability analysis. Each of the homogenised specimens then underwent extraction, purification and instrumental analysis via HPLC-UV. A limit of quantitation (LOQ) of 0.05mg/kg was determined, this being the lowest level of target analyte fortification and subsequent successful recovery analysis.

Study VG11029 abamectin consisted of eight trials in total. One greenhouse trial was conducted in chillies in Queensland. Two field trials were conducted in spring onions, one in Victoria and one in Queensland. One field trial in shallots was conducted in Queensland. Four field trials were conducted in sweetcorn; one in New South Wales, one in the Lockyer Valley in Queensland and two in the Moreton Bay Region of Queensland. This spread of sites covered different climatic conditions, different management practices and different crop varieties.

At each site, two separated plots were marked out and clearly identified. One plot was an untreated control plot and the other was the treated plot. For the chilli, spring onion and shallot trials, each treated plot received two applications of Vertimec (18g ai/L abamectin) at a rate of 8.1g ai/ha at 31 and 3 days before harvest. The applications to the chillies were made with a motorised mister. The applications to the remaining crops were made with a constant pressure mini boom. Specimens were collected at 0, 1, 3, 5 and 7 days after the last application. Specimens were placed in labelled plastic sample bags, doubled bagged and placed in a freezer at $\leq$ -15^{o}C as soon as possible after collection. For the sweetcorn trials, each treated plot received two applications of Vertimec (18g ai/L abamectin) at a rate of 8.1g ai/ha at 38 and 10 days before harvest. The application was made with a constant pressure mini boom. Specimens were collected at 0, 3 and 10 days after the last application. Specimens were placed in labelled plastic sample bags, doubled bagged and placed in a freezer at $\leq$ -15^{o}C as soon as possible after collection.

Once all specimens had been collected, they were shipped to AgriSolutions Laboratory at Deception Bay, Queensland. Soon after receival at the laboratory, specimens were homogenised and an untreated sample from the first specimen to arrive for each crop was fortified for storage stability analysis. Each of the homogenised specimens then underwent extraction, purification and instrumental analysis via LC-MS/MS. A limit of quantitation (LOQ) of 0.01mg/kg was determined, this being the lowest level of target analyte fortification and subsequent successful recovery analysis in each of the associated specimens and/or portions of specimens.

Study VG11029 pirimicarb consisted of seven field trials in total. Two trials were conducted in celery, one in Victoria and one in Queensland. One trial in spring onions was conducted in Queensland. Four trials were conducted in sweetcorn; one in New South Wales, one in the Lockyer Valley in Queensland and two in the Moreton Bay Region of Queensland. This spread of sites covered different climatic conditions, different management practices and different crop varieties.

At each site, two separated plots were marked out and clearly identified. One plot was an untreated control plot and the other was the treated plot. For the celery and spring onion trials, each treated plot received two applications of Pirimor (500g ai/kg pirimicarb) at a rate of 500g ai/ha at 9 and 2 days before harvest. The applications were made with a constant pressure mini boom. Celery specimens were collected at 0, 1, 2 and 5 days after the last application. Spring onion specimens were collected at 0, 1, 2, 7 and 10 days after the last application. Specimens were placed in labelled plastic sample bags, doubled bagged and placed in a freezer at $\leq$ -15^{o}C as soon as possible after collection. For the sweetcorn trials, each treated plot received one application of Pirimor (500g ai/kg pirimicarb) at a rate of 500g ai/ha at 14 days before harvest. The application was made with a constant pressure mini boom. Specimens were collected at 0, 7 and 14 days after the application. Specimens were placed in labelled plastic sample bags, doubled bagged and placed in a freezer at $\leq$ -15^{o}C as soon as possible after collection.

Once all specimens had been collected, they were shipped to AgriSolutions Laboratory at Deception Bay, Queensland. Soon after receival at the laboratory, specimens were homogenised and an untreated sample from the first specimen to arrive for each crop was fortified for storage stability analysis. Each of the homogenised specimens then underwent extraction, purification and instrumental analysis via GC-MS. A limit of quantitation (LOQ) of 0.02mg/kg was determined, this being the lowest level of target analyte fortification and subsequent successful recovery analysis in each of the associated specimens and/or portions of specimens.

The data generated from this study are being used to support applications to the APVMA to renew existing or apply for new permits.

Introduction:

Clethodim is approved for use by the Australian Pesticides and Veterinary Medicines Authority (APVMA) in carrots and parsnips, for the control of grass weeds under minor use permit PER10402. The permit has expired and residue data are required to support an application to the APVMA for renewal of the permit being made.

Abamectin is registered in capsicums for the control of Two Spotted Mites. Abamectin is approved for use in chillies and paprika under minor use permit PER10730. The permit has expired and residue data are required to support an application being made to the APVMA for renewal of the permit. There is also a need to generate residue data in chillies grown in a protected cropping situation to support an application to add this use to the permit.

Spring onion and shallot growers have requested a permit allowing them to use abamectin in their crops for the control of Two Spotted Mites. Residue data are required to support an application to the APVMA for a minor use permit for this use.

Abamectin is approved for use in sweetcorn for the control of Two-Spotted Mites under minor use permit PER11355. This permit has expired and residue data are required to support an application to the APVMA for a renewal of the permit.

Pirimicarb is approved for use in sweetcorn to control aphids under APVMA minor use permit PER10433. This permit has expired and residue data are required to support an application to the APVMA for renewal of the permit.

Pirimicarb is approved for use in spring onions to control aphids under APVMA minor use permit PER11763. This permit has expired and residue data are required to support an application to the APVMA for renewal of the permit. The data will also be used to support an increase in the permitted application rate.

Celery growers have requested a permit allowing them to use pirimicarb in their crops for the control of aphids. Residue data are required to support an application to the APVMA for a minor use permit for this use.

Horticulture Australia Limited (HAL) Project VG11029 was established to fund 19 trials to generate the residue data required to support the minor use permit applications. Four trials were conducted in carrots with clethodim; two in Victoria, one in New South Wales and one in Queensland. Eight trials were conducted with abamectin; one in protected chillies in Queensland; one in spring onions in Victoria, one in spring onions in Queensland, one in shallots in Queensland; three in sweetcorn in Queensland and one in sweetcorn in New South Wales. Seven trials were conducted with pirimicarb; one in celery in Victoria; one in celery in Queensland; one in spring onions in Queensland; three in sweetcorn in Queensland and one in sweetcorn in New South Wales.

The field and analytical phases of this study were conducted by AgriSolutions Australia Pty Ltd. The study was conducted in compliance with the OECD Principles of Good Laboratory Practice (GLP).

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

Materials & Methods:

Once project VG11029 had been allocated to AgriSolutions Australia Ltd (ASA), three detailed study plans were developed setting out the requirements for both the field and analytical phases of this study. One study plan was prepared for each of the test items, clethodim, abamectin and pirimicarb. The study plans were given the following study numbers to differentiate the three studies within this project; VG11029 clethodim, VG11029 abamectin and VG11029 pirimicarb.

The study plans were audited to ensure Good Laboratory Practice (GLP) compliance and approved by Horticulture Australia Limited (HAL) prior to the commencement of field trials.

All field and laboratory activities carried out during this project were in accordance with the principles of GLP and were audited as required by the AgriSolutions Australia Quality Assurance Officer. The raw data and final reports were also audited The results of all audits were reported to the study director and the facility manager.

Full details of each trial are included on the following pages.

Clethodim (VG11029 clethodim)

Formulation

Product Name:	Platinum 240 EC
Active Constituent:	clethodim
Nominal Concentration in Formulation:	240g ai/L
Lot No.	10078248
Formulation Type:	Emulsifiable Concentrate (EC)
CAS No:	99129-21-2
Storage Conditions:	Cool, dry, well ventilated out of direct sunlight
Source:	Farmoz

Treatment Information

Treatment	Test Item	Rate of Test Item	Rate of Active Ingredient	Application Timing
1	Untreated	N/A	N/A	N/A
2	Platinum 240 EC	500mL/ha	120g ai/ha	28 days before harvest

Site, Application and Specimen Collection Details

Site 1: Cranbourne Region, Victoria

Field Scientist	Ross Holding
Co-operator	Phil Cochrane
Trial Site Address	P. Cochrane & Sons. North Road, Devon Meadows, Victoria
Soil Type	Sandy Loam
Crop	Carrots – Baby/dutch
Cultivar	Mokem and Bijay
Planting Date	April 2012
Plot Design	Non randomised, unreplicated plots of sufficient size to satisfy APVMA sampling requirements. Plots were clearly and uniquely marked and mapped in the field data book.
Irrigation	Irrigation was applied as required by overhead sprinklers.

Treatments Applied	T2
Actual Application Timing	28 DBH
Application Date	15-JUN-2012
Growth Stage	5 frond stage
Temperature (^{o}C)	15
Relative Humidity (%)	70
Wind Speed (km/hr)	5-9
Wind Direction	North
Cloud Cover (%)	50
Application Method	The test item was applied over the top of the crop with an LPG powered mini boom.

DBH= days before harvest

Details	**Sample Timing**	
	1	**2**
Date	29-JUN-2012	13-JUL-2012
Sample Timing	14 DAA	28 DAA
Treatments Sampled	T2	T1, T2
Growth Stage	5-6 true frond stage	Harvest
Order of Sampling	T2	T1 → T2
Quantity Sampled	160 (>2kg)	100 (>2kg)
Sampling Method	Baby carrots were selected from approximately 30 locations within each plot. Carrots were lightly washed and tops trimmed as per protocol and placed into labelled sampling bag then double bagged.	

DAA = days after application

Site 2: Gippsland Region, Victoria

Field Scientist	Ross Holding
Co-operator	Sudhan Shah
Trial Site Address	Covino Farms, "Sandy Ridge" 207 Johnsons Road, Dutson Vic
Soil Type	Loamy Sand
Crop	Carrots
Cultivar	Senior (Clause)
Planting Date	07-JUL-2012
Plot Design	Non randomised, unreplicated plots of sufficient size to satisfy APVMA sampling requirements. Plots were clearly and uniquely marked and mapped in the field data book.
Irrigation	Irrigation was applied as required by overhead sprinklers

Treatments Applied	T2
Actual Application Timing	28 DBH
Application Date	07-SEP-2012
Growth Stage	5-6 fronds
Temperature (oC)	18
Relative Humidity (%)	59
Wind Speed (km/hr)	10
Wind Direction	South East
Cloud Cover (%)	50
Application Method	The test item was applied over the top of the crop with an LPG powered mini boom in sufficient water volume to reach the point of run-off.

DBH= days before harvest

Details	**Sample Timing**	
	1	**2**
Date	10-OCT-2012	24-OCT-2012
Sample Timing	14 DAA	28 DAA
Treatments Sampled	T2	T1 & T2
Growth Stage	2 weeks prior to harvest	Harvest
Order of Sampling	T2	T1 → T2
Quantity Sampled	20 (>2kg)	20 (>2kg)
Sampling Method	Carrots pulled carefully from plot at random, dirt brushed off, tops trimmed and placed into pre-labelled bags then double bagged.	

DAA = days after application

Site 3: Moreton Bay Region, Queensland

Field Scientist	Odin Franssen
Co-operator	Odin Franssen
Trial Site Address	75 Thompson Street, Deception Bay, Queensland
Soil Type	Sandy gray loam
Crop	Carrots
Cultivar	Chantenay Red Cored
Planting Date	18th May 2012
Plot Design	Non randomised, unreplicated plots of sufficient size to satisfy APVMA sampling requirements. Plots were clearly and uniquely marked and mapped in the field data book.
Irrigation	Mini Sprinkler – 10mm every 3 days

Treatments Applied	T2
Actual Application Timing	28 DBH
Application Date	03-OCT-2012
Growth Stage	Roots 5-10cms
Temperature (oC)	20
Relative Humidity (%)	55
Wind Speed (km/hr)	5
Wind Direction	South
Cloud Cover (%)	45
Application Method	One pass over top of crop with an LPG powered mini boom, 500mm above the centre of the plot.

DBH= days before harvest

Details	**Sample Timing**	
	1	**2**
Date	17-OCT-2012	31-OCT-2012
Sample Timing	14 DAA	28 DAA
Treatments Sampled	T2	T1, T2
Growth Stage	Early maturity	Maturity
Order of Sampling	T2	T1 → T2
Quantity Sampled	30 (>2kg)	30 (>2kg)
Sampling Method	Carrots were dug from all areas of plots excluding one metre at each end. Collected carrots were brushed and lightly washed and tops trimmed as per protocol and placed into labelled sampling bag.	

DAA = days after application

Site 4: Tweed Valley, New South Wales

Field Scientist	Odin Franssen
Co-operator	John Julius
Trial Site Address	611 Cudgen Road, Cudgen, NSW
Soil Type	Red Ferrosol
Crop	Carrots
Cultivar	Chantenay Red
Planting Date	30th Nov 2012
Plot Design	Non randomised, unreplicated plots of sufficient size to satisfy APVMA sampling requirements. Plots were clearly and uniquely marked and mapped in the field data book.
Irrigation	Drip irrigation as required

Treatments Applied	T2
Actual Application Timing	28 DBH
Application Date	06-FEB-2013
Growth Stage	Roots 5 – 10cm
Temperature (°C)	23
Relative Humidity (%)	60
Wind Speed (km/hr)	10
Wind Direction	South South-East
Cloud Cover (%)	80
Application Method	The test item was applied over the top of the crop with an LPG powered mini boom in sufficient water volume to reach the point of run-off.

DBH= days before harvest

Details	**Sample Timing**	
	1	**2**
Date	20-FEB-2013	06-MAR-2013
Sample Timing	14 DAA	28 DAA
Treatments Sampled	T2	T1, T2
Growth Stage	Early maturity	Maturity
Order of Sampling	T2	T1 → T2
Quantity Sampled	15 (>2kg)	15 (>2kg)
Sampling Method	Whole carrots pulled from the soil from throughout the plot excluding first and last metre. Carrots were lightly washed and tops trimmed as per protocol and placed into labelled sampling bags then double bagged.	

DAA = days after application

Abamectin (VG11029 abamectin)

Formulation

Product Name:	Vertimec
Active Constituent:	Abamectin
Nominal Concentration in Formulation:	18g ai/L
Lot No.	AAC2A25645
Formulation Type:	Emulsifiable Concentrate (EC)
CAS No:	71751-41-2
Storage Conditions:	Cool, dry, well ventilated out of direct sunlight
Source:	Syngenta

Treatment Information

Treatment	Test Item	Rate of Test Item	Rate of Active Ingredient	Application Timing
1	Untreated	N/A	N/A	N/A
2	Vertimec	450mL/ha	8.1g ai/ha	31 and 3 days before harvest

Site, Application and Specimen Collection Details

Site 1: Moreton Bay Region, Queensland

Field Scientist	Odin Franssen
Co-operator	Odin Franssen
Trial Site Address	75 Thompson Street, Deception Bay, Qld
Soil Type	Clay loam
Crop	Chilli – protected cropping situation
Cultivar	Cayenne "Caysan"
Planting Date	26-SEP-2012
Plot Design	Non randomised, unreplicated plots of sufficient size to satisfy APVMA sampling requirements. Plots were clearly and uniquely marked and mapped in the field data book.
Irrigation	Irrigation was applied with drippers as required.

Treatments Applied	T2	T2
Actual Application Timing	31 DBH	3 DBH
Application Date	04-NOV-2012	02-DEC-2012
Growth Stage	Early flowering	Fruiting
Temperature (^{o}C)	21.9	26.9
Relative Humidity (%)	55	59
Wind Speed (km/hr)	13	19
Wind Direction	East	North North-East
Cloud Cover (%)	Clear	Clear
Application Method	Test item was applied to the plants with a motorised mister to the point of runoff .	

DBH= days before harvest

Details	**Sample Timing**				
	1	2	3	4	5
Date	05-DEC-2012	06-DEC-2012	08-DEC-2012	10-DEC-2012	12-DEC-2012
Sample Timing	0 DALA	1 DALA	3 DALA	5 DALA	7 DALA
Treatments Sampled	T1, T2	T2	T2	T2	T2
Growth Stage	Fruiting	Fruiting	Fruiting	Fruiting	Fruiting
Order of Sampling	T1 → T2	T2	T2	T2	T2
Quantity Sampled	>1kg	>1kg	>1kg	>1kg	>1kg
Sampling Method	Chillies were selected at random and picked by hand before being placed into a labelled specimen bag and then double bagged. Chillies were selected from shielded and unshielded positions from all levels on the bushes.				

DALA = days after last application

Site 2: Park Ridge, Queensland

Field Scientist	Odin Franssen
Co-operator	Tain Tan Ly
Trial Site Address	455 Park Ridge Road, Park Ridge Queensland
Soil Type	Sandy loam
Crop	Spring onion
Cultivar	Paragon (SPS)
Planting Date	21-MAR-2012
Plot Design	Non randomised, unreplicated plots of sufficient size to satisfy APVMA sampling requirements. Plots were clearly and uniquely marked and mapped in the field data book.
Irrigation	As required by overhead sprinklers

Treatments Applied	T2	T2
Actual Application Timing	31 DBH	3 DBH
Application Date	14-MAY-2012	11-JUN-2012
Growth Stage	Mid growth	Mature
Temperature (^{o}C)	17	17
Relative Humidity (%)	46	75
Wind Speed (km/hr)	9	10
Wind Direction	West South-West	South South-West
Cloud Cover (%)	60	10
Application Method	Test item was applied over the top of the crop to the point of run-off with the boom held 500mm above the centre of the crop.	

DBH= days before harvest

Details	**Sample Timing**				
	1	**2**	**3**	**4**	**5**
Date	11-JUN-2012	12-JUN-2012	14-JUN-2012	16-JUN-2012	18-JUN-2012
Sample Timing	0 DALA	1 DALA	3 DALA	5 DALA	7 DALA
Treatments Sampled	T1 & T2	T2	T2	T2	T2
Growth Stage	Mature	Mature	Mature	Mature	Mature
Order of Sampling	T1 → T2	T2	T2	T2	T2
Quantity Sampled	30 (2kg)	30 (2kg)	30 (2kg)	30 (2kg)	30 (2kg)
Sampling Method	Whole plants were randomly selected within plot area avoiding first and last metre. Once collected, roots were trimmed off and soil removed then placed into sample bags.				

DALA = days after last application

Site 3: Cranbourne Region, Victoria

Field Scientist	Ross Holding
Co-operator	Phil Cochrane
Trial Site Address	P. Cochrane & Sons. North Road, Deavon Meadows, Vic
Soil Type	Sandy loam
Crop	Spring onions
Cultivar	Zephyr
Planting Date	04-APR-2012
Plot Design	Non randomised, unreplicated plots of sufficient size to satisfy APVMA sampling requirements. Plots were clearly and uniquely marked and mapped in the field data book.
Irrigation	As required by overhead sprinklers

Treatments Applied	T2	T2
Actual Application Timing	31 DBH	3 DBH
Application Date	15-JUN-2012	13-JUL-2012
Growth Stage	2 – 3 leaves	3 Leaves
Temperature (^{o}C)	15	14.5
Relative Humidity (%)	70	78
Wind Speed (km/hr)	5-9	0
Wind Direction	North	N/A
Cloud Cover (%)	50	95
Application Method	One pass over top of crop - 400m above centre of crop to the point of runoff	

DBH= days before harvest

Details	**Sample Timing**				
	1	2	3	4	5
Date	13-JUL-2012	14-JUL-2012	16-JUL-2012	18-JUL-2012	20-JUL-2012
Sample Timing	0 DALA	1 DALA	3 DALA	5 DALA	7 DALA
Treatments Sampled	T1, T2	T2	T2	T2	T2
Growth Stage	Mature	Mature	Mature	Mature	Mature
Order of Sampling	T1 → T2	T2	T2	T2	T2
Quantity Sampled	50-100 >2kg	50-100 >2kg	50-100 >2kg	50-100 >2kg	50-100 >2kg
Sampling Method	Spring onions collected from all areas of plot (except 1m at plot ends). Roots were trimmed and the plants were placed into labelled sample bag then double bagged. Disposable gloves used and changed between treatments.				

DALA = days after last application

Site 4: Moreton Bay Region, Queensland

Field Scientist	Odin Franssen
Co-operator	Odin Franssen
Trial Site Address	75 Thompson Street, Deception Bay, QLD
Soil Type	Sandy grey loam
Crop	Shallots *(Allium ascalonicum)*
Cultivar	Roderique
Planting Date	13-SEP-2012
Plot Design	Non randomised, unreplicated plots of sufficient size to satisfy APVMA sampling requirements. Plots were clearly and uniquely marked and mapped in the field data book.
Irrigation	As required by drip tape

Treatments Applied	T2	T2
Actual Application Timing	31 DBH	3 DBH
Application Date	20-NOV-2012	18-DEC-2012
Growth Stage	Bulbing	Late Bulbing
Temperature (^{o}C)	24	30
Relative Humidity (%)	41	55
Wind Speed (km/hr)	2	6
Wind Direction	East	East North East
Cloud Cover (%)	10	20
Application Method	Test item applied in two passes (one in each direction) with the boom 500mm above the centre of the crop. Application was to the point of runoff.	

DBH= days before harvest

Details	**Sample Timing**				
	1	**2**	**3**	**4**	**5**
Date	18-DEC-2012	19-DEC-2012	21-DEC-2012	23-DEC-2012	25-DEC-2012
Sample Timing	0 DALA	1 DALA	3 DALA	5 DALA	7 DALA
Treatments Sampled	T1, T2	T2	T2	T2	T2
Growth Stage	Mature bulbs	Mature bulbs	Mature bulbs	Mature bulbs	Mature bulbs
Order of Sampling	T1 → T2	T2	T2	T2	T2
Quantity Sampled	14 >2kg	15 >2kg	15 >2kg	15 >2kg	15 >2kg
Sampling Method	Whole bulbs were collected from all areas of plot avoiding first & last metre. Plants pulled from soil and roots and tops trimmed from bulbs. Bulbs were lightly brushed free of soil and placed into pre labelled plastic sample bags and then double bagged.				

DALA = days after last application

Site 5: Moreton Bay Region, Queensland

Field Scientist	Odin Franssen
Co-operator	Odin Franssen
Trial Site Address	75 Thompson Street, Deception Bay, QLD
Soil Type	Sandy grey loam
Crop	Sweetcorn
Cultivar	Hybrid "Max"
Planting Date	02-MAY-2012
Plot Design	Non randomised, unreplicated plots of sufficient size to satisfy APVMA sampling requirements. Plots were clearly and uniquely marked and mapped in the field data book.
Irrigation	As required by drip tape

Treatments Applied	T2	T2
Actual Application Timing	38 DBH	10 DBH
Application Date	20-NOV-2012	18-DEC-2012
Growth Stage	Cobs silking	Near mature
Temperature (^{o}C)	22	30
Relative Humidity (%)	41	55
Wind Speed (km/hr)	15	6
Wind Direction	South South-East	East North-East
Cloud Cover (%)	10	20
Application Method	Test item applied with a constant pressure mini boom held vertically up each side of plot just to the point of runoff.	

DBH= days before harvest

Details	**Sample Timing**		
	1	2	3
Date	18-DEC-2012	21-DEC-2012	28-DEC-2012
Sample Timing	0 DALA	3 DALA	10 DALA
Treatments Sampled	T1 & T2	T2	T2
Growth Stage	Mature	Mature	Mature
Order of Sampling	T1 → T2	T2	T2
Quantity Sampled	12 cobs + >2kg foliage	12 cobs + >2kg foliage	12 cobs + >2kg foliage
Sampling Method	Specimens were picked from all areas of the plot avoiding a 1 metre area at each end of the plot. The cobs were removed from the plant leaving the husks intact. Cobs were placed in pre labelled bags and then double bagged. The foliage was collected randomly from the bottom, middle & top sections of the plants with the collected material placed into pre labelled specimen bags and then double bagged.		

DALA = days after last application

Site 6: Lockyer Valley, Queensland

Field Scientist	John Duff
Co-operator	Tim O'Hare
Trial Site Address	Gatton Research Facility, Warrego Highway, via Gatton QLD
Soil Type	Clay loam
Crop	Sweetcorn
Cultivar	Golden Sweet Improved
Planting Date	12-SEP-2012
Plot Design	Non randomised, unreplicated plots of sufficient size to satisfy APVMA sampling requirements. Plots were clearly and uniquely marked and mapped in the field data book
Irrigation	As required by flood and overhead

Treatments Applied	T2	T2
Actual Application Timing	38 DBH	10 DBH
Application Date	29-OCT-2012	26-NOV-2012
Growth Stage	First signs of tasselling	Tasselling and silking
Temperature (^{o}C)	23	29
Relative Humidity (%)	47.8	48
Wind Speed (km/hr)	14	9
Wind Direction	East	East
Cloud Cover (%)	95	40
Application Method	Test item was applied in 2 passes, one pass down each side of the row with the boom held vertically to cover the maximum amount of crop. Application was to the point of runoff.	

DBH= days before harvest

Details	**Sample Timing**		
	1	**2**	**3**
Date	26-NOV-2012	29-NOV-2012	06-DEC-2012
Sample Timing	0 DALA	3 DALA	10 DALA
Treatments Sampled	T1, T2	T2	T2
Growth Stage	Tasselling & silking	Silks browning off	Mature cobs
Order of Sampling	T1 → T2	T2	T2
Quantity Sampled	12 cobs + >2kg foliage	12 cobs + >2kg foliage	12 cobs + >2kg foliage
Sampling Method	Cobs were picked from the stalks leaving as much of the leaf sheaths on as possible and placed in pre labelled sample bags then double bagged. Whole plants were cut off at the base, dirt removed from stem and lower leaves, cut into 3 parts and placed in pre-labelled sample bags then double bagged.		

DALA = days after last application

Site 7: Tweed Valley, New South Wales

Field Scientist	Odin Franssen
Co-operator	John Julius
Trial Site Address	611 Cudgen Road, Cudgen, NSW
Soil Type	Red Ferrosol
Crop	Sweetcorn
Cultivar	Sentinel
Planting Date	09-OCT-2012
Plot Design	Non randomised, unreplicated plots of sufficient size to satisfy APVMA sampling requirements. Plots were clearly and uniquely marked and mapped in the field data book.
Irrigation	Not irrigated

Treatments Applied	T2	T2
Actual Application Timing	38 DBH	10 DBH
Application Date	30-OCT-2012	26-NOV-2012
Growth Stage	Cobs forming	Silking
Temperature (^{o}C)	20	25
Relative Humidity (%)	65	60
Wind Speed (km/hr)	7	15
Wind Direction	South East	North
Cloud Cover (%)	60	25
Application Method	Test item was applied in 2 passes, one pass down each side of the row with the boom held vertically to cover the maximum amount of crop. Application was to the point of runoff.	

DBH= days before harvest

Details	**Sample Timing**		
	1	2	3
Date	26-NOV-2012	29-NOV-2012	05-DEC-2012
Sample Timing	0 DALA	3 DALA	10 DALA
Treatments Sampled	T1 & T2	T2	T2
Growth Stage	Silking	Mature	Mature – Browned Silks
Order of Sampling	T1 → T2	T2	T2
Quantity Sampled	15 cobs + >2kg foliage	12 cobs + >2kg foliage	15 cobs + >2kg foliage
Sampling Method	Whole saleable cobs were collected from all areas of plot except for the first and last metre leaving husks intact and placed in pre labelled sample bags then double bagged. Foliage was collected from randomly selected plants, cut into top, middle and bottom sections and placed into pre labelled plastic specimen bags then double bagged.		

DALA = days after last application

Site 8: Moreton Bay Region, Queensland

Field Scientist	Odin Franssen
Co-operator	Odin Franssen
Trial Site Address	75 Thompson Street, Deception Bay, QLD
Soil Type	Sandy grey loam
Crop	Sweetcorn
Cultivar	MAX
Planting Date	11-JAN-2013
Plot Design	Non randomised, unreplicated plots of sufficient size to satisfy APVMA sampling requirements. Plots were clearly and uniquely marked and mapped in the field data book. The untreated plot was located on the up wind side of the treated plots.
Irrigation	As required by drip tape

Treatments Applied	T2	T2
Actual Application Timing	38 DBH	10 DBH
Application Date	18-MAR-2013	17-APR-2013
Growth Stage	Silking	Harvestable cobs
Temperature (°C)	24	24
Relative Humidity (%)	46	60
Wind Speed (km/hr)	5	7
Wind Direction	South East	West South West
Cloud Cover (%)	75	40
Application Method	Test item applied in 2 passes, one on each side of the plot with the boom held vertically. Application was to the point of runoff.	

DBH= days before harvest

Details	**Sample Timing**		
	1	2	3
Date	17-APR-2013	20-APR-2013	27-APR-2013
Sample Timing	0 DALA	3 DALA	10 DALA
Treatments Sampled	T1 & T2	T2	T2
Growth Stage	Harvest	Harvest	Harvest
Order of Sampling	T1 → T2	T2	T2
Quantity Sampled	12 cobs + 2kg foliage	12 cobs + 2kg foliage	12 cobs + 2kg foliage
Sampling Method	Cobs with husks intact were picked from all areas of the plot avoiding a 1 metre area at each end of the plot and placed in labelled specimen bags and double bagged. The foliage was collected randomly from the bottom, middle and top sections of the plants, and placed into labelled specimen bags and double bagged.		

DALA = days after last application

Pirimicarb (VG11029 pirimicarb)

Formulation

Product Name:	Pirimor
Active Constituent:	pirimicarb
Nominal Concentration in Formulation:	500g ai/kg
Lot No.	MAA15411
Formulation Type:	Water Dispersible Granule (WG)
CAS No:	23103-98-2
Storage Conditions:	Cool, dry, well ventilated out of direct sunlight
Source:	Syngenta Australia Pty Ltd

Treatment Information

Sites 1, 2, 3 & 4

Treatment	Test Item	Rate of Test Item	Rate of Active Ingredient	Application Timing
1	Untreated	N/A	N/A	N/A
2	Pirimor	1kg/ha	500g ai/ha	9 and 2 days before harvest

Sites 5, 6, 7 & 8

Treatment	Test Item	Rate of Test Item	Rate of Active Ingredient	Application Timing
1	Untreated	N/A	N/A	N/A
2	Pirimor	1kg/ha	500g ai/ha	14 days before harvest

Site, Application and Specimen Collection Details

Site 1: Moreton Bay Region, Queensland

Field Scientist	Odin Franssen
Co-operator	Odin Franssen
Trial Site Address	75 Thompson Street, Deception Bay, Qld
Soil Type	Sandy grey loam
Crop	Celery
Cultivar	Tango
Planting Date	17-MAY-2012
Plot Design	Non randomised, unreplicated plots of sufficient size to satisfy APVMA sampling requirements. Plots were clearly and uniquely marked and mapped in the field data book.
Irrigation	Irrigation was applied with drip tape

Treatments Applied	T2	T2
Actual Application Timing	9 DBH	2 DBH
Application Date	28-SEP-2012	05-OCT-2012
Growth Stage	Row closure	Early harvest
Temperature (°C)	22	26.9
Relative Humidity (%)	60	59
Wind Speed (km/hr)	8	19
Wind Direction	North North-East	North North-East
Cloud Cover (%)	10	60
Application Method	Test item was applied in one pass over the top of the crop using a constant pressure mini boom held approximately 500mm above the centre of the crop.	

DBH= days before harvest

Details	**Sample Timing**			
	1	2	3	4
Date	05-OCT-2012	06-OCT-2012	07-OCT-2012	10-OCT-2012
Sample Timing	0 DALA	1 DALA	2 DALA	5 DALA
Treatments Sampled	T2	T2	T1, T2	T2
Growth Stage	Mature	Mature	Mature	Mature
Order of Sampling	T2	T2	T1 → T2	T2
Quantity Sampled	12 plants	12 plants	12 plants	12 plants
Sampling Method	Plants were randomly selected and cut at ground level. Dirt and withered leaves were removed and the whole plant was folded and placed in a labelled bag and then double bagged.			

DALA = days after last application

Site 2: Cranbourne Region, Victoria

Field Scientist	Ross Holding
Co-operator	Colin Gazzola
Trial Site Address	Gazzola Farms, 605 Limestone Road, Boneo VIC
Soil Type	Sandy loam
Crop	Celery
Cultivar	L.G. 200
Planting Date	12-MAR-2012
Plot Design	Non randomised, unreplicated plots of sufficient size to satisfy APVMA sampling requirements. Plots were clearly and uniquely marked and mapped in the field data book.
Irrigation	As required by overhead sprinklers

Treatments Applied	T2	T2
Actual Application Timing	9 DBH	2 DBH
Application Date	30-MAY-2012	06-JUN-2012
Growth Stage	2 weeks prior to cutting	Mature
Temperature (^{o}C)	16.6	14
Relative Humidity (%)	77	72
Wind Speed (km/hr)	Calm	5
Wind Direction	N/A	South East
Cloud Cover (%)	100	90
	Test item was applied in one pass over the top of the crop using a constant pressure mini boom held approximately 500mm above the centre of the crop.	

DBH= days before harvest

Details	**Sample Timing**			
	1	**2**	**3**	**4**
Date	06-JUN-2012	07-JUN-2012	08-JUN-2012	11-JUN-2012
Sample Timing	0 DALA	1 DALA	2 DALA	5 DALA
Treatments Sampled	T2	T2	T1, T2	T2
Growth Stage	Mature	Mature	Mature	Mature
Order of Sampling	T2	T2	T1 → T2	T2
Quantity Sampled	12 plants	12 plants	12 plants	12 plants
Sampling Method	Each celery plant cut from ground at base (1cm above ground level). Outside stalks trimmed, each plant cut longways down middle, top 150mm leaves/stalks folded over to fit into bag. Placed directly into pre-labelled sample bag. Then double bagged.			

DALA = days after last application

Site 3: South Brisbane Region, Queensland

Field Scientist	Odin Franssen
Co-operator	Tain Tan Ly
Trial Site Address	455 Park Ridge Road, Park Ridge QLD
Soil Type	Sandy loam
Crop	Spring onion
Cultivar	Paragon (SPS)
Planting Date	25-MAR-2012
Plot Design	Non randomised, unreplicated plots of sufficient size to satisfy APVMA sampling requirements. Plots were clearly and uniquely marked and mapped in the field data book.
Irrigation	As required by overhead sprinklers

Treatments Applied	T2	T2
Actual Application Timing	9 DBH	2 DBH
Application Date	14-MAY-2012	21-MAY-2012
Growth Stage	Mid growth	Mature
Temperature (^{o}C)	17	17
Relative Humidity (%)	46	75
Wind Speed (km/hr)	9	10
Wind Direction	West South-West	South South-West
Cloud Cover (%)	60	95
Application Method	One pass over top of crop - 400m above centre of crop to the point of runoff	

DBH= days before harvest

Details	**Sample Timing**				
	1	2	3	4	5
Date	21-MAY-2012	22-MAY-2012	23-MAY2012	28-MAY-2012	31-MAY-2012
Sample Timing	0 DALA	1 DALA	2 DALA	7 DALA	10 DALA
Treatments Sampled	T2	T2	T2	T2	T2
Growth Stage	Mature	Mature	Mature	Mature	Mature
Order of Sampling	T2	T2	T2	T2	T2
Quantity Sampled	30 >2kg	30 >2kg	30 >2kg	30 >2kg	30 >2kg
Sampling Method	Whole spring onions were collected from all parts of the plots except one metre each end. Roots were clipped off and plants were placed in labelled sample bags.				

DALA = days after last application

Site 4: Moreton Bay Region, Queensland

Field Scientist	Odin Franssen
Co-operator	Odin Franssen
Trial Site Address	75 Thompson Street, Deception Bay, QLD
Soil Type	Sandy grey loam
Crop	Sweetcorn
Cultivar	Hybrid
Planting Date	02-MAY-2012
Plot Design	Non randomised, unreplicated plots of sufficient size to satisfy APVMA sampling requirements. Plots were clearly and uniquely marked and mapped in the field data book.
Irrigation	As required by drip tape

Treatments Applied	T2
Actual Application Timing	14 DBH
Application Date	28-SEP-2012
Growth Stage	Early silking
Temperature (^{o}C)	22
Relative Humidity (%)	60
Wind Speed (km/hr)	10
Wind Direction	North North-East
Cloud Cover (%)	10
Application Method	Test item applied in two passes (one in each direction) with the boom 500mm above the centre of the crop. Application was to the point of runoff.

DBH= days before harvest

Details	**Sample Timing**		
	1	**2**	**3**
Date	28-SEPT-2012	05-OCT-2012	12-OCT-2012
Sample Timing	0DALA	7DALA	14DALA
Treatments Sampled	T2	T1 & T2	T2
Growth Stage	Silking	Mature	Mature
Order of Sampling	T2	T1 → T2	T2
Quantity Sampled	15 + >kg foliage	15 + >2kg foliage	20 + >2kg foliage
Sampling Method	Whole cobs were collected from all areas of plot except for the first and last metre leaving husks intact. Foliage was collected from randomly selected plants and cut into top, middle & bottom sections and placed into pre labelled plastic specimen bags and then double bagged.		

DALA = days after last application

Site 5: Lockyer Valley, Queensland

Field Scientist	John Duff
Co-operator	Tim O'Hare
Trial Site Address	Gatton Research Facility, Warrego Highway, Gatton, QLD
Soil Type	Sandy grey loam
Crop	Sweetcorn
Cultivar	Golden Sweet Improved
Planting Date	12-SEP-2012
Plot Design	Non randomised, unreplicated plots of sufficient size to satisfy APVMA sampling requirements. Plots were clearly and uniquely marked and mapped in the field data book.
Irrigation	As required by overhead and flood

Treatments Applied	T2
Actual Application Timing	14 DBH
Application Date	23-NOV-2012
Growth Stage	Tasselling and silking
Temperature (^{o}C)	29
Relative Humidity (%)	43.8
Wind Speed (km/hr)	5
Wind Direction	Easterly
Cloud Cover (%)	95
Application Method	Test item was applied in 2 passes, one either side of the row with the boom held vertically to cover the maximum amount of crops.

DBH= days before harvest

Details	**Sample Timing**		
	1	2	3
Date	23-NOV-2012	30-NOV-2012	07-DEC-2012
Sample Timing	0 DALA	7 DALA	14 DALA
Treatments Sampled	T2	T2	T2
Growth Stage	Tassels in full flower	Silks browning off	Brown silks
Order of Sampling	T2	T2	T2
Quantity Sampled	15 + >2kg foliage	15 + >2kg foliage	12 + >2kg foliage
Sampling Method	Cobs were picked from the stalks leaving as much leaf sheaths on as possible. Whole plants were cut off at the base, dirt removed from stem and lower leaves, then plants cut into 3 pieces and placed in labelled specimen bags.		

DALA = days after last application

Site 6: Tweed Valley, New South Wales

Field Scientist	Odin Franssen
Co-operator	John Julius
Trial Site Address	611 Cudgen Road, Cudgen NSW
Soil Type	Red Ferrosol
Crop	Sweetcorn
Cultivar	Sentinal
Planting Date	09-OCT-2012
Plot Design	Non randomised, unreplicated plots of sufficient size to satisfy APVMA sampling requirements. Plots were clearly and uniquely marked and mapped in the field data book
Irrigation	No irrigation applied

Treatments Applied	T2
Actual Application Timing	14 DBH
Application Date	30-OCT-2012
Growth Stage	Silking
Temperature (^{o}C)	20
Relative Humidity (%)	60
Wind Speed (km/hr)	8
Wind Direction	East South-East
Cloud Cover (%)	30
Application Method	Test item was applied to the crop in two passes, one on each side of the row. Application was to the point of runoff.

DBH= days before harvest

Details	**Sample Timing**		
	1	**2**	**3**
Date	30-OCT-2012	06-NOV-2012	13-NOV-2012
Sample Timing	0 DALA	7 DALA	14 DALA
Treatments Sampled	T2	T1 & T2	T2
Growth Stage	Late silking	Mature	Mature
Order of Sampling	T2	T1 → T2	T2
Quantity Sampled	12 + >2kg foliage	12 + >2kg foliage	12 + >2kg foliage
Sampling Method	Whole cobs were collected from all areas of plot except for the first and last metre leaving husks intact. Foliage was collected using randomly selected plants. Selections were made from top, middle & bottom cuts and placed into pre labelled plastic specimen bags and then double bagged.		

DALA = days after last application

Site 7: Moreton Bay Region, Queensland

Field Scientist	Odin Franssen
Co-operator	Michael Keats
Trial Site Address	75 Thompson Street, Deception Bay, Queensland
Soil Type	Sandy loam
Crop	Sweetcorn
Cultivar	Sentinel
Planting Date	12-JAN-2013
Plot Design	Non randomised, unreplicated plots of sufficient size to satisfy APVMA sampling requirements. Plots were clearly and uniquely marked and mapped in the field data book.
Irrigation	Not irrigated

Treatments Applied	T2
Actual Application Timing	14 DBH
Application Date	19-MAR-2013
Growth Stage	Silking
Temperature (^{o}C)	24
Relative Humidity (%)	46
Wind Speed (km/hr)	5
Wind Direction	South East
Cloud Cover (%)	5
Application Method	Sprayed the crop either side of the row with the boom orientated vertically to the crop. Applied to the point of runoff.

DBH= days before harvest

Details	**Sample Timing**		
	1	2	3
Date	02-APR-2013	09-APR-2013	16-APR-2013
Sample Timing	0 DALA	7 DALA	14 DALA
Treatments Sampled	T2	T2	T1, T2
Growth Stage	Silks browning off	Brown silks	Mature
Order of Sampling	T2	T1 → T2	T2
Quantity Sampled	12 + >2kg foliage	12 + >2kg foliage	12 + >2kg foliage
Sampling Method	Whole cobs were collected from all areas of plot except for the first and last metre leaving husks intact. Foliage was collected using randomly selected plants. Selections were made from top, middle & bottom cuts and placed into plastic specimen bags.		

DALA = days after last application

Analytical Method Details:

Clethodim

Valent U.S.A. Method EPA-RM-26D-1: "*CONFIRMATORY METHOD FOR THE DETERMINATION OF CLETHODIM AND CLETHODIM METABOLITES IN CROPS, ANIMAL TISSUES, MILK AND EGGS*". Dated: 23 August 1990.

The analysis involved the extraction of clethodim residues from carrot samples with methanol/water. After partitioning with dichloromethane, the residue was methylated with trimethylsilyldiazomethane, cleaned by a base wash, oxidized with m-chloroperbenzoic acid, cleaned-up on a silica SPE cartridge, evaporated, then made-up in mobile phase. The instrumental analyses involved chromatographic separation of the target analyte via High Performance Liquid Chromatography equipped with a UV detector (HPLC-UV/DAD).

Abamectin

SYNGENTA METHOD REM 198.02 "DETERMINATION OF AVERMECTIN B1A, AVERMECTIN B1A 8,9-Z-ISOMER AND AVERMECTIN B1B BY LC-LC-MS/MS". DATED: 16 OCT 2002.

The extraction and purification analyses involved residues of abamectin (consisting of abamectin B1a, abamectin B1a 8,9-Z isomer and abamectin B1b) being extracted from the homogenised samples with methanol, followed by clean-up on a C18 SPE cartridge, and made-up in mobile phase. The instrumental analyses involved chromatographic separation of the target analyte via Liquid Chromatography and identification and quantitation of residues via triple-quad mass spectrometry (LC-MS/MS).

Pirimicarb

MANUAL OF PESTICIDE RESIDUE ANALYSIS VOLUME I, METHOD 309: "PIRIMICARB: APPLES, BEANS, BRUSSELS SPROUTS, CHIVES, HEAD CABBAGE, LETTUCE, SOIL, WATER. GAS-CHROMATOGRAPHIC DETERMINATION." DFG DEUTSCHE FORSCHUNGSGEMEINSCHAFT. (GERMAN VERSION PUBLISHED 1984)

Pirimicarb and its metabolites pirimicarb-desmethyl and pirimicarb-desmethyl-formamido were extracted from crop matrices using methanol. Following overnight conversion of the pirimicarb-desmethyl-formamido metabolite to pirimicarb-desmethyl in dilute HCl solution, clean-up by liquid/liquid partition with ethyl acetate was performed. After neutralisation of the aqueous acidic phase, a buffer was added. The pirimicarb residues were extracted by liquid/liquid partitioning into ethyl acetate. The organic phase was dried through anhydrous sodium sulphate, then evaporated to dryness. The final extract was redissolved in acetone and analysed for pirimicarb and pirimicarb-desmethyl by GC/MS on a Phenomenex 'Zebron' ZB-5MS column using an ion-trap Mass Spectrometer Detector (GC/MS). The quantitative determination was carried out by external standardisation.

Results:

Clethodim

Specimen Number	Sample Timing	Formulation Rate (g a.i/ha)	Total Clethodim Residues[1] (mg/kg)	Total Residues Expressed as Sethoxydim[2] (mg/kg)
Site 1: Cranbourne Region, Victoria – Carrots				
ASA11195/S1/T1/UTC	= 28 DAA	N/A	<LOQ	<LOQ
ASA11195/S1/T2/14DALA	14 DAA	120	0.23	0.21
ASA11195/S1/T2/28DALA	28 DAA	120	0.06	0.06
Site 2: Gippsland Region, Victoria – Carrots				
ASA11195/S2/T1/UTC	= 28 DAA	N/A	<LOQ	<LOQ
ASA11195/S2/T2/14DALA	14 DAA	120	0.25	0.22
ASA11195/S2/T2/28DALA	28 DAA	120	0.06	0.06
Site 3: Moreton Bay Region, Queensland – Carrots				
ASA11195/S3/T1/UTC	= 28 DAA	N/A	<LOQ	<LOQ
ASA11195/S3/T2/14DALA	14 DAA	120	0.11	0.10
ASA11195/S3/T2/28DALA	28 DAA	120	0.05	0.05
Site 4: Tweed Valley, New South Wales – Carrots				
ASA11195/S4/T1/UTC	= 28 DAA	N/A	<LOQ	<LOQ
ASA11195/S4/T2/14DALA	14 DAA	120	0.11	0.10
ASA11195/S4/T2/28DALA	28 DAA	120	0.05	0.05

DALA = Days After Application
LOQ = 0.05 mg/kg for clethodim analytes in carrot specimens.
Note 1: Total Clethodim Residues: Cumulative total of DME and DME-OH analytes, converted by molecular weight, and expressed as clethodim.
Note 2: Total Residues Expressed as Sethoxydim: Cumulative total of DME and DME-OH analytes, converted by molecular weight, and expressed as sethoxydim.

Abamectin

Specimen Number	Treatment	Sample Timing[1]	Specimen Type	Total Abamectin Residues[2,3] (mg/kg)
Site 1: Moreton Bay Region, QLD – Chillies (Protected)				
ASA11194/S1/T1/UTC	1	= 0 DAA	Chilli fruit	<LOQ
ASA11194/S1/T2/0DALA	2	0 DAA	Chilli fruit	0.13
ASA11194/S1/T2/1DALA	2	1 DAA	Chilli fruit	0.04
ASA11194/S1/T2/3DALA	2	3 DAA	Chilli fruit	0.04
ASA11194/S1/T2/5DALA	2	5 DAA	Chilli fruit	<LOQ
ASA11194/S1/T2/7DALA	2	7 DAA	Chilli fruit	<LOQ

Note 1: DAA = days after application
Note 2: Total Abamectin Residues = Cumulative total of abamectin B1a, abamectin B1b and abamectin B1a 8,9-Z isomer.
Note 3: LOQ = 0.01 mg/kg for abamectin residues in chilli fruit specimens.

Specimen Number	Treatment	Sample Timing[1]	Specimen Type	Total Abamectin Residues[2,3] (mg/kg)
Site 2: Moreton Bay Region, QLD – Spring Onions				
ASA11194/S2/T1/UTC	1	= 0 DAA	Spring onions	<LOQ
ASA11194/S2/T2/0DALA	2	0 DAA	Spring onions	0.04
ASA11194/S2/T2/1DALA	2	1 DAA	Spring onions	0.02
ASA11194/S2/T2/3DALA	2	3 DAA	Spring onions	0.02
ASA11194/S2/T2/5DALA	2	5 DAA	Spring onions	<LOQ
ASA11194/S2/T2/7DALA	2	7 DAA	Spring onions	<LOQ
Site 3: Deavon Meadows VIC – Spring Onions				
ASA11194/S3/T1/UTC	1	= 0 DALA	Spring onions	<LOQ
ASA11194/S3/T2/0DALA	2	0 DALA	Spring onions	0.06
ASA11194/S3/T2/1DALA	2	1 DALA	Spring onions	0.02
ASA11194/S3/T2/3DALA	2	3 DALA	Spring onions	0.02
ASA11194/S3/T2/5DALA	2	5 DALA	Spring onions	<LOQ
ASA11194/S3/T2/7DALA	2	7 DALA	Spring onions	<LOQ

Note 1: DAA = days after application
Note 2: Total Abamectin Residues = Cumulative total of abamectin B1a, abamectin B1b and abamectin B1a 8,9-Z isomer.
Note 3: LOQ = 0.01 mg/kg for abamectin residues in spring onion specimens.

Specimen Number	Treatment	Sample Timing[1]	Specimen Type	Total Abamectin Residues[2,3] (mg/kg)
Site 4: Moreton Bay Region, QLD – Shallots				
ASA11194/S4/T1/UTC	1	= 0 DAA	Shallot bulbs	<LOQ
ASA11194/S4/T2/0DALA	2	0 DAA	Shallot bulbs	<LOQ
ASA11194/S4/T2/1DALA	2	1 DAA	Shallot bulbs	<LOQ
ASA11194/S4/T2/3DALA	2	3 DAA	Shallot bulbs	<LOQ
ASA11194/S4/T2/5DALA	2	5 DAA	Shallot bulbs	<LOQ
ASA11194/S4/T2/7DALA	2	7 DAA	Shallot bulbs	<LOQ

Note 1: DAA = days after application
Note 2: Total Abamectin Residues = Cumulative total of abamectin B1a, abamectin B1b and abamectin B1a 8,9-Z isomer.
Note 3: LOQ = 0.01 mg/kg for abamectin residues in shallot bulb specimens.

Specimen Number	Treatment	Sample Timing[1]	Specimen Type	Total Abamectin Residues[2,3] (mg/kg)	
				Fresh Basis	Dry Basis[4]
Site 5: Moreton Bay Region, QLD – Sweetcorn					
ASA11194/S5/T1/UTC/cobs	1	= 0 DALA	Sweetcorn cobs	<LOQ	*N/A*
ASA11194/S5/T1/UTC/foliage	2	= 0 DALA	Sweetcorn foliage	<LOQ	<LOQ
ASA11194/S5/T2/0DALA/cobs	2	0 DALA	Sweetcorn cobs	<LOQ	*N/A*
ASA11194/S5/T2/0DALA/foliage	2	0 DALA	Sweetcorn foliage	0.73	4.52
ASA11194/S5/T2/3DALA/cobs	2	3 DALA	Sweetcorn cobs	0.05	*N/A*
ASA11194/S5/T2/3DALA/foliage	2	3 DALA	Sweetcorn foliage	0.41	2.42
ASA11194/S5/T2/10DALA/cobs	2	10 DALA	Sweetcorn cobs	0.02	*N/A*
ASA11194/S5/T2/10DALA/foliage	2	10 DALA	Sweetcorn foliage	0.08	0.49
Site 6: Lockyer Valley, QLD – Sweetcorn					
ASA11194/S6/T1/UTC/cobs	1	= 0 DALA	Sweetcorn cobs	<LOQ	*N/A*
ASA11194/S6/T1/UTC/foliage	2	= 0 DALA	Sweetcorn foliage	<LOQ	<LOQ
ASA11194/S6/T2/0DALA/cobs	2	0 DALA	Sweetcorn cobs	<LOQ	*N/A*
ASA11194/S6/T2/0DALA/foliage	2	0 DALA	Sweetcorn foliage	0.40	2.35
ASA11194/S6/T2/3DALA/cobs	2	3 DALA	Sweetcorn cobs	0.02	*N/A*
ASA11194/S6/T2/3DALA/foliage	2	3 DALA	Sweetcorn foliage	0.09	0.48
ASA11194/S6/T2/10DALA/cobs	2	10 DALA	Sweetcorn cobs	0.01	*N/A*
ASA11194/S6/T2/10DALA/foliage	2	10 DALA	Sweetcorn foliage	<LOQ	<LOQ
Site 7: Tweed Valley, NSW – Sweetcorn					
ASA11194/S7/T1/UTC/cobs	1	= 0 DALA	Sweetcorn cobs	<LOQ	N/A
ASA11194/S7/T1/UTC/foliage	2	= 0 DALA	Sweetcorn foliage	<LOQ	<LOQ
ASA11194/S7/T2/0DALA/cobs	2	0 DALA	Sweetcorn cobs	<LOQ	N/A
ASA11194/S7/T2/0DALA/foliage	2	0 DALA	Sweetcorn foliage	0.48	2.82
ASA11194/S7/T2/3DALA/cobs	2	3 DALA	Sweetcorn cobs	0.02	N/A
ASA11194/S7/T2/3DALA/foliage	2	3 DALA	Sweetcorn foliage	0.10	0.62
ASA11194/S7/T2/10DALA/cobs	2	10 DALA	Sweetcorn cobs	0.01	N/A
ASA11194/S7/T2/10DALA/foliage	2	10 DALA	Sweetcorn foliage	<LOQ	<LOQ
Site 8: Moreton Bay Region, QLD – Sweetcorn					
ASA11194/S8/T1/UTC/cobs	1	= 0 DALA	Sweetcorn cobs	<LOQ	N/A
ASA11194/S8/T1/UTC/foliage	2	= 0 DALA	Sweetcorn foliage	<LOQ	<LOQ
ASA11194/S8/T2/0DALA/cobs	2	0 DALA	Sweetcorn cobs	<LOQ	N/A
ASA11194/S8/T2/0DALA/foliage	2	0 DALA	Sweetcorn foliage	0.72	4.45
ASA11194/S8/T2/3DALA/cobs	2	3 DALA	Sweetcorn cobs	0.04	N/A
ASA11194/S8/T2/3DALA/foliage	2	3 DALA	Sweetcorn foliage	0.31	1.79
ASA11194/S8/T2/10DALA/cobs	2	10 DALA	Sweetcorn cobs	0.01	N/A
ASA11194/S8/T2/10DALA/foliage	2	10 DALA	Sweetcorn foliage	0.05	0.29

Note 1: DALA = days after last application
Note 2: Total Abamectin Residues = Cumulative total of abamectin $B1_a$, abamectin $B1_b$ and abamectin $B1_a$ 8,9-Z isomer.
Note 3: LOQ = 0.01 mg/kg for abamectin residues in sweetcorn cobs and foliage specimens.
Note 4: Where no quantifiable levels were found, i.e. the result on a Fresh Weight is <LOQ, the associated result expressed on a dry weight basis is also expressed as <LOQ. This approach was implemented to avoid magnification of error that would be associated with multiplying an estimated level below the limit of quantitation.

Pirimicarb

Specimen Number	Treatment	Sample Timing[1]	Specimen Type	Total Pirimicarb Residues [2,3] (mg/kg)
Site 1: Moreton Bay Region, Queensland – Celery				
ASA11196/S1/T1/UTC	1	= 0 DALA	Celery	<LOQ
ASA11196/S1/T2/0DALA	2	0 DALA	Celery	10.71
ASA11196/S1/T2/1DALA	2	1 DALA	Celery	8.42
ASA11196/S1/T2/2DALA	2	2 DALA	Celery	6.10
ASA11196/S1/T2/5DALA	2	5 DALA	Celery	0.58
Site 2: Cranbourne Region, Victoria – Celery				
ASA11196/S2/T1/UTC	1	= 0 DALA	Celery	<LOQ
ASA11196/S2/T2/0DALA	2	0 DALA	Celery	10.78
ASA11196/S2/T2/1DALA	2	1 DALA	Celery	9.23
ASA11196/S2/T2/2DALA	2	2 DALA	Celery	6.26
ASA11196/S2/T2/5DALA	2	5 DALA	Celery	0.53

Note 1: DALA = Days After Last Application

Note 2: Total Pirimicarb Residues = Cumulative total of pirimicarb, pirimicarb-desmethyl and pirimicarb-desmethyl-formamido analytes converted by molecular weight and expressed as pirimicarb.

Note 3: LOQ = 0.02 mg/kg for pirimicarb residues in celery specimens.

Specimen Number	Treatment	Sample Timing[1]	Specimen Type	Total Pirimicarb Residues [2,3] (mg/kg)
Site 3: Moreton Bay Region, Queensland – Spring Onions				
ASA11196/S3/T1/UTC	1	= 0 DALA	Spring Onion	<LOQ
ASA11196/S3/T2/0DALA	2	0 DALA	Spring Onion	4.37
ASA11196/S3/T2/1DALA	2	1 DALA	Spring Onion	3.50
ASA11196/S3/T2/2DALA	2	2 DALA	Spring Onion	2.94
ASA11196/S3/T2/7DALA	2	7 DALA	Spring Onion	0.03
ASA11196/S3/T2/10DALA	2	10 DALA	Spring Onion	<LOQ

Note 1: DALA = Days After Last Application

Note 2: Total Pirimicarb Residues = Cumulative total of pirimicarb, pirimicarb-desmethyl and pirimicarb-desmethyl-formamido analytes converted by molecular weight and expressed as pirimicarb.

Note 3: LOQ = 0.02 mg/kg for pirimicarb residues in spring onion specimens.

Specimen Number	Treatment	Sample Timing[1]	Specimen Type	Total Pirimicarb Residues[2,3] (mg/kg)	
				Fresh Basis	Dry Basis[4]
Site 4: Moreton Bay Region, Queensland – Sweetcorn					
ASA11196/S4/T1/UTC/cobs	1	= 0 DALA	Sweetcorn cobs	<LOQ	*N/A*
ASA11196/S4/T1/UTC/foliage	2	= 0 DALA	Sweetcorn foliage	<LOQ	<LOQ
ASA11196/S4/T2/0DALA/cobs	2	0 DALA	Sweetcorn cobs	0.03	*N/A*
ASA11196/S4/T2/0DALA/foliage	2	0 DALA	Sweetcorn foliage	5.59	37.05
ASA11196/S4/T2/7DALA/cobs	2	7 DALA	Sweetcorn cobs	0.04	*N/A*
ASA11196/S4/T2/7DALA/foliage	2	7 DALA	Sweetcorn foliage	0.09	0.63
ASA11196/S4/T2/14DALA/cobs	2	14 DALA	Sweetcorn cobs	<LOQ	*N/A*
ASA11196/S4/T2/14DALA/foliage	2	14 DALA	Sweetcorn foliage	<LOQ	<LOQ
Site 5: Lockyer Valley, Queensland – Sweetcorn					
ASA11196/S5/T1/UTC/cobs	1	= 0 DALA	Sweetcorn cobs	<LOQ	N/A
ASA11196/S5/T1/UTC/foliage	2	= 0 DALA	Sweetcorn foliage	<LOQ	<LOQ
ASA11196/S5/T2/0DALA/cobs	2	0 DALA	Sweetcorn cobs	0.05	N/A
ASA11196/S5/T2/0DALA/foliage	2	0 DALA	Sweetcorn foliage	5.72	37.16
ASA11196/S5/T2/7DALA/cobs	2	7 DALA	Sweetcorn cobs	0.03	N/A
ASA11196/S5/T2/7DALA/foliage	2	7 DALA	Sweetcorn foliage	0.09	0.54
ASA11196/S5/T2/14DALA/cobs	2	14 DALA	Sweetcorn cobs	<LOQ	N/A
ASA11196/S5/T2/14DALA/foliage	2	14 DALA	Sweetcorn foliage	<LOQ	<LOQ
Site 6: Tweed Valley, New South Wales – Sweetcorn					
ASA11196/S6/T1/UTC/cobs	1	= 0 DALA	Sweetcorn cobs	<LOQ	N/A
ASA11196/S6/T1/UTC/foliage	2	= 0 DALA	Sweetcorn foliage	<LOQ	<LOQ
ASA11196/S6/T2/0DALA/cobs	2	0 DALA	Sweetcorn cobs	0.04	N/A
ASA11196/S6/T2/0DALA/foliage	2	0 DALA	Sweetcorn foliage	6.64	39.50
ASA11196/S6/T2/7DALA/cobs	2	7 DALA	Sweetcorn cobs	0.02	N/A
ASA11196/S6/T2/7DALA/foliage	2	7 DALA	Sweetcorn foliage	0.09	0.53
ASA11196/S6/T2/14DALA/cobs	2	14 DALA	Sweetcorn cobs	<LOQ	N/A
ASA11196/S6/T2/14DALA/foliage	2	14 DALA	Sweetcorn foliage	<LOQ	<LOQ
Site 7: Moreton Bay Region, Queensland – Sweetcorn					
ASA11196/S7/T1/UTC/cobs	1	= 0 DALA	Sweetcorn cobs	<LOQ	N/A
ASA11196/S7/T1/UTC/foliage	2	= 0 DALA	Sweetcorn foliage	<LOQ	<LOQ
ASA11196/S7/T2/0DALA/cobs	2	0 DALA	Sweetcorn cobs	<LOQ	N/A
ASA11196/S7/T2/0DALA/foliage	2	0 DALA	Sweetcorn foliage	5.92	38.21
ASA11196/S7/T2/7DALA/cobs	2	7 DALA	Sweetcorn cobs	<LOQ	N/A
ASA11196/S7/T2/7DALA/foliage	2	7 DALA	Sweetcorn foliage	0.10	0.65
ASA11196/S7/T2/14DALA/cobs	2	14 DALA	Sweetcorn cobs	<LOQ	N/A
ASA11196/S7/T2/14DALA/foliage	2	14 DALA	Sweetcorn foliage	<LOQ	<LOQ

Note 1: DALA = Days After Last Application

Note 2: Total Pirimicarb Residues = Cumulative total of pirimicarb, pirimicarb-desmethyl and pirimicarb-desmethyl-formamido analytes converted by molecular weight and expressed as pirimicarb.

Note 3: LOQ = 0.02 mg/kg for pirimicarb residues in sweetcorn cobs and foliage specimens.

Note 4: Where no quantifiable levels were found, i.e. the result on a Fresh Weight is <LOQ, the associated result expressed on a dry weight basis is also expressed as <LOQ. This approach was implemented to avoid magnification of error that would be associated with multiplying an estimated level below the limit of quantitation.

Discussion:

This project was commissioned to determine the residue profiles of:

clethodim in carrots; abamectin in chillies, spring onions, shallots and sweetcorn; and pirimicarb in celery, spring onions and sweetcorn.

The Australian Pesticides and Veterinary Medicines Authority (APVMA) have previously issued the following permits:

PER10402 allowing one application of 240g/L clethodim products in carrots and parsnips for the control of grass weeds.

PER10730 allowing up to two applications of 18g/L abamectin products in chillies and paprika two spotted mite control.

PER11355 allowing up to two applications of 18g/L abamectin products in sweet corn for two spotted mite control.

PER10433 allowing one application of 500g/kg pirimicarb products in sweetcorn for aphid control.

PER11763 allowing up to two applications of 500g/kg pirimicarb products in spring onions for aphid control.

Residue data has been generated to support applications for each of these permits to be renewed. Residue data has also been generated to support applications for additional permits requested by growers.

Three detailed reports were written in compliance with the OECD Principles of Good Laboratory Practice (GLP). Three confidential reports were submitted to Horticulture Australia Limited (HAL) in June 2013.

Technology Transfer:

The data generated from this study will be included in submissions to the Australian Pesticides and Veterinary Medicines Authority. The data may also be used for additional submissions for permit applications, pesticide label extensions or for inclusion in complete pesticide registration applications.

Recommendations:

The highest residue level of clethodim detected in carrots from the four residue trials was 0.25mg/kg. This is one quarter of the 1.0mg/kg which is the Maximum Residue Limit (MRL) established by the Australian Pesticides and Veterinary Medicines Authority (APVMA). The data is therefore suitable to support an application to renew a minor use permit.

In three of the four abamectin trials in sweetcorn, the abamectin residue level in cob specimens had declined to 0.01mg/kg by 10 days after the last application. The remaining site had a residue level of 0.02mg/kg in the cob sample at 10 days after the last application. An MRL of T0.01 has been established by the APVMA for abamectin in sweetcorn cobs. The previous permit had a withholding period of 10 days after application. On this basis, the data generated is suitable to support an application to renew the permit, however the TMRL may need to be reconsidered.

In the protected chilli trial, the level of abamectin residue had declined to 0.04mg/kg by 3 days after the last application. The established MRL for tomatoes which are a similar crop is 0.05mg/kg. The recent permit for abamectin in chillies and paprika had a WHP of 3 days. Based on this, the data should be suitable to support an application for the addition of protected chillies to a renewed permit.

In the abamectin spring onion trials, the highest residue level at 3 days after the last application was 0.02mg/kg while the shallot trial had residue levels below the level of quantitation. Once again, compared to the tomato MRL of 0.05mg/kg, this data should be suitable for supporting an application to add spring onions and shallots to a minor use permit with a withholding period of 3 days.

In the four pirimicarb trials in sweetcorn, the residue levels in cob specimens had declined below the level of quantitation by 14 days after the last application. The stipulated withholding period on the minor used permit is 14 days, hence the data is suitable to support an application for renewal of the permit.

In the pirimicarb spring onion trial, the residue level declined to 2.94mg/kg at 2 days after last application which is the stipulated withholding period on the minor use permit. An MRL of T3.0 has been established for pirimicarb in spring onions therefore the data generated is suitable for supporting an application to renew the minor use permit.

In the pirimicarb celery trials, the highest residue level determined at 5 days after last application was 0.58mg/kg. There is no MRL for pirimicarb in celery but there is an MRL for assorted vegetables of 1.0mg/kg. Based on this, the generated data should be suitable for supporting a minor use permit application.

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Sudhan Shah – Dutson, Victoria

References:

APVMA (Australian Pesticides and Veterinary Medicines Authority)
The MRL Standard: Maximum residue limits in food and animal feedstuff December 2012.
Table :1 Maximum residue limits of agricultural and veterinary chemicals and associated substances in food commodities

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