Generation of residue data for pesticide minor-use permit applications in vegetable crops 2008 - Agronico

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Project Number: VG07194

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Generation of Residue Data for Pesticide Minor-use Permit Applications in Vegetable Crops 2008

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Purpose: To report on GLP studies conducted to generate residue data in various vegetable crops for several pesticide active-constituents; data which will be submitted to the APVMA for their consideration along with permit applications seeking the use of these pesticides in these crops.

Reported: 10th December, 2011

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Contents list

1. Media Summary

Growers of some horticultural crops are left exposed to greater production risk and can incur significant crop losses when pesticides are not registered for use on their crop(s). This potentially leaves pests, weeds and diseases inadequately controlled.

This situation occurs when a cost-benefit analysis indicates that the cost of generating data and preparing data packages for product registration is significantly higher than the additional sales they may be generated from the new registration.

To address this situation, the Australian Pesticides and Veterinary Medicines Authority (APVMA) developed a permit system whereby, they permit the use of a pesticide on a crop after reviewing less data than would otherwise be reviewed when a manufacturer registers a pesticide.

Their review tends to focus primarily on residue data when considering an application for a minor-use permit. However, crop safety is also an important consideration for them, particularly when reviewing permits seeking the use of selective herbicides.

Because the amount of supportive data required for permits is typically much lower, growers and industry groups can sometimes afford to generate enough data to satisfy the APVMA, without waiting for a manufacturer who may never generate it.

AusVeg, the Australian vegetable industry's representative group, through Horticulture Australia Ltd, commissioned Crop Protection Research Pty Ltd (CPR), to generate such data for a number of situations where the permit system was the only path available to growers of certain crops.

This report summarises the work undertaken by CPR to generate residue and, for some pesticides, crop-safety data, which was subsequently submitted to the APVMA for their consideration with associated applications that sought minor-use permits from the APVMA.

Pesticide residue data and crop safety data were generated for the selective herbicides: s-metolachlor, metribuzin and phenmedipham. Residue data alone was generated for the fungicides: iprodione, pyrimethanil and fenhexamid.

The residue data generated for each of the pesticides was supportive in regard to a minor-use permit application for each one. And, where appropriate, the application was prepared and submitted.

However, two of the herbicides, s-metolachlor and metribuzin, caused significant damage to at least one of the crops to which they were applied. In these circumstances, the data was referred to Horticulture Australia Ltd's, pesticide minor-use coordinator (PMUC) for further consideration.

However, on the basis of data generated during this project, the APVMA released permits for the use of: iprodione on carrots for suppression of black-rot and for the use of fenhexamid to control grey-mould of capsicum and lettuce.

Permits for the use of pyrimethanil on capsicum and lettuce; for fenhexamid on cucumber; for iprodione on beans, silver beet and spinach; and, for the use of phenmedipham on lettuces, are still being considered by the APVMA and have not been released to date.

2. Technical Summary

A major project (VG07194) was separated into 6 sub-projects, each of which was a single pesticide residue study which, was conducted in accordance with the principles of Good Laboratory Practice (GLP).

Each of the 6 residue studies was designed to determine the residual level of a single, pesticide active constituent, which remained in horticultural produce following one or more applications of a commercially-formulated agrichemical product.

The active constituents studied, followed in parentheses by the crops treated with them, were the herbicides: s-metolachlor (celery and celeriac); metribuzin (daikon, taro, sugar-snap and snow peas); and, phenmedipham (head and leafy lettuces); as well as the fungicides: iprodione (carrots, beans, silver beet and spinach); pyrimethanil (capsicums and lettuce); and, fenhexamid (cucumber, capsicums and lettuce).

A range of crops were treated with the pesticide in each of the studies with each crop located at different study-sites in most circumstances. Where possible, the study-sites were positioned in commercially-grown crops, otherwise they were grown specifically for the study at facilities or properties where staff were on hand to grow them in accordance with local Good Agricultural Practice (GAP).

Application of each pesticide was completed using a hand-held, gas-powered boom sprayer fitted with flat-fan nozzles, when herbicides were applied or, with hollow-cone nozzles when fungicides were applied. The fungicides were applied on multiple occasions whereas, the herbicides, which were typically pre-plant herbicides were only applied once.

Where s-metolachlor or metribuzin was under study, crops were inspected for signs and symptoms of phyto-toxicity caused by these herbicides.

At certain times after the application of pesticides, samples from non-treated crop, as well as treated crop, were collected, packaged to prevent contamination, deep-frozen to minimise pesticides residue degradation.

The samples were then sent to a pesticide-residue laboratory for analysis were they were unpacked, defrosted to the point where they could be sub-sampled and homogenised before residue extraction procedures were conducted on the homogenate.

Depending upon the pesticide being analysed, the extract was analysed using validated methodology, based on liquid or gas-chromatography and mass-spectrophotometry, to detect and quantify the residual pesticide.

When pesticides that were detected at levels higher than the limit of quantitation (LOQ), the results were recorded, and reported as milligrams of pesticide per of kilogram produce (mg / kg) which is equivalent to parts per million (ppm).

Each residue study was reported separately before being submitted to Horticulture Australia Ltd's Pesticide Minor-use Co-ordinator for deliberation. Appropriate results were forwarded to the APVMA for consideration with relevant permit applications.

Residue data collected from the s-metolochlor study was supportive of a minor-use permit; however, the herbicide caused severe stunting in both celery and celeriac.

Similarly, residues of metribuzin in taro, sugar-snap peas and snow peas were supportive of a minor-use permit; however, the herbicide caused the death of the Asian root-vegetable crop, daikon.

Phenmedipham residues in head and leafy lettuces were either at or below the LOQ at 28 days after application of the product. This provided support for a minor-use permit application which was submitted to the APVMA for their consideration.

A permit allowing the use of iprodione on carrots for black-rot disease was released by the APVMA on the basis of supporting data generated during this study. However, a permit for its use in beans, silverbeet and spinach has not yet been released.

An application to the APVMA seeking the use of pyrimethanil in capsicums and lettuce, supported by residue data generated during this study has been received but not yet released.

A minor-use permit has been released by the APVMA, on the basis of supporting data generated during this project which, allows the use of fenhexamid on capsicums and lettuces. However, the use of fenhexamid on cucumber was not included on that permit and a separate permit has not yet been released.

3. Introduction

In Australia, before an agrochemical product can be sold or used, the Australian Pesticides and Veterinary Medicines Authority (APVMA) must register it following a review of a comprehensive data package that includes efficacy, crop safety and residue data. The manufacturer of the product must supply this information to the APVMA before this process can begin.

The cost of generating and collating such data packages is high, often costing many hundreds-of-thousands of dollars. These costs must be recouped by the manufacturer through sales of their product.

However, only small areas of many horticultural crops are grown and manufacturers consider it too difficult or impossible to recoup their registration costs. Thus, manufacturers will rarely spend resources on generating the data or preparing the associated applications.

As a result, horticulturalists are often placed in situations where they risk severe crop losses from insects, weeds and diseases because the agrochemical tools needed to protect their crops from these pests are not registered for their situation. On the other hand, they could spray their crops with pesticides that are not registered and risk buyers rejecting their produce and potentially-face severe penalties for pesticide miss-use.

The need to gain minor-use permits and new registrations has come about due to loss of some agrochemical products and/or registered uses because of chemical reviews and product rationalisation.

The APVMA's permit system adds some flexibility to the lengthy registration process and legalises the availability of products for minor-use purposes, not specified on the product label. However, off-label permits issued by the APVMA still must be applied for along with information and data that verifies that the permitted use will be effective and will not have any harmful effects on humans, the crops or the environment.

In early 2000, the vegetable industry undertook a national approach to permits by working with industry generated 'wishlists' for new pesticide uses, but this led to congestion in Australian Pesticide & Veterinary Management Authority (APVMA) system and dissatisfaction amongst growers and grower groups. This was in part due to widespread duplication of the requests made for permits in the absence of a truly co-ordinated system and concern over the priority assessment for each pesticide. This approach was also unable to give relevant priority to new pesticide technologies and available Integrated Pest Management (IPM) friendly pesticides that were outside the industry's experience.

A new approach to address the current and future pesticide requirements for horticultural crops has been developed using the Strategic Agrichemical Review Process (SARP). This approach had the benefit of IPM compatibility, where possible, improved scope for resistance management, sound biological profile and residue and trade acceptance domestically and for export.

This review process provides the vegetable industry with sound pesticide options for the future that the industry can pursue for registration with the manufacturer, or minor-use permits with APVMA for clearly identified crop protection needs, many of which will also assist the expansion of effective IPM strategies. All of the studies in this tender have been identified through the SARP.

4. Materials and methods

Project VG07194 was managed as 6 separate residue studies (Table 1), one for each of the active constituents included in the project. In accordance with the OECD Principles of Good Laboratory Practice (GLP), each residue study was uniquely identified; they included several different crops and were conducted across multiple study-sites.

Before each residue study began, an audited study plan was prepared. These documents were much like a scientific protocol and contained all details necessary to complete the field-phase activities of the study as well as the laboratory (analytical-phase) activities. The auditing was completed by an independent, third party quality assurance expert.

Because the pesticide active constituent in each study was unique to each study, as was the spectrum of crops, the methods used, particularly the laboratory methods, varied in some aspects between studies. A complete description of the methods used for each study was provided in the final report of each study, the reference for which is provided in Section 9 of this report. Brief details are provided in sections 4.1 to 4.6 below.

4.1. S-metolochlor (celery and celeriac)

A single GLP study was conducted across six study sites that were situated in field-grown, celery and celeriac crops. These were located in the production regions of northern Tasmania, south-east Victoria and south-east Queensland.

At all six study sites, a single application of Dual Gold® Herbicide (s-metolachlor 960 g / L), was applied at a rate of 2.0 L / ha using a water-rate of approximately 120 L/ha. The treatment was applied, immediately prior to the crop being transplanting, using a gas powered, hand-held, boom sprayer, representative of commercial application equipment.

Irrigation was applied to soil as required and according to the collaborating growers' standard crop-production operations. Thus, soil was moist at, or soon after the application of s-metolachlor to improve seedling survival. However, the exact timing of irrigation in relation to treatment application was not recorded.

The areas (plots) to which the herbicide treatment was applied was satisfactory in size to ensure sufficient samples could be collected for laboratory analysis.

The treated plots were also positioned in fields where Dual Gold® Herbicide was not applied by the collaborating grower. The area outside of the treated plots was considered to be the untreated control areas and samples were collected from this area for comparative analysis.

Following treatment application, crops were managed by each grower, in accordance with local Good Agricultural Practice (GAP).

Specimens were collected from treated plot and from the surrounding non-treated control areas at commercial harvest and placed into frozen storage where they were maintained until being shipped to the analytical laboratory for residue analysis.

At the time of sampling, observations on any phyto-toxic effects that may have appeared following application of s-metolachlor on each crop were made by comparing the health of the non-treated crop with that of the treated crop.

At the laboratory, residues of s-metolachlor were determined using gas-chromatography, mass-spectrophotometry methods that were customised specifically to the measurement of s-metolachlor in these crops.

Table 1. Project VG07194 was managed by separating it into 6 sub-projects. In accordance with the OECD Principles of Good Laboratory Practice, each of these was identified uniquely. The sub-projects included a single active constituent, usually included several crops and were conducted across multiple study sites.

Residue study ID (HAL reference)	Active constituent	Crops	Number of study sites	Locations by State	Reference
08-HAL-004(a)GLP (HAL1143 & HAL1563)	**s-metolochlor**	Celeriac and celery	6	Vic (x3), Tas (x2) and Qld	Griffin and Lean, 2010a
08-HAL-004(b)GLP (AVG1060 & AVG1113)	**metribuzin**	Daikon, taro, sugar-snap peas and snow peas	4	Vic (x2) and Qld (x2)	Griffin and Lean, 2011
08-HAL-004(c)GLP (AVG172)	**phenmedipham**	Head lettuce and leafy lettuce	4	Tas (x2) and Qld(x2)	Griffin and Lean, 2010b
08-HAL-004(d)GLP (AVG384)	**iprodione**	Carrots, beans, silverbeet and spinach	12	Vic (x3), SA (x3), Qld (x3), Tas, NSW and WA	Griffin and Lean, 2010c
08-HAL-004(e)GLP (AVG226 & HAL1667))	**pyrimethanil**	Capsicums and lettuce	8	Tas (x4)	Griffin and Lean, 2010d
08-HAL-004(f)GLP (HAL1389)	**fenhexamid**	Cucumber, capsicum and lettuce	9	SA (x2), Qld (x2), NSW (x2), Tas (x2) and Vic	Griffin and Lean, 2010e

4.2. Metribuzin (daikon, taro, sugar-snap peas and snow peas)

A single residue study was undertaken to determine the residues of the herbicide, metribuzin, that remained in snow peas, sugar snap peas, taro and daikon following a single pre-plant application of the registered herbicide product, Sencor® 750WG herbicide (metribuzin 750 g/kg) or Stacato® 750WG herbicide (metribuzin 750 g/kg) at a rate of 180 g/ha to 380 g/ha depending on soil type.

The study was undertaken at 4 study sites across different growing regions which included, Victoria and South East Queensland.

The herbicide treatment was applied, immediately before the crop was transplanted, using a gas powered, hand held boom sprayer fitted with flat-fan nozzles.

The areas (plots) to which the herbicide treatment was applied was satisfactory in size to ensure a sufficient sample could be collected for analysis. These treated plots were positioned in fields where the herbicide was not applied by the collaborating grower. The area outside of the treated plots was considered to be the untreated control areas.

Following treatment application, crops were managed by each grower, in accordance with local Good Agricultural Practice (GAP), at each site.

At the time of sampling, observations on any phyto-toxic effects that may have appeared following application of s-metolachlor on each crop were made by comparing the health of the non-treated crop with that of the treated crop.

Specimens were collected for residue analysis at commercial harvest at site 2, 3 and 4. However, specimens were not collected from site 1 (daikon) because phyto-toxicity was so severe the crop was severely damaged and eventually died following application of the test-item.

Immediately after collection, specimens were packaged and stored in freezers (≤ minus 10°C) before they were shipped to the analytical-laboratory for residue analysis.

At the laboratory, residues of metribuzin in the samples were determined using gas-chromatography, mass-spectrophotometry methods that were customised specifically to the measurement of metribuzin in these crops.

4.3. Phenmedipham (head lettuce and leafy lettuce)

A single residue study was conducted across four study-sites on commercial, field-grown, head and leafy lettuce crops that were located in the production regions of northern Tasmania and south-east Queensland.

At all four sites, a single application of Betanal® Herbicide Spray (phenmedipham 157 g / L), was applied at a rate of 2.5 L / ha using a water-rate of approximately 250 L/ha. The treatment was applied, immediately after seedlings were transplanted, using a gas powered, hand-held boom sprayer, typical of commercial application equipment.

Specimens were collected for residue analysis 28 days after treatment (DAT) and again at commercial harvest. They were maintained in frozen storage before being shipped to an analytical laboratory for residue analysis.

At the laboratory, residues of phenmedipham were determined using liquid-chromatography, mass-spectrophotometry methods that were customised specifically to the measurement of phenmedipham in these crops.

4.4. Iprodione (carrots, beans, silver beet and spinach)

A single study was conducted across twelve field sites in carrots, green beans, silverbeet and spinach. The crops were commercially produced in field-grown production systems located in south-east South Australia, south-east Queensland, south-western Western Australia, south-east Victoria, Eastern New South Wales and northern Tasmania.

At sites 1 to 4 (carrots), two applications of Rovral® Aquaflo Fungicide (iprodione 500g/L) were applied at a rate of 1.0L/ha. The first application was applied when the crop was 6 to 8 weeks old and again 7 days later.

At sites 5 to 12 (green beans, silverbeet and spinach) four applications of Rovral® Aquaflo Fungicide were applied at 1.0L/ha. The applications were made at 28, 21, 14 and 7 days before harvest.

Treatments were applied at all sites using a hand-held, gas-powered boom sprayer, representative of that typically used in commercial practice.

Specimens were collected from treated and non-treated areas of the crop at each of the sites. Samples of carrots were taken at harvest, approximately 50 days (7 weeks) after the second application. Samples of green beans were taken at 0, 1, 3 and 7 days after the 4th application and samples of silverbeet and spinach were taken at 3, 7, 14 and 21 days after the 4th application.

All samples were maintained in frozen storage before they were transported to the analytical laboratory where residues of iprodione were determined using gas-chromatography, mass-spectrophotometry methods.

4.5. Pyrimethanil (capsicums and lettuce)

A single study was conducted across eight study sites in crops of leafy lettuce and capsicum. The crops used at each site were produced in protected growing systems, such as glasshouses or polyhouses, located in northern Tasmania, south-east Victoria, south east Queensland and south-east South Australia.

At all eight sites, three applications of Scala® 400 SC Fungicide (pyrimethanil 400g/L) were applied at a rate of 2.0L/ha. The treatments were applied at 17, 10 and 3 days before harvest, using a gas powered, hand-held boom sprayer, representative of the equipment typically used at such commercial production facilities.

Specimens were collected from treated and non-treated areas of the crop at each of the sites at 0, 1, 3, 5 and 7 days after the final treatment application and were maintained in frozen storage before they were transported to the analytical laboratory for residue analysis.

Residues of pyrimethanil were determined at a GLP recognised residue laboratory using gas-chromatography, mass-spectrophotometry methodology.

4.6. Fenhexamid (cucumber, capsicum and lettuce)

A single study was conducted across 9 study sites in crops of cucumber, capsicum and lettuce.

At each site, a single application of Teldor® 500 SC Fungicide (fenhexamid 500 g / L), was applied at a rate of 1.0 L / ha using a water-rate of approximately 500 L/ha. The treatment was applied, at approximately 7 days before typical commercial harvest, using a gas powered, hand-held boom sprayer, typical of commercial application equipment.

Specimens were collected for residue analysis at 0, 1, 3, 7 and 10 days after treatment (DAT). Following collection, the samples were maintained in frozen storage before being shipped to an analytical laboratory for residue analysis.

At the laboratory, residues of fenhexamid were determined using liquid-chromatography, mass-spectrophotometry methods.

5. Results

5.1. S-metolochlor (celery and celeriac)

Residual levels of s-metolachlor were below the limit of quantitation (LOQ) of 0.01 mg / kg, in specimens collected from the non-treated control areas of the study site.

In all samples collected from the treated areas of crop at commercial harvest, which was at least 8 weeks after treatment, levels of s-metolachlor were below the LOQ.

However, when compared to non-treated areas, both celery and celeriac were severely stunted at two of the study-sites in areas where Dual Gold® Herbicide was applied (Table 2). Whilst a replicated experiment was not conducted to enable statistical evaluation of the phyto-toxic effects on the crop, they were considered severe enough that significant yield-loss would have resulted.

Table 2. The occurrence of symptoms of phyto-toxicity caused by s-metolachlor on celery and celeriac during an unreplicated residue study.

Study site	Crop	Soil-type	Phyto-toxic effects observed	Comments
1	Celeriac	Grey sand (Vic)	None	No damage observed
2	Celeriac	Clay-red ferrosol (Tas)	Damage caused	Severe stunting
3	Celery	Grey sand (Vic)	None	No damage observed
4	Celery	Clay-red ferrosol (Tas)	None	No damage observed
5	Celery	Brown clay (SE Qld)	Damage caused	Severe stunting
6	Celery	Grey sand (Vic)	None	No damage observed

5.2. Metribuzin (daikon, taro, sugar-snap peas and snow peas)

The limit of quantitation (LOQ) was reported to be 0.02 mg/kg in snow peas and in sugar snap peas, and 0.01 mg/kg in taro.

Residual levels of metribuzin were below the LOQ in all specimens, collected from the non-treated and treated areas at all study sites, regardless of the crop that was treated.

5.3. Phenmedipham (head lettuce and leafy lettuce)

Residual levels of phenmedipham were below the limit of quantitation (LOQ) of 0.01 mg / kg, in all lettuces collected from the non-treated control areas of the study sites.

Lettuces collected from 3 of the 4 sites at 28 days (4 weeks) after treatment, had residual levels of phenmedipham that were at the LOQ. At the fourth site, the residual phenmedipham was below the LOQ.

In all lettuces collected at commercial harvest, 6 to 10 weeks after treatment, levels of phenmedipham were below the LOQ.

5.4. Iprodione (carrots, beans, silver beet and spinach)

Residual levels of iprodione were below the limit of quantitation (LOQ) of 0.02 mg/kg in samples collected from the non-treated control areas of crop at all study sites.

However, residues of iprodione were above the limit of quantitation (LOQ) in all treated samples, regardless of crop, site and time they were collected.

At harvest, the mean level of iprodione across the 4 carrot sites was 0.05 mg/kg; 10 times lower then the current temporary MRL (tMRL) of 0.5 mg.kg currently accepted by the APVMA.

The mean level of iprodione was 0.71 mg/kg in silverbeet and 0.82 mg/kg in spinach at 7 days after the fourth application. These levels are significantly less than the APVMA tMRL of 5.0 mg/kg currently accepted in silverbeet and spinach.

5.5. Pyrimethanil (capsicums and lettuce)

Residual levels of pyrimethanil were below the limit of quantitation (LOQ) of 0.02 mg/kg in samples collected from the non-treated control areas of crop at each study site.

However, residues of pyrimethanil were above the limit of quantitation (LOQ) in all samples regardless of crop, site and sampling-time after application.

At 3 days after application of Scala® 400 SC Fungicide, the mean level of pyrimethanil was 0.3 mg/kg in capsicums and 2.14 mg/kg in leafy lettuces.

5.6. Fenhexamid (cucumber, capsicum and lettuce)

Residual levels of fenhexamid were below the limit of quantitation (LOQ) of 0.01 mg/kg in samples collected from the non-treated control areas of crop at each study site.

Residues of fenhexamid were above the LOQ in all specimens, regardless of crop, site and sample-time after application.

At 7 days after application of Teldor® 500 SC, the mean level (average of 3 sites) of fenhexamid was 2 mg / kg in cucumbers; 6 mg / kg in capsicums; and, 9 mg / kg in leafy lettuces.

6. Discussion

6.1. S-metolochlor (celery and celeriac)

The residue data generated during this study supported an application for a minor-use permit that allows the use of s-metolachlor in celeriac and celery.

However, observations of phyto-toxic effects of the herbicide over-shadowed the positive residue data. Severe stunting of celery that was treated with this herbicide occurred at one site and stunting of treated celeriac occurred at a different site.

The symptoms of phyto-toxicity observed were somewhat consistent with the mode-of-action of s-metolachlor (WSSA, 2007). It is a plant-growth inhibitor that interferes with the biosynthesis of several plant-cell molecules thereby stunting plant-growth.

The activity of this herbicide is affected by soil-type; it is more readily adsorbed to organic matter than clay and more so to clay than to lighter, sandier soils (WSSA, 2007). Furthermore, the moisture content of soil at application, and heavy irrigation or rain soon after application can also affect product efficacy and its impact on the crop because the product is moved from the soil surface into the crop root-zone.

Both sites where phyto-toxicity was observed had distinctly different soil-types; although, both were considered to be clay or silt-based. Interestingly, there was no phytotoxocity caused to celery on the clay-soil (red ferrosol) in Tasmania and there were no negative effects, on either crop, where they were grown in the sandy soil of the Victorian sites.

The effect of soil-moisture is also considered to be a contributing factor in this study; at the two sites where crop damage occurred, significant rainfall (>>20 mm) was recorded by nearby weather stations at or soon after the time of application (Griffin and Lean, 2010a). This facilitated movement of the herbicide into the root-zone where it entered the plant.

On the sandy soils at the Victorian sites, rainfall was not recorded for at least 14 days after application. Irrigation at these sites was unlikely to have exceeded crops requirements, although this was applied by the collaborating grower and records were not kept.

The crop-safety concerns raised during this project meant that this project was referred to the Pesticide Minor-use Co-ordinator (PMUC), Mr Peter Dal Santo for further consideration before progressing to permit application.

The progress of this sub-project was most recently discussed with the PMUC (8 December, 2012).

6.2. Metribuzin (daikon, taro, sugar-snap peas and snow peas)

The data generated during this study supported an application for a minor-use permit that allows the use of metribuzin in taro, sugar snap peas and snow peas.

However, because of the severe phyto-toxic effects of this herbicide to daikon, the final GLP report has been forwarded to the Pesticide Minor-use Co-ordinator (PMUC) for further consideration.

The final outcome of this project, therefore, will be determined by the PMUC following further deliberations.

6.3. Phenmedipham (head lettuce and leafy lettuce)

The data generated for this active constituent supported an application for a minor-use permit that allows the use of phenmedipham in head and leafy lettuces.

Currently, there is a temporary MRL of 0.2 mg / kg accepted by the APVMA for phenmedipham in leafy and head lettuces. The residue data generated during this study is 20 times lower than that tMRL.

Thus, a permit application, seeking to allow the use of Betanal® Herbicide Spray was prepared by the regulatory affairs expert, Mr Kevin Bodnaruk.

This permit application and the supporting GLP residue report were submitted, via email, to the PMUC on August 12, 2010. Following consideration of the documents, it was submitted to the APVMA, who acknowledged receipt of the application 15th September, 2010.

Subsequently, the scope of the permit application has been modified by MUPC; therefore, the final outcome of this application is yet to be determined by the APVMA.

6.4. Iprodione (carrots, beans, silver beet and spinach)

The residue data generated during this study supported the application for a minor-use permit that allows the use of iprodione in carrots, beans, silver beet and spinach.

Thus, a permit application was prepared by the regulatory affairs expert, Mr Kevin Bodnaruk.

The permit application and the supporting GLP residue report were submitted to the PMUC on October 15, 2010. Following consideration of the documents, the permit application was submitted to the APVMA who received it on 15th November, 2010.

Subsequently, a minor-use permit (PER12400), which allows the use of iprodione in carrots for black-rot control, has been released by the APVMA (APVMA, 2011).

However, a permit(s) allowing the use of iprodione on beans, silver beet and spinach has not yet been released.

6.5. Pyrimethanil (capsicums and lettuce)

The data generated during this study supported the application for a minor-use permit that allows the use of pyrimethanil in capsicums and lettuce; currently, there is an Australian temporary MRL (tMRL) of 5 mg/kg for pyrimethanil in both capsicums and leafy vegetables. Furthermore, the EU and Japan have both set an MRL of 2mg/kg for capsicums and an MRL of 10mg/kg (EU) or 2 mg/kg (Japan) for leafy lettuce.

The residual level of pyrimethanil in capsicum and leafy lettuce reported here, at the 3-day with-holding period, is near or significantly lower than the MRL accepted by the arguably more stringent jurisdictions, European Union (EU) and Japan after a 3-day with-holding period.

Thus, a permit application was prepared by the regulatory affairs expert, Mr Kevin Bodnaruk.

The permit application and the supporting GLP residue report were submitted to the PMUC on October 12, 2010. Following consideration of the documents, the permit application was submitted to the APVMA, who received it on 15th November, 2010.

However, correspondence from the APVMA, regarding the status or progress of the application has not been received by the PMUC and a permit has not yet been issued.

6.6. Fenhexamid (cucumber, capsicum and lettuce)

The data generated during this study supported the application for a minor-use permit that allows the use of fenhexamid in cucumber, capsicum and lettuce.

Thus, a permit application was prepared by the regulatory affairs expert, Mr Kevin Bodnaruk.

The permit application and the supporting GLP residue report were submitted to the PMUC on 9th September, 2010. Following consideration of the documents, the permit application was submitted to the APVMA who received it on 15th September, 2010.

Subsequently, a minor-use permit (PER11852), which allows the use of fenhexamid on field-grown, greenhouse-grown and protectively-cropped capsicums and lettuces, for the control of grey-mould disease, was released by the APVMA (APVMA, 2010).

However, a permit allowing the use of this pesticide on cucumbers has not yet been released.

7. Technology transfer

Technology transfer activities were not included in the scope of this project. In regard to minor-use permits sought for the Australian Vegetable industry on the basis of data generated during projects funded by HAL; such activities are co-ordinated and, or conducted by the Pesticides Minor-use Co-ordinator who is funded by Horticulture Australia Ltd, project number: MT10029 ‘Managing pesticide access in horticulture’.

8. Recommendations

8.1. S-metolochlor (celery and celeriac)

Crop Protection Research Pty Ltd (CPR) recommends that the Pesticide Minor-use Co-ordinator (PMUC) carefully consider the phyto-toxicity caused by this herbicide before seeking a permit to allow the use of s-metolachlor on celery and celeriac.

Furthermore, CPR recommends that the PMUC discuss, with Horticulture Australia Ltd and AusVeg, the options available to industry regarding this permit. The options include:

1. Do not seek a permit for the use of s-metolochlor in celery and celeriac and take no further action.
2. Undertake replicated, crop safety trials on a range of soil-types and application timings to determine suitable application conditions.
3. Investigate alternatives to s-metolochlor that may provide pre-plant or early post-plant weed control in celery and celeriac and which do not cause phyto-toxicity

8.2. Metribuzin (daikon, taro, sugar-snap peas and snow peas)

CPR recommends that the PMUC carefully consider the phyto-toxicity caused by metribuzin when applied to daikon before seeking a permit to allow the use of metribuzin on these crops.

Furthermore, CPR recommends that the PMUC discuss, with Horticulture Australia Ltd and AusVeg, the options available to industry regarding this permit. The options include:

1. Proceed with permit application, excluding daikon, after assessing the risk of applying metribuzin to taro, sugar-snap peas and snow-peas.
2. Investigate alternatives to the use of metribuzin on daikon, which may provide early post-plant weed control without phyto-toxicity to crop.

8.3. Phenmedipham (head lettuce and leafy lettuce)

A permit application has been submitted to the Australian Pesticides and Veterinary Medicines Authority (APVMA); however, the outcome of this is yet to be determined.

Therefore, CPR recommends that the PMUC continues to regularly enquire to the APVMA regarding the status and outcome of this application.

8.4. Iprodione (carrots, beans, silver beet and spinach)

A permit application was received by the APVMA who subsequently released minor-use permit number: PER12400 (APVMA, 2011), which allows the use of iprodione in carrots for black-rot control.

However, despite supportive data, a permit(s) allowing the use of iprodione on beans, silver beet and spinach has not yet been released.

Thus, CPR recommends that the PMUC continues to regularly enquire to the APVMA regarding the status and outcome of this application, in relation to these 3 crops.

8.5. Pyrimethanil (capsicums and lettuce)

A permit application was received by the APVMA. However, correspondence from the APVMA, regarding the status or progress of the application has not been received by the PMUC and a permit has not yet been issued.

Thus, CPR recommends that the PMUC continues to regularly enquire to the APVMA regarding the status and outcome of this application.

8.6. Fenhexamid (cucumber, capsicum and lettuce)

A permit application was received by the APVMA who subsequently released minor-use permit number, PER11852 (APVMA, 2010), which allows the use of fenhexamid on field-grown, greenhouse-grown and protectively-cropped capsicums and lettuces, for the control of grey-mould disease.

However, despite supportive data, a permit(s) allowing the use of fenhexamid on cucumbers has not yet been released.

Thus, CPR recommends that the PMUC continues to regularly enquire to the APVMA regarding the status and outcome of this application in relation to cucumbers.

9. References

APVMA (Australian Pesticides and Veterinary Medicines Authority) (2010) Permit to allow minor use of an agvet chemical product for control of grey mould in field, greenhouse and protected cropping capsicum and lettuce. Permit number PER 11852. Department of Agriculture, fisheries and forestry, Australian Government.

APVMA (Australian Pesticides and Veterinary Medicines Authority) (2011) Permit to allow minor use of an agvet chemical product for suppression of black rot in carrots. Permit number PER 12400. Department of Agriculture, fisheries and forestry, Australian Government.

Griffin, D. and Lean, R. (2010a). The determination of s-metolachlor residues in celeriac and celery after a single Dual Gold® Herbicide application in commercial cropping situations in Australia. Crop Protection Research Pty Ltd, Victoria, Australia.

Griffin, D. and Lean, R. (2010b). The determination of phenmedipham residues in head and leafy lettuce crops after a single Betanal® Herbicide Spray application in commercially grown field crops in Australia. Crop Protection Research Pty Ltd, Victoria, Australia.

Griffin, D. and Lean, R. (2010c). The determination of iprodione residues in carrots, beans, silverbeet and spinach when multiple spray applications of Rovral® Aquaflo Fungicide are made in commercially grown crops in Australia. Crop Protection Research Pty Ltd, Victoria, Australia.

Griffin, D. and Lean, R. (2010d). The determination of pyrimethanil residues in capsicum and lettuce crops after three applications of Scala® 400 SC Fungicide in protected growing systems in Australia. Crop Protection Research Pty Ltd, Victoria, Australia.

Griffin, D. and Lean, R. (2010e). The determination of fenhexamid residues in cucumber, capsicum and lettuce crops after a single application of Teldor® 500 SC Fungicide in protected growing systems in Australia. Crop Protection Research Pty Ltd, Victoria, Australia.

Griffin, D. and Lean, R. (2011). The determination of metribuzin residues in daikon, taro, snow peas and sugar snap peas after a single application of Sencor® 750 WG Herbicide in commercial cropping situations in Australia. Crop Protection Research Pty Ltd, Victoria, Australia.

WSSA (Weed Science Society of America) (2007). Herbicide Handbook (Ed 9th). Kansas, USA.