FINAL REPORT

Project number: **VG11039 (8th November 2013)**

Project Title: **Movento label additions – Lettuce (western flower thrips), rhubarb, bulb vegetable crop group and herbs**

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Horticulture Australia Ltd Project VG11039 (4 July 2013)

Movento label additions – Lettuce (western flower thrips), rhubarb, bulb vegetable crop group and herbs

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The purpose of this report is to present data generated from field efficacy and "Good Laboratory Practice" (GLP) residue trials with Movento® 240 SC Insecticide in lettuce, several bulb vegetables and herbs which will allow for a submission for registration to the APVMA for the control of several thrips and aphids species.

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

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Table of Contents

Media Summary

The Australian lettuce, bulb vegetable, rhubarb and herb industries combined consist of approximately 13 800 hectares. Depending on the industry, the key sucking pests include aphids and/or thrips, however, across all abovementioned crops few or no registered pesticide options exist.

In lettuce, the main product currently registered for western flower thrips is Success™ Neo. Movento® 240 SC Insecticide, a group 23 insecticide is registered for use in lettuce production but only for aphids. In the bulb vegetable industry (other than onions), the key sucking pest is onion thrips (*Thrips tabaci*). Currently, the bulb vegetable industry (other than onions), has access to one registered thrips option, the active ingredient dimethoate, while garlic also has a registration for methidathion. In rhubarb there are currently no registered products for the control of aphids and thrips. The herb industry has access to a small number of registered products and only for the control of aphids. The registered aphicide actives include alpha-cypermethrin (a synthetic pyrethroid) and chlorpyrifos (an organophosphate); both are disruptive to beneficial species when used in a spray program.

This lack of new and softer systemic chemistry, especially those with an integrated pest management (IPM) fit has impacted on vegetable production and resulted in a reliance on minor use permit applications to gain access to alternative chemistry.

Bayer CropScience has shown a commitment in addressing minor use crops or major crops with minor uses with a new initiative called MUSCLE – **M**inor **U**se, **S**creening **P**roducts, **C**o-funding opportunities and **L**abel **E**xtensions. As part of this initiative Bayer CropScience resources have been allocated towards working more closely with the horticultural industry to help facilitate minor use claims. The main aim of this initiative is to avoid minor use permits and where possible, with support of industry funding, achieve registrations and label extensions.

As a result the “Movento® – Lettuce (western flower thrips), rhubarb, bulb vegetable crop group and herbs” was identified based on industry requirements. Movento® 240 SC Insecticide (active ingredient spirotetramat) is an innovative insecticide for the control of sucking pests in a range of vegetable and fruiting tree crops. The first Group 23 insecticide available in Australia, Movento® is effective on many pest populations that may have developed resistance to existing insecticide groups. The systemic nature of Movento provides a highly effect means of aphid control, vectors of virus. By using Movento during early stages of crop development it will control aphids which are not directly contacted by non-systemic insecticides. The effectiveness of Movento on thrips would also be very useful in reducing feeding damage on stalks/stems (sustained earlier in the crop), but also these vectors of virus. Movento also has an excellent Integrated Pest Management (IPM) fit and is “soft” on most beneficial species compared to broad spectrum alternatives when used according to current label directions.

The data generated from this project (which includes 8 x efficacy and 14 x “Good Laboratory Practice” residue field trials) will allow for the submission to the APVMA of Movento® 240 SC Insecticide in lettuce for Western flower thrips control, bulb vegetable group (other than onions) for onion thrips, rhubarb and herbs for several aphid and thrips species. The anticipated registration (as early as early 2015) provides growers with a tool to help manage key sucking pests in vegetable crops.

Technical Summary

The Australian lettuce, bulb vegetable, rhubarb and herb industries combined consist of approximately 13 800 hectares. Depending on the industry, the key sucking pests include aphids such as green peach aphid (*Myzus persicae*) and cotton aphid (*Aphis gossypii*) and/or thrips including onion (*Thrips tabaci*), plague (*Thrips imaginis*) and western flower thrips (*Frankliniella occidentalis*).

In lettuce, the most effective product currently registered for western flower thrips is Success™ Neo. In the bulb vegetable industry (other than onions), there is only one registered thrips option, the active ingredient dimethoate, while garlic also has a registration for methidathion. Currently, the bulb vegetable industry (other than onions), has access to one registered thrips option, the active ingredient dimethoate, while garlic also has a registration for methidathion. In rhubarb there are currently no registered products for the control of aphids and thrips. The herb industry has access to a small number of registered products and only for the control of aphids. The registered aphicide actives include alpha-cypermethrin (a synthetic pyrethroid) and chlorpyrifos (an organophosphate); both are disruptive to beneficial species when used in a spray program.

It is known from other vegetable industries that products such as dimethoate (an organophosphate) have limited activity on aphids and thrips. Furthermore, products which belong to the organophosphate and synthetic pyrethroid group of chemistry, which are known to be disruptive to beneficial species when used in a spray program. This lack of new and softer chemistry, especially those with an Integrated Pest Management (IPM) fit has impacted on vegetable production and resulted in a reliance on minor use permit applications to gain access to alternative chemistry for a large number of insects. Currently the industries have few or no IPM suitable products registered and are desperately seeking a sucking pest product compatible in an Integrated Pest Management System.

Bayer CropScience has developed a new systemic product Movento® 240 SC Insecticide. Movento (active ingredient spirotetramat) is an innovative insecticide for the control of sucking pests in a range of vegetable crops. The first Group 23 insecticide available in Australia, Movento is effective on many pest populations that may have developed resistance to existing insecticide groups. Movento has a unique '2-way systemicity'. After penetrating into plant tissue it is highly mobile in sap flows both up and down through the phloem and xylem in the plant, so hidden pests can be controlled. The systemic nature of Movento may provide a highly effect means of aphid control, vectors of virus. By using Movento during early stages of crop development it will control aphids which are not directly contacted by non-systemic insecticides. The effectiveness of Movento on thrips would also be very useful in reducing feeding damage on stalks and stems (sustained earlier in the crop), but also these vectors of virus. Movento also has an excellent IPM fit and is "soft" on most beneficial species compared to broad spectrum alternatives when used according to current label directions.

For Movento to be registered for lettuce (thrips control), bulb vegetable crop group, rhubarb and herbs additional data was requested by the APVMA for Australian growing conditions. This project was established to generate the efficacy, crop safety and residue data to support the future registration of Movento as a foliar spray for the control of aphids and/or thrips.

A total of 8 efficacy trials and 14 residue trials were conducted in the field, over one season in production regions of Australia. All the data from this project will be used by Bayer CropScience to submit for registration to the APVMA for Movento as a foliar spray for the control of Western flower thrips in lettuce, onion thrips in bulb vegetables and several aphid and thrips species in rhubarb and herbs.

The application of Movento as a foliar spray allows effective control of aphids and thrips with minimal effects on non-target species. As more management options for the control of aphids and thrips are developed, integrated crop management strategies and insecticide resistance strategies in vegetable production will need to be modified to ensure the sustainable management of these pests in the future.

Introduction

The Australian lettuce, bulb vegetable, rhubarb and herb industries combined consist of approximately 13 800 hectares. Depending on the industry, the key sucking pests include aphids such as green peach aphid **(*Myzus persicae*)** and cotton aphid **(*Aphis gossypii*)** and/or thrips including onion **(*Thrips tabaci*)**, plague **(*Thrips imaginis*)** and western flower thrips **(*Frankliniella occidentalis*)**.

The life cycle of thrips is dependent on temperature and food quality. Direct feeding by these species can also cause scarring and deformations on leaves and stems, with seedlings and soft tissue particularly prone to feeding damage. Celery is particularly susceptible to fruit scarring.

Green peach aphid **(*Myzus persicae*)** is a common pest in vegetables with a very wide host range. Typically, infestation commences with the arrival of winged adults which then give birth to wingless nymphs if a suitable host is found. Females do not need to mate before producing nymphs. Multiplication can continue until the colony becomes overcrowded or until young plant growth is no longer available when the winged forms are again produced.

Aphids in high numbers can produce large deposits of honeydew and as a secondary affect, can result in the development of sooty moulds. The development of sooty moulds results in an unsightly appearance on produce and thus affects the crops marketability. Large aphid numbers may also result in plant stunting particularly on younger plants. However, virus transmission, particularly of celery mosaic virus is a major issue with these aphids. This virus causes a dark green mosaic pattern on affected leaves as well as lumpy and distorted stems.

The lettuce (head and leafy) industry currently grows around 7500 ha in the field and 320 ha per year in protected situations[2]. New South Wales, Queensland and Victoria are the largest producers of lettuce each per year. The key sucking pests affecting lettuce in protected cropping include aphids and thrips.

In lettuce, the registered thrips options include the active ingredients dimethoate, maldison, methomyl and spinetoram (Success™ Neo). Dimethoate and maldison, both organophosphates, do not offer any control of western flower thrips (*Frankliniella occidentalis*) and are disruptive to beneficial species when used in a spray program. The only products currently registered for western flower thrips are methomyl, Durivo (chlorantraniliprole + thiamethoxam) and Success Neo. Movento 240 SC Insecticide, a group 23 insecticide is registered for use in hydroponic lettuce production but only for aphids. Movento at higher label rates would give producers the option of using new, selective, Integrated Pest Management (IPM) friendly chemistry to control thrips nymphs and will compliment Success Neo. At the time this proposal was prepared there were seven permits issues for field lettuce and eight permits issued for protected cropping grown lettuce.

The Australian bulb vegetable industry is dominated by the onion industry which grows around 5 500 ha nationally. Also included in the bulb vegetable group is spring onion, shallot, chives garlic and leeks industries (approximately 900 ha nationally)[2]. The key sucking pest affecting bulb vegetable production is onion thrips (*Thrips tabaci*). Currently, the bulb vegetable industry (other than onions), has access to one registered thrips option, the active ingredient dimethoate, while garlic also has a registration for methidathion. At the time this project was submitted there were a large number of industry permits[3] including PER8762 for maldison in spring onion, shallots and leek, and for spring onions and shallots alone PER6914 for methomyl, PER10882 for diazinon, PER11508 for chlorfenapyr and PER10596 for spinosad, which have all since expired. The only active permits are PER13088 for Success Neo in leek, sping onions and shallots and PER12221 for petroleum oil in bulb vegetables for the control of thrips and aphids.

Dimethoate, maldison, methidathion and diazinon, all organophosphates, and methomyl a carbamate, are all disruptive to beneficial species when used in a spray program. This lack of new and selective chemistry, especially those with an IPM fit has resulted in a heavy reliance on Success Neo under permit. The current registration of Movento Insecticide in onions will offer control of onion thrips. A label extension of Movento to spring onions, shallots, chives, garlic and leek will provide a registered label solution for the control of onion thrips for the bulb vegetable industry. At the time this proposal was prepared there were over 30 permits issued to the bulb vegetable group not including onions.

The stalk and stem vegetable crop group includes crops such, as celery (1300 ha)[2] and rhubarb (unknown hectares). The main sucking pests affecting production in the celery and rhubarb industries include aphids, including green peach aphid (*Myzus persicae*) and cotton aphid (*Aphis gossypii*) and thrips including onion (*Thrips tabaci*), plague (*Thrips imaginis*) and western flower thrips (*Frankliniella occidentalis*).

Previously, there was a completed HAL project (VG10077) for the label extension of celery to Movento for the control of aphids and thrips. This project will add rhubarb to the Movento label, which currently has no registered products for the control of aphids and thrips. The only product that can be used in rhubarb for aphid control is imidacloprid under permit PER14212[3]. At the time this project was initiated in 2011, there were six permits issued for rhubarb.

The Australian herb industry consists of approximately 200 ha of parsley and 250 ha of other herbs. The exact area grown in protected cropping is not known, but is estimated to be approximately 22 ha. The Australian herb industry has very few control options (either by registration or minor use permits) to treat its major pests. In 2004, the Australian Herb & Spice peak industry body (AHSIA) identified the key problematic pests and diseases facing the Australian herb and spice industry[4]. The key pests were ranked as 1) aphids 2) whitefly 3) mites and 4) thrips.

The herb industry has access to a small number of registered products and only for the control of aphids. The registered aphicide actives include alpha-cypermethrin (a synthetic pyrethroid) and chlorpyrifos (an organophosphate); both are disruptive to beneficial species when used in a spray program. The active ingredient spinosad is also registered in parsley but only for lepidopteran pests and not for thrips. There are currently no registrations for silverleaf whitefly control in parsley. Currently the herb industry (including parsley) relies heavily on permit applications for access to alternative chemistry. At the time this project was proposed the herb industry held two permits for aphids, cypermethrin (PER8595) and petroleum oil (PER11815), as well as two permits for silverleaf whitefly, buprofezin (PER8576) and pyriproxyfen (PER8601), which have all since expired. There are now two permits available for aphids and thrips; these include imidacloprid (PER13794) and petroleum oil (PER11815). A label extension of Movento 240 SC to herbs including parsley will provide a registered label solution for the control of aphids, thrips and silverleaf whitefly for the industry. Currently there are 21 permits issued to parsley as part of the herb industry.

The lack of new chemistry exposes the various cropping industries mentioned in this project to significant crop losses and as a consequence, unpredictable market supply due to the lack of the necessary tools, but also to the major risk of developing resistance to the present chemical options. If the current limited number of products were to continue to be used in the current way, it would present a serious threat to the viability of the various industries.

Bayer CropScience has shown a commitment in addressing minor use crops or major crops with minor uses with a new initiative called MUSCLE – **M**inor **U**se, **S**creening **P**roducts, **C**o-funding opportunities and **L**abel **E**xtensions. As part of this initiative Bayer CropScience resources have been allocated towards working more closely with the horticultural industry to help facilitate minor use claims. The main aim of this initiative is to avoid minor use permits and where possible, with support of industry funding, achieve registrations and label extensions.

Bayer CropScience has developed a new systemic product Movento® 240 SC Insecticide. Movento® (active ingredient spirotetramat) is an innovative insecticide already registered for the control of sucking pests, including green peach aphid, onion thrips and western flower thrips, in a range of vegetable crops. The first Group 23 insecticide available in Australia, Movento® is effective on many pest populations that may have developed resistance to existing insecticide groups. Movento® has a unique '2-way systemicity'. Movento® also has an excellent IPM fit and is "soft" on most beneficial species compared to broad spectrum alternatives when used according to current label directions.

This project was established to generate the efficacy, crop safety and residue data to support the future registration of Movento® as a foliar spray for the control of sucking pests in several vegetable crops.

The project was set up with the following aims;

1. To achieve the registration of Movento 240 SC Insecticide in lettuce (including protected cropping) for

western flower thrips.
2. To achieve the registration of Movento 240 SC Insecticide in rhubarb for aphids and thrips.
3. To achieve the registration of Movento 240 SC Insecticide in bulb vegetables, which includes crops such as spring onions, shallot, chives, garlic and leek for onion thrips.
4. To achieve the registration of Movento 240 SC Insecticide in herbs (including parsley) for silverleaf whitefly, aphids and thrips.

Materials and Methods

Efficacy - lettuce

The aims of the efficacy trials were:

1. Compare Movento 240 SC at 300 and 400 mL/ha plus Agridex 810 XL at 500 mL/ha and 1 L/ha for the control of Western flower thrips in protected cropping lettuce.
2. Compare Movento plus Agridex with the standard Success Neo 120 SC at 400 mL/ha for the control of Western flower thrips in lettuce.
3. Evaluate Movento plus Hasten or Agridex for their crop safety to lettuce.

All efficacy trials (Tables 1 to 4) were conducted as replicated complete block trials with either 3 or 4 replicates of each treatment. All trials were conducted on commercial lettuce properties in field grown or hydroponic growing systems. A summary of the efficacy trials conducted are listed in Table 1.

Table 1: Summary of lettuce efficacy trial site details

Site	**ID12AUSHM2QB17**	**ID12AUSHM2QB18**	**ID12AUSHM2NC16**	**ID12AUSHM2NC17**
Location	Heatherton, Victoria	Nelsons Plains, New South Wales	Glenorie, New South Wales	Glenorie, New South Wales
Pest	Western flower thrips Plague thrips	Western flower thrips	Western flower thrips	Western flower thrips
Soil Type	Sandy loam	Not applicable	Not applicable	Not applicable
Crop Management	Field	Hydroponic (Field)	Hydroponic (Protected)	Hydroponic (Protected)
Crop	Lettuce	Lettuce	Lettuce	Lettuce
Variety	Oakleaf	Coral (green)	Kipling	Kipling
Trial Design	Randomised Complete Block	Randomised Complete Block	Randomised Complete Block	Randomised Complete Block
Replicate	4	4	3	3
Plot Size	1 bed (3 rows) 1.1 m x 5 m	1 row 1 m x 8 m	1 row 1.5 m x 10 m	1 row 1.5 m x 10 m
Equipment	Solo 416 battery sprayer	Motorised backpack sprayer fitted with hand held boom	Hand held compressed air boom sprayer	Hand held compressed air boom sprayer
Nozzles	Size not recorded	5 cone jets (Size 8)	11002VK flat fan	11002VK flat fan
Application Dates	1. 11/12/12 2. 20/12/12	1. 28/03/13 2. 07/04/13	1. 27/02/13 2. 08/03/13	1. 13/03/13 2. 22/03/13
Crop stage	1. 100 mm diameter 2. 200 mm diameter	Not recorded	1. 50% of leaf mass reached 2. 70% of leaf mass reached	1. 4 leaf stage 2. 30% of leaf mass reached
Assessment Dates	Pre-spray: none 1. 20/12/12 (9 DAA1) 2. 01/01/13 (11 DAA2)	Pre-spray: 28/03/13 1. 07/04/13 (10 DAA1) 2. 17/04/13 (10 DAA2) 3. 27/04/13 (20 DAA2)	Pre-spray: none 1. 08/03/13 (9 DAA1) 2. 19/03/13 (11 DAA2)	Pre-spray: 13/03/13 1. 22/03/13 (9 DAA1) 2. 03/04/13 (12 DAA2)

Figure 1: QB17 - Movento trial site, Heatherton, Victoria

Table 2: Lettuce efficacy product list

Product name	Active ingredient (ai)	Concentration of active ingredient	Formulation
Movento 240 SC	spirotetramat	240 g/L	Suspension concentrate
Agridex 810 XL (old formulation)	petroleum oil	810 g/L	Soluble concentrate
Agridex 810 XL (new formulation)	petroleum oil	810 g/L	Soluble concentrate
Success Neo 120 SC	spinetoram	120 g/L	Suspension concentrate

Table 3: Lettuce efficacy treatment list

No.	Treatment	Rate	
		Product (mL/ha)	Active ingredient (g ai/ha)
1	Untreated control	nil	nil
2	Movento 240 SC Agridex 810 XL (old formulation)	300 500	72
3	Movento 240 SC Agridex 810 XL (new formulation)	300 500	72
4	Movento 240 SC Agridex 810 XL (old formulation)	400 1000	96
5	Movento 240 SC Agridex 810 XL (new formulation)	400 1000	96
6	Success Neo 120 SC	400	48

Treatment application

Movento was applied as either two broadcast foliar applications in a spray volume of 400 L/ha on a 9 or 10 day spray interval to an establishing or established population of thrips (Table 1 and Table 4). Motorised or compressed air spray equipment fitted with a hand boom was used across all efficacy trials. Booms were fitted with either flat fan or hollow cone nozzles. In two trials the density of thrips was assessed pre-spray and at 2-3 assessment timings post-spray. The numbers of nymph and adult thrips were counted on randomly sampled plants.

Table 4: Lettuce efficacy application summary

Trial No.	Application No. and interval	Application Volume
ID12AUSHM2QB17	2 x 9 days	400 L/ha
ID12AUSHM2QB18	2 x 10 days	400 L/ha
ID12AUSHM2NC16	2 x 9 days	400 L/ha
ID12AUSHM2NC17	2 x 9 days	400 L/ha

Thrips assessment

In QB17, thrips number was assessed be selecting 10 lettuce plants per plot at the first assessment (A1) and on 5 plants per plot assessment two (A2). The lettuce plants were selected at random and then cut at soil level and placed immediately into a container of methylated spirits. The containers were then sealed and shaken for ten seconds. Samples were stored at room temperature. The contents of each container were strained through a 200-micron stainless steel gauze, to separate the leaves/debris from the thrips. The thrips were then washed and assessed under a binocular microscope to count and identify thrips species, nymphs and adults.

In QB18, 10 lettuce plants were randomly selected per plot at each assessment. Plants were placed immediately into containers containing methylated spirits. The containers were sealed and shaken. In the laboratory the leaves were separated from the thrips. The thrips were placed into petri dishes and assessed under a binocular microscope to count and identify thrips species, nymphs and adults.

In NC16, three lettuce plants were randomly selected at A1 and four lettuce plants were randomly selected at A2. In NC17, three lettuce plants were randomly selected at each assessment timing. The lettuce plants were immediately placed into ziplock bags containing methylated spirits. In the laboratory the contents were strained through a 200-micron stainless steel gauze, separating the leaves from the thrips. The strained material containing the thrips was then washed onto petri dishes and counted under a binocular microscope to count and identify thrips species, nymphs and adults

Statistical analysis

In QB17, Analysis of Variance (ANOVA) was conducted on untransformed data and if the *p* value was significant at the 5%, treatment means separated using the Least Significant Difference (LSD) test. Where necessary the YTRANSFORM command in GenStat was used to calculate the optimal value of lambda to transform data values to a normal distribution prior to ANOVA where $T(x) = x^{lambda}$ (transformation indicated in results tables).

In QB18, statistical analyses were conducted using GenStat Release 11.1. The model includes all treatment effects. ANOVA conducted on untransformed data and if the *p* value was significant at the 5% level, means were separated using the LSD test.

In NC 16 and NC 17, data analysed was compared using the Duncan's multiple range test with statistical differences between treatments determined at the 5% level (NC16) or 10% level (NC17). Data that did not fit Bartlett's test for homogeneity was log transformed (NC16) or square root transformed (NC17).

Efficacy – bulb vegetable (spring onions / leek)

The aims of the efficacy trials were:

1. Compare Movento 240 SC at 200 mL/ha tank mixed with Hasten at 0.5 L/100 L and 1 L/100 L for the control of thrips in spring onions and leek.
2. Compare Movento at 200, 300 and 400 mL/ha plus Hasten 1 L/100 L for the control of thrips in spring onions and leek.
3. Compare Movento at 400 mL/ha tank mixed with Hasten at 1 L/100 L, Agridex 810 XL (new formulation) at 1 L/100 L or Maxx Organsilicone Surfactant 1020 XL at 60 mL/100 L for the control of thrips.
4. Compare Movento tank mixtures with the standard Dimethoate 400 EC at 750 mL/ha for the control of thrips in spring onions and leek.
5. Evaluate Movento plus adjuvant for their crop safety to spring onions and leek.

All efficacy trials (Tables 5 to 9) were conducted as replicated complete block trials with 4 replicates of each treatment. All trials were conducted on commercial spring onion or leek properties in field growing systems. A summary of the efficacy trials conducted are listed in Table 5.

Table 5: Summary of bulb vegetable efficacy trial site details

Site	**ID12AUSHM3QB19**	**ID12AUSHM3QB20**
Crop	Spring onion	Leek
Variety	Paragon	Admiral
Location	Heatherton, Victoria	Mangrove Mountain, New South Wales
Pest	Western flower thrips Onion thrips Plague thrips	Onion thrips
Soil Type	Sandy loam	Sandy clay loam
Crop Management	Field	Field
Trial Design	Randomised Complete Block	Randomised Complete Block
Replicate	4	4
Plot Size	1 bed (3 rows) 1.1 m x 5 m	1 bed 1 m x 8 m
Equipment	Solo 416 battery sprayer	Motorised backpack sprayer fitted with hand held boom
Nozzles	Size not recorded	3 Teejet flat fans (8000EVS)
Application Dates	1. 19/12/12 2. 29/12/12	1. 22/04/13 2. 02/05/13
Crop stage	1. 35 cm high 2. 40 cm high	1. 20 to 30 cm 2. 20 to 30 cm
Assessment Dates	Pre-spray: none 1. 28/12/12 (9 DAA1) 2. 08/01/13 (10 DAA2)	Pre-spray: 22/04/13 1. 02/05/13 (10 DAA1) 2. 12/05/13 (10 DAA2) 3. 22/05/13 (20 DAA2)

Figure 2: QB19 - Movento trial site in spring onions, Heatherton, Victoria

Table 6: Bulb vegetable efficacy product list

Product name	Active ingredient (ai)	Concentration of active ingredient	Formulation
Movento 240 SC	spirotetramat	240 g/L	Suspension concentrate
Hasten 704 SL	vegetable oil	704 g/L	Soluble concentrate
Agridex 810 XL (new formulation)	petroleum oil	810 g/L	Soluble concentrate
Maxx 1020 XL	polyether modified polysiloxane	1020 g/L	Soluble concentrate
Dimethoate 400 EC	dimethoate	400 g/L	Emulsifiable concentrate

Table 7: Spring onion efficacy treatment list (QB19)

No.	Treatment	Rate	
		Product (mL/ha)	Active ingredient (g ai/ha)
1	Untreated control	nil	nil
2	Movento 240 SC Hasten 704 SL	200 2000	48
3	Movento 240 SC Hasten 704 SL	200 4000	48
4	Movento 240 SC Hasten 704 SL	300 4000	72
5	Movento 240 SC Hasten 704 SL	400 4000	96
6	Movento 240 SC Agridex 810 XL (new formulation)	400 4000	96
7	Movento 240 SC Maxx 1020 XL	400 240	96
8	Dimethoate	750	300

Table 8: Leek efficacy treatment list (QB20)

No.	Treatment	Rate	
		Product (mL/ha)	Active ingredient (g ai/ha)
1	Untreated control	nil	nil
2	Movento 240 SC Hasten 704 SL	200 500	48
3	Movento 240 SC Hasten 704 SL	200 1000	48
4	Movento 240 SC Hasten 704 SL	300 1000	72
5	Movento 240 SC Hasten 704 SL	400 1000	96
6	Movento 240 SC Agridex 810 XL (new formulation)	400 1000	96
7	Movento 240 SC Maxx 1020 XL	400 60	96
8	Dimethoate	750	300

Treatment application

Movento was applied as either two broadcast foliar applications in a spray volume of 400 L/ha (QB19) or 405 L/ha (QB20) on 10 or 11 day spray interval, respectively to an establishing or established population of thrips (Table 9). Motorised spray equipment fitted with a hand boom was used across all efficacy trials. Booms were fitted with flat fan nozzles. In one trial, (QB20), the density of thrips was assessed pre-spray and at 2 or 3 assessment timings post-spray. The numbers of nymphs and adult thrips were counted on randomly sampled plants.

Table 9: Bulb vegetable efficacy application summary

Trial No.	Application No. and interval	Application Volume
ID12AUSHM3QB19	2 x 10 days	400 L/ha
ID12AUSHM3QB20	2 x 11 days	405 L/ha

Thrips assessment

In QB19, thrips number was assessed be selecting 30 spring onion plants per plot at the first assessment (A1) and on 20 spring onion plants per plot assessment two (A2). The spring onions were selected at random and then cut 10 cm above soil level and placed immediately into a container of methylated spirits. The containers were then sealed and shaken for ten seconds. Samples were stored at room temperature. The contents of each container were strained through using a 200-micron stainless steel gauze, to separate the leaves/debris from the thrips. The thrips were then washed and assessed under a binocular microscope to count and identify thrips species, nymphs and adults.

In QB20, 10 leek plants were randomly selected per plot at each assessment. Plants were placed immediately into containers containing methylated spirits. The containers were sealed and shaken. In the laboratory the leaves were separated from the thrips. The thrips were placed into petri dishes and assessed under a binocular microscope to count and identify thrips species, nymphs and adults.

Statistical analysis

In QB19, Analysis of Variance (ANOVA) was conducted on untransformed data and if the *p* value was significant at the 5%, treatment means separated using the Least Significant Difference (LSD) test. Where necessary the YTRANSFORM command in GenStat was used to calculate the optimal value of lambda to transform data values to a normal distribution prior to ANOVA where $T(x) = x^{lambda}$ (transformation indicated in results tables).

In QB20, statistical analyses were conducted using GenStat Release 11.1. The model includes all treatment effects. ANOVA conducted on untransformed data and if the *p* value was significant at the 5% level, means were separated using the LSD test.

Efficacy – parsley

The aims of the efficacy trials were:

1. Compare Movento 240 SC at 200, 300 and 400 mL/ha plus Hasten at 1 L/ha for the control of aphids and thrips in parsley.
2. Compare Movento at 400 mL/ha plus Hasten at 1 L/ha with the adjuvant Agridex (new and old formulations) at 1 L/ha for the control of aphids and thrips in parsley.
3. Compare Movento at 400 mL/ha tank mixed with Agridex (old formulation) versus Agridex (new formulation) at 1 L/ha.
4. Compare Movento tank mixtures with the standard Success Neo 120 SC at 400 mL/ha plus Agral for the control of thrips in parsley or White Oil at 5 mL/L for the control of aphids and thrips.
5. Evaluate Movento plus adjuvant for their crop safety to parsley.

All efficacy trials (Tables 10 to 14) were conducted as replicated complete block trials with either 3 or 4 replicates of each treatment. All trials were conducted on commercial parsley properties in field growing systems. A summary of the efficacy trials conducted are listed in Table 10.

Table 10: Summary of parsley efficacy trial site details

Site	**ID12AUSHM4QB21**	**ID12AUSHM4QB22**
Crop	Parsley – curled leaf	Parsley – flat leaf
Variety	Limerick	Grande
Location	Heatherton, Victoria	Mangrove Mountain, New South Wales
Pest	Western flower thrips Plague thrips	Green peach aphid
Soil Type	Sandy loam	Not applicable
Crop Management	Field	Hydroponic - field
Trial Design	Randomised Complete Block	Randomised Complete Block
Replicate	4	4
Plot Size	1 bed (3 rows) 1.1 m x 5 m	1 bed 1 m x 8 m
Equipment	Solo 416 battery sprayer	Motorised backpack sprayer fitted with hand held boom
Nozzles	Size not recorded	2 Teejet flat fans (8000EVS)
Application Dates	1. 11/12/12 2. 20/12/12	1. 28/03/13 2. 11/04/13
Crop stage	1. 20 cm high 2. 22 cm high	1. 20 to 30 cm 2. 20 to 30 cm
Assessment Dates	Pre-spray: none 1. 20/12/12 (9 DAA1) 2. 01/01/13 (12 DAA2)	Pre-spray: 28/03/13 1. 11/04/13 (14 DAA1) 2. 21/04/13 (10 DAA2) 3. 02/05/13 (21 DAA2)

Figure 3: QB21 - Movento trial site in curled leaf parsley, Heatherton, Victoria

Table 11: Parsley efficacy product list

Product name	Active ingredient (ai)	Concentration of active ingredient	Formulation
Movento 240 SC	spirotetramat	240 g/L	Suspension concentrate
Hasten 704 SL	vegetable oil	704 g/L	Soluble concentrate
Agridex 810 XL (old formulation)	petroleum oil	810 g/L	Soluble concentrate
Agridex 810 XL (new formulation)	petroleum oil	810 g/L	Soluble concentrate
Agral 600 SL	alkyl phenol ethylene oxide	600 g/L	Soluble concentrate
Ampol Summer Spray Oil	petroleum oil	839 g/L	Soluble concentrate
Success Neo 120 SC	spinetoram	120 g/L	Suspension concentrate

Table 12: Curled leaf parsley efficacy treatment list (QB21)

No.	Treatment	Rate	
		Product (mL/ha)	Active ingredient (g ai/ha)
1	Untreated control	nil	nil
2	Movento 240 SC Hasten 704 SL	200 1000	48
3	Movento 240 SC Hasten 704 SL	300 1000	72
4	Movento 240 SC Hasten 704 SL	400 1000	96
5	Movento 240 SC Agridex 810 XL (old formulation)	400 1000	96
6	Movento 240 SC Agridex 810 XL (new formulation)	400 1000	96
7	Success Neo 120 SC Agral 600 SL	400 10 mL/100 L	48
8	Ampol Summer Oil	2000	1678

Table 13: Flat leaf parsley efficacy treatment list (QB22)

No.	Treatment	Rate	
		Product (mL/ha)	Active ingredient (g ai/ha)
1	Untreated control	nil	nil
2	Movento 240 SC Hasten 704 SL	200 1000	48
3	Movento 240 SC Hasten 704 SL	300 1000	72
4	Movento 240 SC Hasten 704 SL	400 1000	96
5	Movento 240 SC Agridex 810 XL (old formulation)	400 1000	96
6	Movento 240 SC Agridex 810 XL (new formulation)	400 1000	96
7	Movento 240 SC Agral 600 SL	400 10 mL/100 L	96
8	Ampol Summer Oil	1990	1670

Treatment application

Movento was applied as either two broadcast foliar applications in a spray volume of 400 L/ha (QB21) or 398 L/ha (QB22) on 9 or 14 day spray interval, respectively to an establishing or established population of thrips or aphids (Tables 10 and 14). Motorised spray equipment fitted with a hand boom was used across all efficacy trials. Booms were fitted with flat fan nozzles. In one trial, (QB20), the density of thrips was assessed pre-spray and at 2 or 3 assessment timings post-spray. The numbers of nymphs and adult thrips or aphids were counted on randomly sampled plants.

Table 14: Parsley efficacy application summary

Trial No.	Application No. and interval	Application Volume
ID12AUSHM4QB21	2 x 9 days	400 L/ha
ID12AUSHM4QB22	2 x 14 days	398 L/ha

Thrips/aphids assessments

In QB21, thrips number was assessed be selecting 5 parsley plants per plot at each assessment. The parsley was selected at random and placed immediately into a container of methylated spirits. The containers were then sealed and shaken for ten seconds. Samples were stored at room temperature and assessed within three days of sampling. The contents of each container were strained through a 200-micron stainless steel gauze, to separate the leaves/debris from the thrips. The thrips were then washed and assessed under a binocular microscope to count and identify thrips species, nymphs and adults.

In QB22, 10 parsley plants were randomly selected per plot at each assessment. Plants were placed immediately into containers containing methylated spirits. The containers were sealed and shaken. In the laboratory the leaves were separated from the aphids. The aphids were placed into petri dishes and counted as nymphs and adults using a binocular microscope.

Statistical Analysis

In QB21, Analysis of Variance (ANOVA) was conducted on untransformed data and if the *p* value was significant at the 5%, treatment means separated using the Least Significant Difference (LSD) test. Where necessary the YTRANSFORM (log or square root) command in GenStat was used to calculate the optimal value of lambda to transform data values to a normal distribution prior to ANOVA where $T(x) = x^{lambda}$ (transformation indicated in results tables).

In QB22, statistical analyses were conducted using GenStat Release 11.1. The model includes all treatment effects. ANOVA conducted on untransformed data and if the *p* value was significant at the 5% level, means were separated using the LSD test.

Residues

Study Plan number: BCS-0381

Determination of residues of spirotetramat in rhubarb following two applications of Movento 240 SC at 96 g ai/ha at seven day intervals.

The aim of the rhubarb residue trial was to determine the magnitude of the residues of spirotetramat in rhubarb following two applications of Movento 240 SC at 96 g ai/ha made seven days apart just before harvest.

Two field trials (Tables 15 to 17) were conducted under Good Laboratory Practice (GLP) to generate residue data to set Maximum Residue Limits (MRLs).

Peracto Pty Ltd conducted the field phase of this residue study in rhubarb at two test sites: P381-1 at Heatherton in Victoria and at P381-2 at Latrobe in Tasmania. Two applications of Movento 240 SC were made at 96 g ai/ha at seven and 0 days before commercial harvest.

Test samples were collected nominally at 7 days after the first application and at 0, 3, 7, 10, 14 days after the second application. The analysis of the residues in the test samples was conducted at the Bayer CropScience Residue Laboratory in Brisbane. The results from the two trials (Tables 18 and 19) will be used in the registration submission for the control of several aphid and thrips species in rhubarb.

Table 15: BCS-0381 rhubarb residue trial summary

Study Plan No.	Test site	Location	Cultivar	Growing type	Spray Volume (L/ha)	Interval
BCS-0381	P381-1	Heatherton, Vic	Ruby Red	Field	A = 438 B = 472	7 days
	P381-2	Latrobe, Tas	Wandin Red	Field	A = 500 B = 500	8 days

Table 16: Treatment list for BCS-0381 residue trials

Treatment Number	Formulated Test Substance	Active Ingredient	Rates of Test Substance (mL/ha)	Rates of Active Ingredient (g ai/ha)	Application Timing Codes
1	Untreated	N/A	Nil	Nil	N/A
2	Movento 240 SC	BYI-08330 (spirotetramat)	400	96	A and B

*Hasten Spray Adjuvant was added to Movento at a rate of 1.1 L/ha.

Table 17: Sampling information for BCS-0381 residue trials

Treatment Number	Test Item	Rates of Test Substance (mL/ha)	Sample Timing	Specimen Quantity
1	Untreated	Nil	P381-1 – 7 DAAA P381-2 – 8 DAAA	Rhubarb – 0.7 to 1 kg of commercially viable rhubarb stems were collected from various parts of each plot; buffer areas were avoided.
2	Movento 240 SC	400*	P381-1 – 7 DAAA, 0,3,7,10,15 DAAB P381-2 – 8 DAAA, 0,2,7,9,13 DAAB	

*Hasten Spray Adjuvant was added to Movento at a rate of 1.1 L/ha.
DAAA = Days after application A; DAAB = Days after applications A and B

Table 18: Residues of spirotetramat in rhubarb from test site P381-1 (Heatherton, Victoria)

Test Substance	Rates of Active Ingredient per Application (g a.i./ha)	Number of Applications (Application Timing Codes)	Sampling Timings	Test Sample Codes	Concentrations (mg/kg)					
					Detected as Spirotetramat	Detected as BYI 08330 enol	Detected as BYI 08330 mono-hydroxy	Detected as BYI 08330 keto-hydroxy	Detected as BYI 08330 enol-glucoside	Expressed as Spirotetramat Parent Equivalent
Nil	Not applicable	Not applicable	7 DAAA	VS 1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.11
Movento 240 SC	96	1 (A)	7 DAAA	VS 2	0.05	<0.02	<0.02	<0.02	<0.02	<0.11
		2 (A and B)	0 DAAB	VS 3	0.44	0.02	<0.02	<0.02	<0.02	0.47
			3 DAAB	VS 4	0.03	<0.02	<0.02	<0.02	<0.02	<0.11
			7 DAAB	VS 5	<0.02	<0.02	<0.02	<0.02	<0.02	<0.11
			10 DAAB	VS 6	<0.02	<0.02	<0.02	<0.02	<0.02	<0.11
			15 DAAB	VS 7	<0.02	<0.02	<0.02	<0.02	<0.02	<0.11

DAAA = Days after Application A
DAAB = Days after Application B of applications A and B
LOQ for Spirotetramat, BYI 08330 enol, BYI 08330 keto-hydroxy, BYI 08330 mono-hydroxy and BYI 08330 enol-glucoside = 0.02 mg/kg
LOQ expressed as Spirotetramat parent equivalent = 0.11 mg/kg
Note the above results might not always match the raw data because of rounding adjustments.

Table 19: Residues of spirotetramat in rhubarb from test site P381-2 (Latrobe, Tasmania)

Test Substance	Rates of Active Ingredient per Application (g a.i./ha)	Number of Applications (Application Timing Codes)	Sampling Timings	Test Sample Codes	Concentrations (mg/kg)					
					Detected as Spirotetramat	Detected as BYI 08330 enol	Detected as BYI 08330 mono-hydroxy	Detected as BYI 08330 keto-hydroxy	Detected as BYI 08330 enol-glucoside	Expressed as Spirotetramat Parent Equivalent
Nil	Not applicable	Not applicable	8 DAAA	VS 1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.11
Movento 240 SC	96	1 (A)	8 DAAA	VS 2	0.05	<0.02	<0.02	<0.02	<0.02	<0.11
		2 (A and B)	0 DAAB	VS 3	0.32	0.08	<0.02	0.03	<0.02	0.46
			2 DAAB	VS 4	0.24	0.10	<0.02	0.02	<0.02	0.39
			7 DAAB	VS 5	0.11	0.16	<0.02	0.05	<0.02	0.36
			9 DAAB	VS 6	0.06	0.03	<0.02	0.02	<0.02	0.13
			13 DAAB	VS 7	<0.02	0.08	<0.02	0.05	<0.02	0.15

DAAA = Days after Application A
DAAB = Days after Application B of applications A and B
LOQ for Spirotetramat, BYI 08330 enol, BYI 08330 keto-hydroxy, BYI 08330 mono-hydroxy and BYI 08330 enol-glucoside = 0.02 mg/kg
LOQ expressed as Spirotetramat parent equivalent = 0.11 mg/kg
Note the above results might not always match the raw data because of rounding adjustments.

Study Plan number: BCS-0402

Study name: Determination of residues of spirotetramat in spring onions, shallots, fennel, leek and garlic following two applications of Movento 240 SC at 96 g ai/ha at seven day intervals.

The aim of the bulb vegetable crop group residue trial was to determine the magnitude of the residues of spirotetramat in spring onions, shallots, fennel, leek and garlic following two applications of Movento 240 SC at 96 g ai/ha made seven days apart just before harvest.

Six field trials (Tables 20 to 22) were conducted under Good Laboratory Practice (GLP) to generate residue data to set Maximum Residue Limits (MRLs).

Peracto Pty Ltd conducted the field phase of this residue study in shallots at site P402-1 at Nobby in Queensland; in garlic at site P402-2 at Bayles in Victoria; in fennel at site P402-3 at Amiens in Queensland; in spring onions at sites P402-4 at Carabooda in Western Australia; P402-5 at Nobby in Queensland and in leeks at site P402-6 at Forth in Tasmania. Two applications of Movento 240 SC were made at 96 g ai/ha at seven and 0 days before commercial harvest.

Test samples were collected nominally at 7 days after the first application and at 0, 3, 7, 10, 14, 21 days after the second application. The analysis of the residues in the test samples was conducted at the Bayer CropScience Residue Laboratory in Brisbane. The results from the six trials (Tables 23 to 28) will be used in the registration submission for the control of onion thrips in the bulb vegetable crop group.

Table 20: BCS-0402 bulb vegetable crop group residue trial summary

Study Plan No.	Test site	Location	Crop, Cultivar	Growing type	Spray Volume (L/ha)	Interval
BCS-0402	P402-1	Nobby, Qld	Shallots, Gladalan	Field	A = 478 B = 545	7 days
	P402-2*	Bayles, Vic	Garlic, Iberose	Field	A = 519 B = 404	6 days
	P402-3	Amiens, Qld	Fennel, Titanic Florence	Field	A = 567 B = 567	6 days
	P402-4	Carabooda, WA	Spring onions, Zeffa	Field	A = 525 B = 526	8 days
	P402-5	Nobby, Qld	Spring onions, Parragon	Field	A = 473 B = 478	7 days
	P402-6	Forth, Tas	Leeks, Duraton	Field	A = 506 B = 509	8 days

*Test site P402-2 was added to the project on the advice of Bayer CropScience's Regulatory Affairs department at no cost to industry to ensure sufficient data was collected to allow for the submission of registration of Movento for the bulb vegetable crop group.

Table 21: Treatment list for BCS-0402 residue trials

Treatment Number	Formulated Test Substance	Active Ingredient	Rates of Test Substance (mL/ha)	Rates of Active Ingredient (g ai/ha)	Application Timing Codes
1	Untreated	N/A	Nil	Nil	N/A
2	Movento 240 SC	BYI-08330 (spirotetramat)	400	96	A and B

*Hasten Spray Adjuvant was added to Movento at a rate of 1.0 L/ha.

Table 22: Sampling information for BCS-0402 residue trials

Treatment Number	Test Item	Rates of Test Substance (mL/ha)	Sample Timing	Specimen Quantity
1	Untreated	Nil	P402-1 – 7 DAAA P402-2 – 6 DAAA P402-3 – 8 DAAA P402-4 – 8 DAAA P402-5 – 7 DAAA P402-6 – 7 DAAA	Bulb vegetables – A minimum of 1 kg of commercially viable bulb vegetable were collected from various parts of each plot; buffer areas were avoided.
2	Movento 240 SC	400*	P402-1 – 7 DAAA, 0,3,7,10,14,21 DAAB P402-2 – 6 DAAA, 0,2,7,9,16,21 DAAB P402-3 – 8 DAAA, 0,2,7,9,12,19 DAAB P402-4 – 8 DAAA, 0,3,7,9,14,21 DAAB P402-5 – 7 DAAA, 0,3,7,10,14,21 DAAB P402-6 – 7 DAAA, 0,3,7,10,14,21 DAAB	

*Hasten Spray Adjuvant was added to Movento at a rate of 1.0 L/ha.
DAAA = Days after application A; DAAB = Days after applications A and B

Table 23: Residues of spirotetramat in shallots from test site P402-1 (Nobby, Queensland)

Test Substance	Rates of Active Ingredient per Application (g a.i./ha)	Number of Applications (Application Timing Codes)	Sampling Timings	Test Sample Codes	Concentrations (mg/kg)					
					Detected as Spirotetramat	Detected as BYI 08330 enol	Detected as BYI 08330 ketohydroxy	Detected as BYI 08330 monohydroxy	Detected as BYI 08330 enol glucoside	Expressed as Spirotetramat Parent Equivalent
Nil	Not applicable	Not applicable	7 DAAA	VA 1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.11
Movento 240 SC	96	1 (A)	7 DAAA	VA 2	<0.02	0.03	<0.02	<0.02	<0.02	<0.11
		2 (A and B)	0 DAAB	VA 3	0.04	0.05	<0.02	<0.02	<0.02	<0.11
			3 DAAB	VA 4	<0.02	0.04	<0.02	<0.02	<0.02	<0.11
			7 DAAB	VA 5	<0.02	0.05	<0.02	<0.02	<0.02	<0.11
			10 DAAB	VA 6	<0.02	0.05	<0.02	<0.02	<0.02	<0.11
			14 DAAB	VA 7	<0.02	0.03	<0.02	<0.02	<0.02	<0.11
			21 DAAB	VA 8	<0.02	<0.02	<0.02	<0.02	<0.02	<0.11

DAAA = Days after Application A
DAAB = Days after Application B of applications A and B
Application A was made 7 days before commercial harvest
Application B was made on the day of commercial harvest
LOQ for spirotetramat, BYI 08330 enol, BYI 08330 ketohydroxy, BYI 08330 monohydroxy and BYI 08330 enol glucoside = 0.02 mg/kg
LOQ expressed as spirotetramat parent equivalent = 0.11 mg/kg
Note the above results might not always match the raw data because of rounding adjustments.

Table 24: Residues of spirotetramat in garlic from test site P402-2 (Bayles, Victoria)

Test Substance	Rates of Active Ingredient per Application (g a.i./ha)	Number of Applications (Application Timing Codes)	Sampling Timings	Test Sample Codes	Concentrations (mg/kg)					
					Detected as Spirotetramat	Detected as BYI 08330 enol	Detected as BYI 08330 ketohydroxy	Detected as BYI 08330 monohydroxy	Detected as BYI 08330 enol glucoside	Expressed as Spirotetramat Parent Equivalent
Nil	Not applicable	Not applicable	6 DAAA	VA 1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.11
Movento 240 SC	96	1 (A)	6 DAAA	VA 2	<0.02	0.05	<0.02	<0.02	<0.02	<0.11
		2 (A and B)	0 DAAB	VA 3	<0.02	0.03	<0.02	<0.02	<0.02	<0.11
			2 DAAB	VA 4	<0.02	0.05	<0.02	<0.02	<0.02	<0.11
			7 DAAB	VA 5	<0.02	0.05	<0.02	<0.02	<0.02	<0.11
			9 DAAB	VA 6	<0.02	0.06	<0.02	<0.02	<0.02	<0.11
			16 DAAB	VA 7	<0.02	0.05	<0.02	<0.02	<0.02	<0.11
			21 DAAB	VA 8	<0.02	0.05	<0.02	<0.02	<0.02	<0.11

DAAA = Days after Application A
DAAB = Days after Application B of applications A and B
Application A was made 6 days before commercial harvest
Application B was made on the day of commercial harvest
LOQ for spirotetramat, BYI 08330 enol, BYI 08330 ketohydroxy, BYI 08330 monohydroxy and BYI 08330 enol glucoside = 0.02 mg/kg
LOQ expressed as spirotetramat parent equivalent = 0.11 mg/kg
Note the above results might not always match the raw data because of rounding adjustments.

Table 25: Residues of spirotetramat in Fennel from test site P402-3 (Amiens, Queensland)

Test Substance	Rates of Active Ingredient per Application (g a.i./ha)	Number of Applications (Application Timing Codes)	Sampling Timings	Test Sample Codes	Concentrations (mg/kg)					
					Detected as Spirotetramat	Detected as BYI 08330 enol	Detected as BYI 08330 ketohydroxy	Detected as BYI 08330 monohydroxy	Detected as BYI 08330 enol glucoside	Expressed as Spirotetramat Parent Equivalent
Nil	Not applicable	Not applicable	8 DAAA	VA 1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.11
Movento 240 SC	96	1 (A)	8 DAAA	VA 2	<0.02	<0.02	<0.02	<0.02	<0.02	<0.11
		2 (A and B)	0 DAAB	VA 3	1.76	0.19	0.03	<0.02	<0.02	2.04
			2 DAAB	VA 4	0.08	0.04	0.03	<0.02	<0.02	0.16
			7 DAAB	VA 5	<0.02	<0.02	<0.02	<0.02	<0.02	<0.11
			9 DAAB	VA 6	<0.02	<0.02	<0.02	<0.02	<0.02	<0.11
			12 DAAB	VA 7	<0.02	<0.02	<0.02	<0.02	<0.02	<0.11
			19 DAAB	VA 8	<0.02	<0.02	<0.02	<0.02	<0.02	<0.11

DAAA = Days after Application A
DAAB = Days after Application B of applications A and B
Application A was made 8 days before commercial harvest
Application B was made on the day of commercial harvest
LOQ for spirotetramat, BYI 08330 enol, BYI 08330 ketohydroxy, BYI 08330 monohydroxy and BYI 08330 enol glucoside = 0.02 mg/kg
LOQ expressed as spirotetramat parent equivalent = 0.11 mg/kg
Note the above results might not always match the raw data because of rounding adjustments.

Table 26: Residues of spirotetramat in spring onions from test site P402-4 (Carabooda, Western Australia)

Test Substance	Rates of Active Ingredient per Application (g a.i./ha)	Number of Applications (Application Timing Codes)	Sampling Timings	Test Sample Codes	Concentrations (mg/kg)					
					Detected as Spirotetramat	Detected as BYI 08330 enol	Detected as BYI 08330 ketohydroxy	Detected as BYI 08330 monohydroxy	Detected as BYI 08330 enol glucoside	Expressed as Spirotetramat Parent Equivalent
Nil	Not applicable	Not applicable	8 DAAA	VA 1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.11
Movento 240 SC	96	1 (A)	8 DAAA	VA 2	<0.02	<0.02	<0.02	<0.02	<0.02	<0.11
		2 (A and B)	0 DAAB	VA 3	0.31	0.09	0.03	<0.02	<0.02	0.45
			3 DAAB	VA 4	<0.02	<0.02	0.02	<0.02	<0.02	<0.11
			7 DAAB	VA 5	<0.02	<0.02	<0.02	<0.02	<0.02	<0.11
			9 DAAB	VA 6	<0.02	<0.02	<0.02	<0.02	<0.02	<0.11
			14 DAAB	VA 7	<0.02	<0.02	0.02	<0.02	<0.02	<0.11
			21 DAAB	VA 8	<0.02	<0.02	<0.02	<0.02	<0.02	<0.11

DAAA = Days after Application A
DAAB = Days after Application B of applications A and B
Application A was made 8 days before commercial harvest
Application B was made on the day of commercial harvest
LOQ for spirotetramat, BYI 08330 enol, BYI 08330 ketohydroxy, BYI 08330 monohydroxy and BYI 08330 enol glucoside = 0.02 mg/kg
LOQ expressed as spirotetramat parent equivalent = 0.11 mg/kg
Note the above results might not always match the raw data because of rounding adjustments.

Table 27: Residues of spirotetramat in spring onions from test site P402-5 (Nobby, Queensland)

Test Substance	Rates of Active Ingredient per Application (g a.i./ha)	Number of Applications (Application Timing Codes)	Sampling Timings	Test Sample Codes	Concentrations (mg/kg)					
					Detected as Spirotetramat	Detected as BYI 08330 enol	Detected as BYI 08330 ketohydroxy	Detected as BYI 08330 monohydroxy	Detected as BYI 08330 enol glucoside	Expressed as Spirotetramat Parent Equivalent
Nil	Not applicable	Not applicable	7 DAAA	VA 1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.11
Movento 240 SC	96	1 (A)	7 DAAA	VA 2	0.07	0.03	<0.02	<0.02	<0.02	<0.11
		2 (A and B)	0 DAAB	VA 3	0.31	0.10	0.04	<0.02	<0.02	0.47
			3 DAAB	VA 4	0.05	0.02	<0.02	<0.02	<0.02	<0.11
			7 DAAB	VA 5	0.03	<0.02	<0.02	<0.02	<0.02	<0.11
			10 DAAB	VA 6	0.03	<0.02	<0.02	<0.02	<0.02	<0.11
			14 DAAB	VA 7	<0.02	<0.02	<0.02	<0.02	<0.02	<0.11
			21 DAAB	VA 8	<0.02	<0.02	<0.02	<0.02	<0.02	<0.11

DAAA = Days after Application A
DAAB = Days after Application B of applications A and B
Application A was made 7 days before commercial harvest
Application B was made on the day of commercial harvest
LOQ for spirotetramat, BYI 08330 enol, BYI 08330 ketohydroxy, BYI 08330 monohydroxy and BYI 08330 enol glucoside = 0.02 mg/kg
LOQ expressed as spirotetramat parent equivalent = 0.11 mg/kg
Note the above results might not always match the raw data because of rounding adjustments.

Table 28: Residues of spirotetramat in leeks from test site P402-6 (Forth, Tasmania)

Test Substance	Rates of Active Ingredient per Application (g a.i./ha)	Number of Applications (Application Timing Codes)	Sampling Timings	Test Sample Codes	Concentrations (mg/kg)					
					Detected as Spirotetramat	Detected as BYI 08330 enol	Detected as BYI 08330 keto-hydroxy	Detected as BYI 08330 mono-hydroxy	Detected as BYI 08330 enol-glucoside	Expressed as Spirotetramat Parent Equivalent
Nil	Not applicable	Not applicable	7 DAAA	VA 1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.11
Movento 240 SC	96	1 (A)	7 DAAA	VA 2	<0.02	<0.02	<0.02	<0.02	<0.02	<0.11
		2 (A and B)	0 DAAB	VA 3	0.32	0.04	<0.02	<0.02	<0.02	0.36
			3 DAAB	VA 4	0.07	<0.02	<0.02	<0.02	<0.02	<0.11
			7 DAAB	VA 5	0.03	<0.02	<0.02	<0.02	<0.02	<0.11
			10 DAAB	VA 6	0.02	<0.02	<0.02	<0.02	<0.02	<0.11
			14 DAAB	VA 7	<0.02	<0.02	<0.02	<0.02	<0.02	<0.11
			21 DAAB	VA 8	<0.02	<0.02	<0.02	<0.02	<0.02	<0.11

DAAA = Days after Application A
DAAB = Days after Application B of applications A and B
Application A was made 8 days before commercial harvest
Application B was made on the day of commercial harvest
LOQ for spirotetramat, BYI 08330 enol, BYI 08330 ketohydroxy, BYI 08330 monohydroxy and BYI 08330 enol glucoside = 0.02 mg/kg
LOQ expressed as spirotetramat parent equivalent = 0.11 mg/kg
Note the above results might not always match the raw data because of rounding adjustments.

Study Plan number: BCS-0427

Study name: Determination of residues of spirotetramat in protected cropping herbs {parsley (curly and flat leaf), mint and basil} following three applications of Movento 240 SC at 96 g ai/ha at seven day intervals.

The aim of the herb residue trial was to determine the magnitude of the residues of spirotetramat in parsley, mint, basil and coriander following three applications of Movento 240 SC at 96 g ai/ha made seven days apart just before harvest.

Agrisearch Services Pty Ltd conducted the field phase of this residue study in parsley (curly leaf) at site A-0427-1 at Waterloo in South Australia; parsley (flat leaf) at site A-0427-2 at Mangrove Mountain in New South Wales; mint at site A-0427-3 at Mangrove Mountain in New South Wales; basil at site A-0427-4 at Cranbourne in Victoria; basil at site A-0427-5 and coriander at site A-0427-6 both at Mangrove Mountain in New South Wales. Three applications of Movento 240 SC were made at 96 g ai/ha at 14, 7 and 0 days before commercial harvest.

The analysis of the residues in the test samples was conducted at the Bayer CropScience Residue Laboratory in Brisbane. The results from the six trials (Tables 32 to 37a) will be used in the registration submission for the control of aphids, thrips and silverleaf whitefly in the herb vegetable crop group.

Table 29: BCS-0427 herb crop group residue trial summary

Study Plan No.	Test site	Location	Crop, Cultivar	Growing type	Spray Volume (L/ha)	Interval
BCS-0427	A-0427-1	Waleroo Corner, SA	Parsley (curly leaf), Condor	Field	A = 442 B = 429 C = 439	NA 7 days 7 days
	A-0427-2	Mangrove Mountain, NSW	Parsley (flat leaf), Grande	Partially protected (hydroponic)	A = 335 B = 340 C = 330	NA 7 days 7 days
	A-0427-3	Mangrove Mountain, NSW	Mint, Common	Partially protected (hydroponic)	A = 349 B = 326 C = 336	NA 7 days 7 days
	A-0427-4	Devon Meadows, Vic	Basil, Genovese	Field	A = 382 B = 389 C = 399	NA 8 days 7 days
	A-0427-5*	Mangrove Mountain, NSW	Basil, Genova large leaf	Fully protected (hydroponic)	A = 400 B = 404 C = 408	NA 7 days 7 days
	A-0427-6*	Mangrove Mountain, NSW	Coriander, Santo	Fully protected (hydroponic)	A = 408 B = 404 C = 412	NA 7 days 7 days

* Test sites A-0427-5 and A-0427-6 were additional test sites added to the project and no cost to industry to ensure sufficient data could be collected under fully protected growing systems.

Table 30: Treatment list for BCS-0427 residue trials

Treatment Number	Formulated Test Substance	Active Ingredient	Rates of Test Substance (mL/ha)	Rates of Active Ingredient (g ai/ha)	Application Timing Codes
1	Untreated	N/A	Nil	Nil	N/A
2	Movento 240 SC	BYI-08330 (spirotetramat)	400	96	A, B and C

*Hasten Spray Adjuvant was added to Movento at a rate of 1.0 L/ha.

Table 31: Sampling information for BCS-0427 residue trials

Treatment Number	Test Item	Rates of Test Substance (mL/ha)	Sample Timing	Specimen Quantity
1	Untreated	Nil	A-0427-1 – 7 DAAB A-0427-2 – 7 DAAB A-0427-3 – 7 DAAB A-0427-4 – 7 DAAB A-0427-5 – 7 DAAB A-0427-6 – 7 DAAB	Herbs – A minimum of 300 grams of curly leaf parsley, mint, flat leaf parsley, basil or coriander were sampled from each treatment for each sample; buffer areas were avoided.
2	Movento 240 SC	400*	A-0427-1 – 7 DAAB, 0,3,7,10,14,21 DAAC A-0427-2 – 7 DAAB, 0,3,7,11,15,22 DAAC A-0427-3 – 7 DAAB, 0,3,7,11,15,22 DAAC A-0427-4 – 7 DAAB, 0,3,6,11,14,21 DAAC A-0427-5 – 7 DAAB, 0,3,7,10,14,21 DAAC A-0427-6 – 7 DAAB, 0,3,7,10,14,21 DAAC	

*Hasten Spray Adjuvant was added to Movento at a rate of 1.0 L/ha.
DAAB = Days after applications A and B; DAAB = Days after applications A, B and C

Table 32: Residues of spirotetramat in field parsley (curly leaf) from test site A-0427-1 (Waterloo, South Australia)

Test Substance	Rates of Active Ingredient per Application (g a.i./ha)	Number of Applications (Application Timing Codes)	Sampling Timings	Test Sample Codes	Concentrations (mg/kg)					
					Detected as Spirotetramat	Detected as BYI 08330-enol	Detected as BYI 08330-ketohydroxy	Detected as BYI 08330-monohydroxy	Detected as BYI 08330-enol glucoside	Expressed as Spirotetramat Parent Equivalent
Nil	Not applicable	Not applicable	7 DAAB	HH 1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.11
Movento 240 SC	96	2 (A and B)	7 DAAB	HH 2	<0.02	<0.02	<0.02	<0.02	0.02	<0.11
		3 (A, B and C)	0 DAAC	HH 3	2.41	0.28	0.07	<0.02	<0.02	2.84
			3 DAAC	HH 4	0.63	0.18	0.18	<0.02	0.04	1.09
			7 DAAC	HH 5	0.05	0.03	0.05	<0.02	0.03	0.18
			10 DAAC	HH 6	<0.02	<0.02	0.05	<0.02	0.04	<0.11
			14 DAAC	HH 7	<0.02	<0.02	<0.02	<0.02	0.02	<0.11
			21 DAAC	HH 8	<0.02	<0.02	<0.02	<0.02	<0.02	<0.11

DAAB = Days after Applications A and B
DAAC = Days after Application B of applications A, B and C
LOQ for spirotetramat, BYI 08330-enol, BYI 08330-ketohydroxy, BYI 08330-monohydroxy and BYI 08330-enol glucoside = 0.02 mg/kg
LOQ expressed as spirotetramat parent equivalent = 0.11 mg/kg
Note the above results might not always match the raw data because of rounding adjustments.

Table 33: Residues of spirotetramat in partially protected hydroponic parsley (flat leaf) from test site A-0427-2 (Mangrove Mountain, New South Wales)

Test Substance	Rates of Active Ingredient per Application (g a.i./ha)	Number of Applications (Application Timing Codes)	Sampling Timings	Test Sample Codes	Concentrations (mg/kg)					
					Detected as Spirotetramat	Detected as BYI 08330-enol	Detected as BYI 08330-ketohydroxy	Detected as BYI 08330-monohydroxy	Detected as BYI 08330-enol glucoside	Expressed as Spirotetramat Parent Equivalent
Nil	Not applicable	Not applicable	7 DAAB	HH 1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.11
Movento 240 SC	96	2 (A and B)	7 DAAB	HH 2	0.16	0.05	0.07	<0.02	0.05	0.35
		3 (A, B and C)	0 DAAC	HH 3	8.52	0.73	0.17	<0.02	0.08	9.68
			3 DAAC	HH 4	2.17	0.19	0.14	<0.02	0.08	2.63
			7 DAAC	HH 5	0.11	<0.02	0.05	<0.02	0.14	0.28
			11 DAAC	HH 6	0.02	<0.02	<0.02	<0.02	<0.02	<0.11
			15 DAAC	HH 7	<0.02	<0.02	<0.02	<0.02	<0.02	<0.11
			22 DAAC	HH 8	<0.02	<0.02	<0.02	<0.02	<0.02	<0.11

DAAB = Days after Applications A and B
DAAC = Days after Application B of applications A, B and C
LOQ for spirotetramat, BYI 08330-enol, BYI 08330-ketohydroxy, BYI 08330-monohydroxy and BYI 08330-enol glucoside = 0.02 mg/kg
LOQ expressed as spirotetramat parent equivalent = 0.11 mg/kg
Note the above results might not always match the raw data because of rounding adjustments.

Table 34: Residues of spirotetramat in partially protected hydroponic mint from test site A-0427-3 (Mangrove Mountain, New South Wales)

Test Substance	Rates of Active Ingredient per Application (g a.i./ha)	Number of Applications (Application Timing Codes)	Sampling Timings	Test Sample Codes	Concentrations (mg/kg)					
					Detected as Spirotetramat	Detected as BYI 08330-enol	Detected as BYI 08330-ketohydroxy	Detected as BYI 08330-monohydroxy	Detected as BYI 08330-enol glucoside	Expressed as Spirotetramat Parent Equivalent
Nil	Not applicable	Not applicable	7 DAAB	HH 1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.11
Movento 240 SC	96	2 (A and B)	7 DAAB	HH 2	0.34	0.43	0.39	<0.02	0.44	1.68
		3 (A, B and C)	0 DAAC	HH 3	7.87	2.00	0.32	<0.02	0.27	10.94
			3 DAAC	HH 4	2.91	1.09	0.61	<0.02	0.58	5.45
			7 DAAC	HH 5	0.17	0.11	0.11	<0.02	0.15	0.57
			11 DAAC	HH 6	<0.02	<0.02	<0.02	<0.02	<0.02	<0.11
			15 DAAC	HH 7	<0.02	<0.02	<0.02	<0.02	<0.02	<0.11
			22 DAAC	HH 8	<0.02	<0.02	<0.02	<0.02	<0.02	<0.11

DAAB = Days after Applications A and B
DAAC = Days after Application B of applications A, B and C
LOQ for spirotetramat, BYI 08330-enol, BYI 08330-ketohydroxy, BYI 08330-monohydroxy and BYI 08330-enol glucoside = 0.02 mg/kg
LOQ expressed as spirotetramat parent equivalent = 0.11 mg/kg
Note the above results might not always match the raw data because of rounding adjustments.

Table 35: Residues of spirotetramat in field basil from test site A-0427-4 (Cranbourne, Victoria)

Test Substance	Rates of Active Ingredient per Application (g a.i./ha)	Number of Applications (Application Timing Codes)	Sampling Timings	Test Sample Codes	Concentrations (mg/kg)					
					Detected as Spirotetramat	Detected as BYI 08330-enol	Detected as BYI 08330-ketohydroxy	Detected as BYI 08330-monohydroxy	Detected as BYI 08330-enol glucoside	Expressed as Spirotetramat Parent Equivalent
Nil	Not applicable	Not applicable	7 DAAB	HH 1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.11
Movento 240 SC	96	2 (A and B)	7 DAAB	HH 2	<0.02	0.04	0.06	<0.02	0.04	0.16
		3 (A, B and C)	0 DAAC	HH 3	0.58	0.52	0.08	<0.02	0.03	1.35
			3 DAAC	HH 4	0.03	0.08	0.06	<0.02	0.03	0.22
			6 DAAC	HH 5	<0.02	0.05	0.04	<0.02	0.03	0.13
			11 DAAC	HH 6	<0.02	<0.02	0.04	<0.02	0.03	<0.11
			14 DAAC	HH 7	<0.02	<0.02	0.03	<0.02	0.03	<0.11
			21 DAAC	HH 8	<0.02	<0.02	<0.02	<0.02	0.02	<0.11

DAAB = Days after Applications A and B
DAAC = Days after Application B of applications A, B and C
LOQ for spirotetramat, BYI 08330-enol, BYI 08330-ketohydroxy, BYI 08330-monohydroxy and BYI 08330-enol glucoside = 0.02 mg/kg
LOQ expressed as spirotetramat parent equivalent = 0.11 mg/kg
Note the above results might not always match the raw data because of rounding adjustments.

Table 36: Residues of spirotetramat in fully protected hydroponic basil from test site A-0427-5 (Mangrove Mountain, New South Wales)

Test Substance	Rates of Active Ingredient per Application (g a.i./ha)	Number of Applications (Application Timing Codes)	Sampling Timings	Test Sample Codes	Concentrations (mg/kg)					
					Detected as Spirotetramat	Detected as BYI 08330-enol	Detected as BYI 08330-ketohydroxy	Detected as BYI 08330-monohydroxy	Detected as BYI 08330-enol glucoside	Expressed as Spirotetramat Parent Equivalent
Nil	Not applicable	Not applicable	7 DAAB	HH 1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.11
Movento 240 SC	96	2 (A and B)	7 DAAB	HH 2	0.53	0.77	0.05	<0.02	<0.02	1.54
		3 (A, B and C)	0 DAAC	HH 3	1.51	2.03	0.11	<0.02	<0.02	4.15
			3 DAAC	HH 4	2.55	1.88	0.20	<0.02	0.04	5.14
			7 DAAC	HH 5	1.64	1.06	0.10	<0.02	0.02	3.09
			10 DAAC	HH 6	0.71	0.46	0.04	<0.02	<0.02	1.33
			14 DAAC	HH 7	0.58	0.51	0.05	<0.02	<0.02	1.27
			21 DAAC	HH 8	0.12	0.16	0.02	<0.02	<0.02	0.34

DAAB = Days after Applications A and B
DAAC = Days after Application B of applications A, B and C
LOQ for spirotetramat, BYI 08330-enol, BYI 08330-ketohydroxy, BYI 08330-monohydroxy and BYI 08330-enol glucoside = 0.02 mg/kg
LOQ expressed as spirotetramat parent equivalent = 0.11 mg/kg
Note the above results might not always match the raw data because of rounding adjustments.

Table 37: Residues of spirotetramat in fully protected hydroponic coriander from test site A-0427-6 (Mangrove Mountain, New South Wales)

Test Substance	Rates of Active Ingredient per Application (g a.i./ha)	Number of Applications (Application Timing Codes)	Sampling Timings	Test Sample Codes	Concentrations (mg/kg)					
					Detected as Spirotetramat	Detected as BYI 08330-enol	Detected as BYI 08330-ketohydroxy	Detected as BYI 08330-monohydroxy	Detected as BYI 08330-enol glucoside	Expressed as Spirotetramat Parent Equivalent
Nil	Not applicable	Not applicable	7 DAAB	HH 1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.11
Movento 240 SC	96	2 (A and B)	7 DAAB	HH 2	1.30	1.07	0.09	<0.02	0.02	2.75
		3 (A, B and C)	0 DAAC	HH 3	2.73	4.08	0.33	<0.02	0.06	8.22
			3 DAAC	HH 4	2.64	3.12	0.30	<0.02	0.08	6.92
			7 DAAC	HH 5	2.09	2.29	0.36	<0.02	0.11	5.44
			10 DAAC	HH 6	1.80	1.56	0.32	<0.02	0.06	4.16
			14 DAAC	HH 7	1.14	0.97	0.32	<0.02	0.08	2.79
			21 DAAC	HH 8	3.95	3.59	0.77	<0.02	0.10	9.39

DAAB = Days after Applications A and B
DAAC = Days after Application B of applications A, B and C
LOQ for spirotetramat, BYI 08330-enol, BYI 08330-ketohydroxy, BYI 08330-monohydroxy and BYI 08330-enol glucoside = 0.02 mg/kg
LOQ expressed as spirotetramat parent equivalent = 0.11 mg/kg
Note the above results might not always match the raw data because of rounding adjustments.

Note: The samples taken at site A-0427-6 are thought to have been mislabelled. The following table is a representation of the results obtained corrected according to the field contractor's file note.

Table 37a: Residues of spirotetramat in fully protected hydroponic coriander from test site A-0427-6 (Mangrove Mountain, New South Wales)

Test Substance	Rates of Active Ingredient per Application (g a.i./ha)	Number of Applications (Application Timing Codes)	Sampling Timings	Test Sample Codes	Concentrations (mg/kg)					
					Detected as Spirotetramat	Detected as BYI 08330-enol	Detected as BYI 08330-ketohydroxy	Detected as BYI 08330-monohydroxy	Detected as BYI 08330-enol glucoside	Expressed as Spirotetramat Parent Equivalent
Nil	Not applicable	Not applicable	7 DAAB	HH 1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.11
Movento 240 SC	96	2 (A and B)	7 DAAB	HH 2	1.30	1.07	0.09	<0.02	0.02	2.75
		3 (A, B and C)	0 DAAC	HH 3	3.95	3.59	0.77	<0.02	0.10	9.39
			3 DAAC	HH 4	2.73	4.08	0.33	<0.02	0.06	8.22
			7 DAAC	HH 5	2.64	3.12	0.30	<0.02	0.08	6.92
			10 DAAC	HH 6	2.09	2.29	0.36	<0.02	0.11	5.44
			14 DAAC	HH 7	1.80	1.56	0.32	<0.02	0.06	4.16
			21 DAAC	HH 8	1.14	0.97	0.32	<0.02	0.08	2.79

Results

Individual reports have been written for each of the efficacy and residue trials. The following efficacy results are taken from the individual trial reports. Not all assessment data is presented, only the relevant assessments, particularly with statistical differences have been presented.

Efficacy (Thrips adults) – Lettuce

In trial **QB17**, all Movento 240 SC treatments provided poor levels of control of adult plague thrips up to 11 days after application 2 (DAA2) and was generally inferior to the standard Success Neo 120 SC (Table 38). All insecticide treatments had significantly fewer western flower thrips (WFT) adults than the untreated control at 11 DAA2. There were no statistical differences between Movento at 300 or 400 mL/ha when tank mixed with Agridex 810 XL old and new formulations. Success Neo recorded significantly fewer WFT thrips adults, at 11 DAA2, and was the superior treatment for the control of adult thrips.

Table 38: Mean number of adult western flower thrips (WFT) and plague thrips (PT).

Trial number		QB17		QB18	NC16	NC17
		Plague thrips	Western flower thrips			
Treatment	Rate (mL/ha)	11 DAA2 01-Jan-13		20 DAA2 27-Apr-13	11 DAA2 19-Mar-13	12 DAA2 03-Apr-13
		5 plants		1 plant	3 plants	
		LOG T(x)=(x)$^{0.4*}$				SQRT (x+0.5)
1. Untreated	-	19.5 bc	28.0 d	1.70 c	4.7 -	14.0 b
2. Movento + Agridex (OLD)	300 + 500	34.0 c	15.8 c	1.48 bc	3.0 -	2.7 a
3. Movento + Agridex (NEW)	300 + 500	32.5 c	13.3 bc	0.98 ab	1.7 -	2.3 a
4. Movento + Agridex (OLD)	400 + 1000	18.0 ab	15.3 bc	0.88 a	1.3 -	3.0 a
5. Movento + Agridex (NEW)	400 + 1000	26.5 bc	8.0 b	1.73 c	2.3 -	3.7 a
6. Success Neo	400	7.3 a	2.0 a	0.95 ab	2.3 -	3.0 a
LSD 5% or 10%**		**0.97**	**0.66**	**0.59**	**ns**	**1.06t****
F-Probability		**0.008**	**<0.001**	**0.016**	**0.3482**	**0.090**

Means within the same column with a letter in common are not significantly different (P>0.05 or >.10**, Duncan's New MRT**)
*ANOVA was conducted on data log transformation to the power of 0.4.
Mean descriptions are reported in untransformed data units.
ns = not significant
DAA = days after application

Efficacy (Thrips adults) – Bulb vegetables

In trial **QB19**, there were no significant treatment effects for adult thrips (Table 39).

In **QB20**, all insecticide treatments statistically reduced numbers of adult onions thrips after two spray applications compared to the untreated control (Table 39).

Table 39: Mean number of thrips adults per 20 spring onions (ID12AUSHM3QB19) or per leaf (ID12AUSHM3QB20).

Trial number		QB1912			QB2012
Crop		Spring onion			Leek
Pest		WFT	Onion	Plague	Onion
Treatment	Rate	10 DAA2 08-Jan-13			20 DAA2 22-May-13
1. Untreated	-	0.5 -	5.0 -	0.3 -	2.0 c
2. Movento + Hasten	200 mL/ha + 500 mL/100 L	1.0 -	7.0 -	0.8 -	0.9 ab
3. Movento + Hasten	200 mL/ha + 1 L/100 L	1.3 -	8.5 -	0.3 -	0.6 a
4. Movento + Hasten	300 mL/ha + 1 L/100 L	0.5 -	5.0 -	0.8 -	0.9 ab
5. Movento + Hasten	400 mL/ha + 1 L/100 L	0.5 -	6.8 -	1.3 -	0.7 ab
6. Movento + Agridex (NEW)	400 mL/ha + 1 L/100 L	0.5 -	5.5 -	1.3 -	1.0 ab
7. Movento + Maxx	400 mL/ha + 60 mL/100 L	1.0 -	6.3 -	0.0 -	1.2 b
8. Dimethoate	750 mL/ha	0.3 -	6.8 -	0.5 -	0.9 ab
LSD 5 %		**ns**	**ns**	**ns**	**0.560**
F-Probability		**0.890**	**0.698**	**0.501**	**<.001**

Means within the same column with a letter in common are not significantly different (P>0.05)
ns = not significant
DAA = days after application

Efficacy (Thrips adults) – Parsley

In trial **QB21**, there were no insecticide treatments with significantly less plague thrips adult numbers compared to the untreated control. At 12 DAA2, the adult western flower thrips numbers were significantly lower in Movento at 400 mL/ha + Agridex (new and old formulations) at 1 L/ha, and the standard Success Neo compared to the Ampol Summer Spray Oil and the untreated control (Table 40).

Table 40: Mean number of adult western flower thrips and plague thrips per 5 parsley plants (ID12AUSHM4QB21).

Pest		WFT	Plague
Treatment	**Rate**	**12 DAA2 01-Jan-13**	
1. Untreated	-	9.0 c	22.5 -
2. Movento + Hasten	200 mL/ha + 1 L/ha	7.3 bc	18.8 -
3. Movento + Hasten	300 mL/ha + 1 L/ha	6.5 bc	29.0 -
4. Movento + Hasten	400 mL/ha + 1 L/ha	6.8 bc	19.3 -
5. Movento + Agridex (NEW)	400 mL/ha + 1 L/ha	4.5 ab	28.0 -
6. Movento + Agridex (OLD)	400 mL/ha + 1 L/ha	4.8 ab	23.8 -
7. Success Neo + Agral	400 mL/ha + 40 mL/ha	2.3 a	20.3 -
8. Ampol Summer Oil	2 L/ha	9.0 c	21.3 -
LSD 5 %		**0.72t**	**ns**
F-Probability		**0.004**	**0.385**

Means within the same column with a letter in common are not significantly different (P>0.05)
ANOVA was conducted on data after square-root transformation.
ns = not significant
DAA = days after application

Efficacy (Thrips nymphs) – Lettuce

In trial **QB17**, no significant differences were recorded for mean numbers of WFT nymphs between treatments at 9 DAA1 (data not shown).

At 11 DAA2 all insecticide treatments had significantly fewer thrips nymph (plague plus western flower thrips) numbers compared to the untreated control (Table 41). Movento at 400 mL/ha + Agridex (old formulation) at 1 L/ha and Success Neo had significantly fewer thrips nymphs compared to Movento 300 mL/ha + Agridex at 500 mL/ha old and new formulations. There was no significant difference between the treatments with Movento when comparing tank mixtures of the spray adjuvant Agridex old and new formulations.

In trials **QB18** and **NC17**, all insecticide treatments provided significant control of WFT nymphs (Table 41). There were no significant differences between Movento treatments and the standard Success Neo.

In trial **NC16**, there were no significant treatment effects recorded, however, all Movento treatments recorded numerically fewer numbers of WFT nymphs compared to the untreated control and the standard Success Neo (Table 41).

Table 41: Mean number of thrips nymphs in lettuce.

Trial number		QB17	QB18	NC16	NC17
Pest		PT & WFT	WFT		
Treatment	Rate (mL/ha)	11 DAA2 01-Jan-13	20 DAA2 27-Apr-13	11 DAA2 19-Mar-13	12 DAA2 03-Apr-13
		5 plants	1 plant	3 plants	
		$T(x)=(x)^{-0.3*}$			SQRT (x+0.5)
1. Untreated	-	120.5 d	3.45 b	6.0 -	80.3 b
2. Movento + Agridex (OLD)	300 + 500	14.8 c	0.10 a	4.3 -	11.0 a
3. Movento + Agridex (NEW)	300 + 500	16.3 c	0.10 a	0.0 -	6.3 a
4. Movento + Agridex (OLD)	400 + 1000	11.5 bc	0.03 a	2.7 -	4.7 a
5. Movento + Agridex (NEW)	400 + 1000	5.5 ab	0.18 a	0.3 -	6.3 a
6. Success Neo	400	4.8 a	0.10 a	4.7 -	20.3 a
LSD 5% or 10%**		**<0.001**	**<0.001**	**ns**	**3.14t****
F-Probability		**0.190**	**0.370**	**0.612**	**0.900**

Means within the same column with a letter in common are not significantly different (P>0.05 or >.10**, Duncan's New MRT**)
*ANOVA was conducted on data log transformation to the power of -0.3.
Mean descriptions are reported in untransformed data units.
ns = not significant
DAA = days after application

Efficacy (Thrips nymphs) – Bulb vegetables

In **QB19**, at 9 DAA1 all Movento treatments tank mixed with the adjuvants Hasten and Agridex had significantly fewer western flower, plague and onion thrips nymph numbers compared to the untreated control in spring onions. Movento at 400 mL/ha tank mixed with the adjuvant Maxx was the only insecticide treatment not significantly different to the untreated control and was statistically inferior to the standard Dimethoate (Table 42).

At 10 DAA2, all insecticide treatments had significantly fewer thrips nymph numbers compared to the untreated control. Movento at 400 mL/ha + Maxx and Movento at 400 mL/ha + Agridex recorded significantly less thrips nymphs compared to Movento 200 mL/ha + Hasten 500 mL/100 L and the standard Dimethoate at 750 mL/ha.

There was no significant difference between the treatments containing the various rates of Movento + Hasten 1 L/100 L.

There was no significant difference between the spray adjuvants Hasten, Agridex and Maxx when tank mixed with Movento at 400 mL/ha for numbers of thrips nymphs following two spray applications.

In **QB20**, Movento at 200 mL/ha tank mixed with Hasten at 500 mL/100 L or 1 L/100 L gave significant control of onion thrips nymphs in leeks. Movento at 200, 300 and 400 mL/ha plus Hasten at 1 L/100 L were equally effective for the control of onion thrips nymphs in leeks (Table 42).

Movento at 400 mL/ha tank mixed with Hasten at 1 L/100 L, Agridex (new formulation) at 1 L/100 L or Maxx at 60 mL/100 L gave equivalent levels of onion thrips nymph control.

All Movento tank mixtures controlled onion thrips nymphs in leek equal to the standard Dimethoate, particularly after two foliar sprays.

Table 42: Mean number of thrips nymphs per 20 spring onions (ID12AUSHM3QB19) or per leaf (ID12AUSHM3QB20).

Trial number		QB1912		QB2012	
Crop		Spring onion		Leek	
Pest		WFT + onion + plague		Onion	
Treatment	Rate	9 DAA1 28-Dec-13	10 DAA2 08-Jan-13	10 DAA1 02-May-13	20 DAA2 22-May-13
		$T(x)=(x)^{-0.4*}$	T(x)=ln(x)**		
1. Untreated	-	50.0 a	32.3 c	1.7 d	1.9 b
2. Movento + Hasten	200 mL/ha + 500 mL/100 L	18.8 bc	12.3 b	1.1 c	0.0 a
3. Movento + Hasten	200 mL/ha + 1 L/100 L	18.8 bc	7.5 ab	0.7 bc	0.0 a
4. Movento + Hasten	300 mL/ha + 1 L/100 L	15.3 bc	7.5 ab	0.3 ab	0.0 a
5. Movento + Hasten	400 mL/ha + 1 L/100 L	16.8 bc	6.0 ab	0.5 b	0.0 a
6. Movento + Agridex (NEW)	400 mL/ha + 1 L/100 L	17.3 bc	3.8 a	0.3 ab	0.0 a
7. Movento + Maxx	400 mL/ha + 60 mL/100 L	32.8 ab	6.0 a	0.6 b	0.0 a
8. Dimethoate	750 mL/ha	17.3 c	12.5 b	0.0 a	0.0 a
LSD 5 %		**0.08t**	**0.83t**	**0.5**	**0.2**
F-Probability		**0.038**	**<0.001**	**<0.001**	**<0.001**

Means within the same column with a letter in common are not significantly different (P>0.05)
* ANOVA was conducted on data log transformation to the power of 0.4.
**ANOVA was conducted on data after natural log transformation.
DAA = days after application

Efficacy (Thrips nymphs) – Parsley

In trial **QB21**, at 9 DAA1 there were no insecticide treatments with significantly less thrips nymph numbers compared to the untreated control (data not presented).

At 12 DAA2, all insecticide treatments had significantly fewer thrips nymph numbers compared to the untreated control except for Movento 200 mL/ha + Hasten 1 L/ha and the standard Ampol Summer Spray Oil (Table 43).

There were no significant differences for thrips nymph counts between Movento 400 mL/ha + Agridex (new and old formulations) at 1 L/ha and Movento 400 mL/ha + Hasten 1 L/ha.

Movento at 400 mL/ha + Hasten trended to significantly fewer thrips nymphs compared to Movento 200 mL/ha and Movento 300 mL/ha + Hasten, though differences were not significant.

The standard Success Neo recorded significantly fewer thrips nymphs than Movento 200 mL/ha + Hasten 1 L/ha and Movento 300 mL/ha + Hasten 1 L/ha. There were no significant differences for thrips nymph counts between Success Neo and Movento 400 mL/ha + Agridex (new and old formulations) at 1 L/ha, and Movento 400 mL/ha + Hasten 1 L/ha.

Table 43: Mean number of western flower and plague thrips nymphs per 5 parsley plants (ID12AUSHM4QB21).

Pest		WFT + plague thrips nymphs
Treatment	**Rate**	**12 DAA2 01-Jan-13**
		$T(x)=(x)^{-0.3}$
1. Untreated	-	125.3 a
2. Movento + Hasten	200 mL/ha + 1 L/ha	71.3 ab
3. Movento + Hasten	300 mL/ha + 1 L/ha	51.0 bc
4. Movento + Hasten	400 mL/ha + 1 L/ha	28.5 bcd
5. Movento + Agridex (NEW)	400 mL/ha + 1 L/ha	22.3 cd
6. Movento + Agridex (OLD)	400 mL/ha + 1 L/ha	23.8 cd
7. Success Neo + Agral	400 mL/ha + 40 mL/ha	15.0 d
8. Ampol Summer Spray Oil	2 L/ha	133.8 a
LSD 5 %		**0.08t**
F-Probability		**<0.001**

Means within the same column with a letter in common are not significantly different (P>0.05)
ANOVA was conducted on data log transformation to the power of -0.3.
DAA = days after application

Table 44: Summary of performance of Movento against standard treatments for thrips control when applied as a foliar spray.

Trial No:		QB17		QB18	NC16	NC17	QB19	QB20	QB21		
Life stage		ADULTS									
Crop		Lettuce					Spring onion	Leek	Parsley		
Dominant thrips species		Plague	WFT	WFT	WFT	WFT	Onion		WFT		Plague
Rate (mL/ha)	Adjuvant rate (L/ha)	Success Neo					Dimethoate		Success Neo	Summer oil	Success Neo / Summer Oil
200	Hasten 1 L/ha								-*	=	=
300	Hasten 1 L/ha								-*	=	=
400	Hasten 1 L/ha								-*	=	=
300	Agridex (old) 0.5	-	-	-	=	=					
300	Agridex (new) 0.5	-	-	=	=	=					
400	Agridex (old) 1.0	-*	-	=	=	=			=	+	=
400	Agridex (new) 1.0	-	-	-	=	=			=	+	=
200	Hasten 2.0						NS	=			
200	Hasten 4.0						NS	=			
300	Hasten 4.0						NS	=			
400	Hasten 4.0						NS	=			
400	Agridex (new) 4.0						NS	=			
400	Maxx 0.24						NS	=			
Life stage		NYMPHS									
Dominant thrips species		Plague + WFT		WFT	WFT	WFT	Onion		Plague + WFT		
200	Hasten 1 L/ha								-	=	
300	Hasten 1 L/ha								-	+	
400	Hasten 1 L/ha								=	+	
300	Agridex (old) 0.5	-		=	=	+*					
300	Agridex (new) 0.5	-		=	=	+*					
400	Agridex (old) 1.0	-		=	=	+*			=	+	
400	Agridex (new) 1.0	=		=	=	+*			=	+	
200	Hasten 2.0						=	=			
200	Hasten 4.0						=	=			
300	Hasten 4.0						=	=			
400	Hasten 4.0						=	=			
400	Agridex (new) 4.0						+*	=			
400	Maxx 0.24						+*	=			

* Not significantly different NS = No significant treatment effects.

Key to efficacy rating

-	inferior to standard
=	equal to standard
+	superior to standard
	treatments not included

Efficacy (Aphids) – Parsley

In trial **QB22**, all rates of Movento at 200, 300 and 400 mL/ha plus Hasten at 1 L/ha were equally effective in controlling green peach aphid in parsley (Table 45).

Movento at 400 mL/ha plus Hasten at 1 L/ha controlled aphids in parsley was equally effective as Movento 400 mL/ha plus Agridex (new and old formulations) at 1 L/ha or Agral at 10 mL/100 L.

Movento tank mixed with Hasten, Agridex (new and old formulations) or Agral provided equivalent control of green peach aphid to the standard Ampol Summer Spray Oil at 2 L/ha.

Table 45: Mean number of green peach aphid per plant at 21 DAA2 (ID12AUSHM4QB22).

Treatment	Rate (mL/ha)	Nymph	Adult	Total
		21 DAA2 02-May-13		
1. Untreated	-	8.75 b	3.60 b	12.35 b
2. Movento + Hasten	200 + 1000	0.05 a	0.00 a	0.05 a
3. Movento + Hasten	300 + 1000	0.00 a	0.00 a	0.00 a
4. Movento + Hasten	400 + 1000	0.00 a	0.00 a	0.00 a
5. Movento + Agridex (NEW)	400 + 1000	0.00 a	0.00 a	0.00 a
6. Movento + Agridex (OLD)	400 + 1000	0.00 a	0.00 a	0.00 a
7. Movento + Agral	400 + 10 mL/100 L	0.00 a	0.18 a	0.18 a
8. Ampol Summer Oil	2 L/ha	0.20 a	0.10 a	0.30 a
LSD 5%		**1.38**	**0.25**	**1.44**
F-Probability		**<.001**	**<.001**	**<.001**

Means within the same column with a letter in common are not significantly different (P>0.05)
ns = not significant
DAA = days after application

Crop safety

Lettuce

- In all trials, **QB17, QB18, NC16** and **NC17**, all rates of Movento 240 SC tank mixed with the spray adjuvants Hasten 704 SL or Agridex 810 XL (new and old formulations) did not cause any adverse effects to lettuce. No effects on plant vigour or foliage were evident after two foliar spray applications.

Spring onion and leek

- In trials **QB19** (spring onion) and **QB20** (leek), all rates of Movento 240 SC tank mixed with the spray adjuvants Agridex 810 XL (new formulation), Hasten 704 SL or Maxx 1020 XL did not cause any adverse effects to spring onion or leek. No effects on plant vigour or foliage were evident after two foliar sprays.

Parsley

- In trials, **QB21** and **QB22**, all rates of Movento 240 SC tank mixed with the spray adjuvants Hasten 704 SL, Agridex 810 XL (new and old formulations) or Agral 600 SL (**QB21** only), did not cause any adverse effects to parsley. No effects on plant vigour or foliage were evident after two foliar spray applications.

Discussion

In all trials foliar applications of Movento 240 SC were made to an existing population of thrips or green peach aphid. Pest pressure across the thrips trials ranged from low to high. Pest pressure was moderate for the green peach aphid trial in parsley.

Efficacy - Thrips

Western flower thrips

In all lettuce and parsley trials, Movento provided either equal or inferior control of adult western flower thrips relative to the standard Success Neo, which is consistent with previous trial work conducted with Movento in other crops. In one trial (QB21) in parsley, Movento provided equal or significantly ($p < 0.05$) higher levels of adult western flower thrips compared to summer oil. In three trials (QB18, NC16 and NC17) dominated by western flower thrips, Movento provided equal or numerically higher levels of nymph control compared to the standard Success Neo. In two trials (QB17 and QB21) where there were mixed populations of plague and western flower thrips Movento at 400 mL/ha plus adjuvant was generally equal to the standard Success Neo, while 200 and 300 mL/ha plus spray adjuvant tended to provide significantly lower levels of nymph control. Movento generally provided significantly higher levels of western flower nymph control compared to summer oil (Table 44).

Plague thrips

Movento provided either equal or inferior control of adult plague thrips relative to the standard Success Neo, which is consistent with previous trial work conducted with Movento in other crops. In one trial (QB21), Movento provided equivalent reduction in numbers of adult plague thrips compared to summer oil.

As per the discussion above, in two trials (QB17 and QB21) where there were mixed populations of plague and western flower thrips Movento at 400 mL/ha plus adjuvant was generally equal to the standard Success Neo, while Movento at 200 and 300 mL/ha plus spray adjuvant tended to provide significantly lower levels of nymph control. Movento generally provided significantly higher levels of western flower nymph control compared to summer oil (Table 44).

Onion thrips

In one trial (QB20) all rates of Movento provided equivalent control of onion thrips adults and nymphs compared to the standard dimethoate (Table 44).

Efficacy - Green peach aphid

In one trial (QB22), all rates of Movento plus various spray adjuvants provided excellent control of green peach aphid nymphs and adults ($p < 0.05$) and was equivalent to the standard summer oil (Table 45).

Conclusions

Efficacy conclusions - Thrips

- Movento 240 SC plus adjuvant tended to provide poor levels of knockdown control of adult western flower and plague thrips and was inferior to Success Neo, particularly under higher pest pressure.
- Movento plus adjuvant tended to provide equivalent levels of knockdown control of onion thrips adults and nymphs compared to the standard dimethoate.
- Movento at 300 mL/ha tank mixed with Hasten 704 SL or Agridex 810 XL provided good control of thrips nymphs under lower pest pressure.
- Movento at 400 mL/ha tank mixed with Hasten 704 SL or Agridex 810 XL provided good control of thrips nymphs under higher pest pressure.
- There was no significant difference in thrips nymph control when Movento was tank mixed with the spray adjuvant Hasten 704 SL or Agridex 810 XL.
- There was no significant difference in thrips nymph control when Movento was tank mixed with the new and old spray adjuvant Agridex 810 XL at 0.5 and 1 L/ha, except for one trial in lettuce.
- Movento at 400 mL/ha plus spray adjuvant tended to provide equivalent control of thrips nymphs compared to the standard Success Neo.

Efficacy conclusions – Green peach aphid

- All rates of Movento at 200, 300 and 400 mL/ha plus Hasten at 1 L/ha, Movento 400 mL/ha plus Agridex (new and old formulations) at 1 L/ha or Agral at 10 mL/100 L provided equivalent control of green peach aphid and was equal to the standard Ampol Summer Spray Oil.

Crop safety conclusion

- In all trials there were no visual symptoms of phytotoxicity following two foliar applications of Movento 240 SC up to at 400 mL/ha plus the spray adjuvant Hasten 704 SL, Agridex 810 XL (new and old formulations), Maxx 1020 XL or Agral 600 SL.

Residue trials conclusion

- Fourteen residue trials were conducted as outlined in Tables 15, 20 and 29 in field and/or protected cropping for rhubarb, bulb vegetables and herbs. The residues obtained were all at acceptable levels for MRL and a With Holding Period (WHP) of 1, 3 or 7 days will be made based on industry requirements for the label extension.

Overall conclusion

The data generated as part of this project will be used for the APVMA submission for registration of Movento® 240 SC Insecticide. The submission to the APVMA will seek a label extension of Movento applied as foliar spray for the control of;

- western flower thrips in lettuce (field and protected cropping) at (300 and 400 mL/ha or 72 and 96 g ai/ha) plus spray adjuvant;
- rhubarb for aphids (200 mL/ha or 48 g ai/ha) plus spray adjuvant and thrips (300 and 400 mL/ha or 72 and 96 g ai/ha) plus spray adjuvant;
- bulb vegetables for control of onion thrips (200 mL/ha or 48 g ai/ha) plus spray adjuvant; and
- herbs (field and protected cropping) for aphids (200 mL/ha or 48 g ai/ha) plus spray adjuvant, thrips (300 and 400 mL/ha or 72 and 96 g ai/ha) plus spray adjuvant and silverleaf whitefly (300 and 400 mL/ha or 72 and 96 g ai/ha) plus spray adjuvant.

Technology Transfer

- Not required but industry will be informed of application progress and the communication of the Movento registration to the various crops will be extended through AUSVEG to its members in the way of a magazine article.

Recommendations

- Submission to the APVMA in Q2 2014 for the registration of Movento® 240 SC Insecticide as a foliar spray for the control of western flower thrips in lettuce (field and protected cropping) at (300 and 400 mL/ha or 72 and 96 g ai/ha) plus spray adjuvant;
- The registration of Movento 240 SC in rhubarb for aphids (200 mL/ha or 48 g ai/ha) plus spray adjuvant and thrips (300 and 400 mL/ha or 72 and 96 g ai/ha) plus spray adjuvant;
- The registration of Movento 240 SC in bulb vegetables for control of onion thrips (200 mL/ha or 48 g ai/ha) plus spray adjuvant; and
- The registration of Movento 240 SC in herbs (field and protected cropping) for aphids (200 mL/ha or 48 g ai/ha) plus spray adjuvant, thrips (300 and 400 mL/ha or 72 and 96 g ai/ha) plus spray adjuvant and silverleaf whitefly (300 and 400 mL/ha or 72 and 96 g ai/ha) plus spray adjuvant.
- As more management tools for the control of thrips and green peach aphid are developed, integrated crop management strategies and insecticide resistance strategies in vegetable production will need to be modified to ensure the sustainable management of these pests in the future.

References

[1]APVMA Public Chemical Registration Information System. Website: http://services.apvma.gov.au/PubcrisWebClient/welcome.do
[2]AUSVEG – Resources Domestic Industry. Website: http://ausveg.com.au/resources/statistics/domestic-industry.htm
[3]APVMA Agriculture and Veterinary Permit Search. Website: http://www.apvma.gov.au/permits/search.php
[4]The Australian Herb and Spice Industry Association website – October 2011) http://web.ahsia.org.au/

Acknowledgements

The input and assistance of the following is gratefully acknowledged.

- Sue Cross, Bayer CropScience
- Anthony De Monte, Bayer CropScience
- Geoff Robertson, Bayer CropScience
- Ian McMaster, Bayer CropScience
- Andrew Ellis, Bayer CropScience
- Andrew Lynch, Bayer CropScience
- David Gregor, Bayer CropScience
- Denise Wallis, Bayer CropScience
- Geoff Perkins, Bayer CropScience
- Jodie Pedrana, Horticulture Australia
- Peter Dal Santo, AgAware Consulting
- Peracto Pty. Ltd. staff
- Agrisearch Services Pty. Ltd. staff