Horticulture Innovation Australia

Final Report

Generation of residue date for pesticide minor-use permit applications in strawberry crops

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1. Media Summary

White-fringed weevil and garden weevil are sporadic pests of strawberry which can cause significant crop-damage particularly when in high numbers. Chemical control is the only effective and efficient method of control; however, there is currently no agrichemical product registered for use in strawberries for the control of these pests.

Avatar, which is known to control these pests and which is suitable for incorporation into some IPM programs, has been available to the strawberry industry previously for weevil control via minor-use permit number 10264. That permit expired on 31st March 2010 and therefore, the product can no longer be used on strawberries.

The APVMA requested further residue data to be provided for review before it could renew the permit. Hence, this Horticulture Australia Ltd project (BS11010) commissioned Crop Protection Research Pty Ltd to generate that residue data.

A study was conducted where commercial strawberry crops at four different locations around Australia including Victoria, South Australia, New South Wales and Queensland were sprayed with Avatar on 2 occasions (9 and 2 days before harvest) and then harvested (0, 1, 2 and 3-days after second spray). The harvested fruit was analysed at a pesticide residue laboratory to measure the amount of insecticide that remained on and in the fruit.

The pesticide residue analysis showed that residues of the insecticide remained in all of the sprayed fruit, regardless of when they were collected. However, the amount of that residue was substantially lower than the APVMA's current maximum allowable amount residue for that pesticide.

The relatively low level of pesticide measured in the fruit provides support to the minor-use permit renewal application that will be submitted to the APVMA and therefore it is expected, although not certain, that a new permit will be released by around October, 2013.

A minor-use permit renewal application has been presented to Horticulture Australia's pesticide minor-use co-ordinator (PMUC). The permit application, which will be reviewed by the PMUC before being submitted to the Australian Pesticides and Veterinary Medicines Authority (APVMA), seeks to allow the use of DuPont Avatar Insecticide (Avatar) for the control of weevil pests in strawberry crops.

2. Technical Summary

Strawberry growers are seeking the renewal of minor-use permit number 10264 which expired on 31st March, 2010 and which allowed them to use the agrichemical product, DuPont™ Avatar® Insecticide (indoxacarb 300 g/kg; Avatar), to control the pest-weevils: white-fringed weevil (*Graphognathus leucoloma*) and garden weevil (*Phlyctinus callosus*).

Both of these insects are significant pests for the industry; whilst they only occur sporadically, they cause significant damage to crops when high numbers develop and there is currently no agrichemical products registered for use on strawberry crops in Australia that control these pests.

It is anticipated that following a satisfactory review of the supporting residue-data submitted to the APVMA along with the application, that they will re-issue the permit in time for use on this coming-season's southern strawberry crops (approx. October, 2013).

To renew a minor-use permit, a 'Category 20' application must be submitted to APVMA along with any data they requested when the permit was last issued.

The pesticide minor-use co-ordinator (PMUC) for Horticulture Australia Limited (HAL) advised industry, following discussions with the APVMA, that indoxacarb residue data was to be generated and reviewed by the APVMA before permit 10264 could be renewed.

Thus, HAL project number BS11010 was developed and funded with the aim of generating data indicating the likely residues of indoxacarb that will remain in strawberries following applications of Avatar in accordance with the use-pattern described in the permit.

Thus, a residue study was conducted in accordance with the OECD principles of Good Laboratory Practice (GLP). The study was conducted at 4 study-sites located in Queensland, New South Wales, South Australia and Victoria. Both broad-types of strawberry production system were represented and included: protected crops (grown under plastic tunnels) and field-grown crops.

At each site, strawberry crops received two applications of Avatar at 170 g/ha at approximately 9 and 2-days before harvest. The spray applications were made using a hand-held, gas-powered boom-sprayer fitted with hollow-cone nozzles spaced 50cm apart.

Following the second application of Avatar, samples of strawberry fruit were collected at 0, 1, 2, and 3-days after the second application was made. Harvested samples were frozen immediately and sent to a laboratory where they were analysed for residual indoxacarb.

The analysis was conducted using highly-sensitive, liquid-chromatography, mass-spectrophotometry equipment (LC/MS-MS) and was able to detect and measure residual indoxacarb at levels as low as 0.001 milligrams of indoxacarb per kilogram of strawberries (0.001 mg/kg).

There was no measurable residue of indoxacarb in strawberries collected from untreated crop; however, residual indoxacarb was found in all samples collected from areas of crop sprayed with Avatar, regardless of whether they were collected 0, 1, 2 or 3-days after the second application of Avatar.

Currently the APVMA recognises a temporary maximum residue limit (tMRL) for indoxacarb of 1.0 mg/kg. Therefore, data generated during this residue study is considered to provide support to the permit renewal application because residual indoxacarb was substantially lower than the tMRL in all treated fruit collected from any of the four sites.

A minor-use permit renewal application has been submitted to the national pesticide regulator, The Australian Pesticides and Veterinary Medicines Authority (APVMA), on behalf of the strawberry industry of Australia.

3. Introduction

In Australia, before an agrochemical product can be sold or used, the Australian Pesticides and Veterinary Medicines Authority (APVMA) must first register it. In order for a manufacturer to register a product they are required to submit a comprehensive data package to the APVMA. The costs for generating and collating such data are high and unfortunately many horticultural crops are too small individually for agrochemical manufacturers to bear the high cost of registering products for use. As a result, horticulturalists are often placed in situations where they risk severe crop losses from insects, weeds and diseases. On the other hand, they risk buyers rejecting their produce and other penalties if they are detected using products that are not registered.

The need to gain minor-use permits and new registrations has come about due to loss of some agrochemicals and/or uses due to chemical reviews and product rationalisation. Horticultural produce must meet minimum standards relating to quality, safety and consumer expectation. Quality Assurance programs, dealing with the whole production process including agrochemical use demand that growers only exercise Good Management Practices. The introduction of new and emerging crops, pesticide resistance, integrated pest management, the continual vigilance of horticultural industries for improved agrochemical choices and the disinclination of manufacturers to register for minor crops has led to the need for this project.

The selective use of pesticides to control pests, weeds and diseases plays an important role in increasing production, improving the quality of Australia's horticultural crops and enabling growers to earn reasonable returns on their investments. At the same time, today's health conscious society is extremely sensitive to issues relating to chemical use and it is essential that consumers be protected by adequate regulations governing the use of agrochemicals.

The APVMA’s National Permit System adds some flexibility to the lengthy registration process and legalises the availability of products for minor-use purposes, not specified on the product label. However, off-label permits issued by the APVMA still must be applied for along with information/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 strawberry 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) compatible pesticides that were outside the industry’s experience.

To address the current and future pesticide requirements for horticultural crops the Strategic Agrichemical Review Process (SARP) has been developed. This approach has the benefit of IPM compatibility, improved scope for resistance management, sound biological profile, and residue and trade acceptance for domestic and export markets.

This review process provides the strawberry 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. The study in this tender has been identified through the SARP.

4. Materials and methods

A single residue study, identified as 11-HAL-027GLP was conducted and as required by the pesticide regulator of Australia, the Australian Pesticides and Veterinary Medicines Authority (APVMA), was conducted in accordance with the OECD Principles of Good Laboratory Practice (GLP).

Before the residue study began, an audited study plan was prepared. This document was much like a scientific protocol and contained all details necessary to complete the field- and the analytical-phase activities of the study. Quality assurance (QA) auditing of the study, a key component of GLP studies was completed by an independent, third party, QA expert.

A complete description of the methods used for the study is provided in the final technical report, not reported in this document. However, brief details are provided below.

The residue study was undertaken across four sites that were located in commercial, field-grown crops of New South Wales, South Australia, Victoria and South-east Queensland. Some sites were protected cropping situations (grown under plastic tunnels), whilst other were field-grown crops.

At each of the field-sites, the study was established using an non-replicated trial design with 2 separate treatments; a non-treated control and DuPont Avatar Insecticide (indoxacarb 300 g/kg; Avatar) applied at 170 g/ha.

Avatar was applied using a gas-powered, hand-held boom-sprayer fitted with hollow-cone nozzles spaced 50 cms apart. Two sprays of Avatar were applied approximately 9 and 2-days before harvest.

Samples of strawberry fruit were collected from sprayed and non-treated areas of crop at 0, 1, 2 and 3-days after the second application. They were packaged into separate double-layered, heavy duty, plastic freezer-bags and then stored in freezers (≤-10^{o}C) before being shipped to the analytical-laboratory for determination of indoxacarb residues.

The indoxacarb analysis was conducted using equipment and methods which utilised Liquid Chromatography and Mass Spectrometry (LC-MS/MS).

All data collected during the field- and laboratory-phase of the study were reported into a single GLP study reported which was audited by QA personnel and approved for release. The report was forwarded to a regulatory affairs expert for review and for preparation of the APVMA application. The has been forwarded, along with a summary version of the GLP report to Horticulture Australia's pesticide minor-use co-ordinator for final review before submission to the APVMA.

5. Results

5.1. Residues of indoxacarb in strawberry fruit

The limit of quantitation (LOQ), the smallest quantity of indoxacarb that the laboratory's equipment and methods could reliably measure in the strawberry fruit, was reported to be 0.001 mg/kg. That is, 0.001 mg of indoxacarb could be reliably quantified in a kilogram of homogenised strawberry fruit.

Residual indoxacarb was below the LOQ in strawberries collected from the non-treated areas at all study sites indicating that the site had not been sprayed with Avatar prior to, or during, the study. It also indicates that spray-drift contamination from treated areas to non-treated areas was successfully avoided.

Regardless of the time after the second application that they were collected, measurable residual indoxacarb was detected in all sprayed fruit-samples collected from all sites. The residues were approximately 0.3 mg/kg in fruit from 3 of the 4 sites across all collection times; while only approximately 0.08 mg/kg was measured in fruit collected from the New South Wales site.

At 2 of the 4 sites, residual indoxacarb was at its highest level in samples collected on the same days as the final application of Avatar was made; however, it was fruit collected 1-day after the same application that had the highest level of indoxacarb.

Disregarding location and time of collection, the residual indoxacarb in any of the samples was substantially lower than the current temporary maximum residue limit (tMRL) accepted by the Australian Pesticides and Veterinary Medicines Authority which is published to be 1.0 mg/kg.

5.2. Regulatory affairs

The final report for the residue study was prepared, audited in accordance with the Principles of Good Laboratory Practice, and then formally released on 13 March 2013.

A copy of the full report was forwarded to Horticulture Australia Ltd (HAL) for review.

Additionally, a summary of the residue study report has been forwarded to HAL's pesticide minor-use co-ordinator for review and approval before it is submitted, along with the permit renewal application, to the Australian Pesticides and Veterinary Medicines Authority (APVMA) for consideration.

6. Discussion

The Australian Pesticides and Veterinary Medicines Authority (APVMA) released permit number 10264 (APVMA, 2008) which allowed the use of DuPont™ Avatar® Insecticide (indoxacarb 300 g/kg; Avatar) on strawberries for the control of weevil pests. The permit expired on 31st March, 2010.

An application has been prepared for submission to the APVMA which seeks to have the permit re-instated with the same use-pattern prescribed in permit 10264; that is, a maximum of 2 applications of the product, with a minimum spray interval of 7-days. A rate of 170 g/ha or 17 g/100L water should be used.

The permit will be underpinned by a current temporary maximum residue limit (tMRL) of 1.0 mg/kg (APVMA, 2012) as prescribed for the crop group - berries and other small fruits.

The data generated in the strawberry residue study of this project, is expected to support the permit renewal application because residual indoxacarb was substantially lower than the tMRL regardless of whether fruit was harvested immediately after a second application was sprayed on to the crop, or 3-days after that spray.

Moreover, the data also suggests that a significant increase in the application-rate and/or a reduction in the with-holding period (time between final application and harvest) could be justified. However, it is likely that additional research would need to be undertaken if such changes to the permit were sought.

7. Technology transfer

Technology transfer activities were not included in the scope of this project. Nevertheless, an email notification of the outcomes of this project has been sent to the strawberry industry's peak industry body, Strawberries Australia Inc, for dissemination to grower's Australia-wide.

Permits released by the Australian Pesticides and Veterinary Medicines Authority (APVMA) based on the work undertaken in this project are available to the public via the APVMA website: www.apvma.gov.au

8. Recommendations

Crop Protection Research Pty Ltd (CPR) recommends that Horticulture Australia Ltd's pesticide minor-use co-ordinator approves the permit renewal application and immediately submits it to the Australian Pesticides and Veterinary Medicines Authority (APVMA) for consideration. The strawberry industry of Australia is particularly eager to have the permit in place for this coming season not only because of the insecticide's ability to control weevil pests but also because of the chemical's suitability for production systems that rely heavily on an integrated pest management program.

Without access to DuPont™ Avatar® Insecticide growers will need to use other agrichemical products to protect their crops and these are likely to be less compatible with IPM programs.

A secondary objective of this project was for two other significant strawberry pests, green mirids and Rutherglen bug, to be included on the permit's list of target pests, in addition to the weevil pests already identified on the previous permit.

CPR recommends that these additional pests are not included in the minor-use permit renewal application and prepared the permit renewal application accordingly. This recommendation is made following consultation with an experienced regulatory affairs expert and the experienced strawberry pest-management expert (James Altmann, Biological Services Pty Ltd) who requested the additional pests be added.

It was established during these consultations that the highest priority was to have the permit re-instated as soon as possible and, that requesting the APVMA to extend the permit scope was likely to cause a significant delay to that renewal process.

The likelihood of such a delay was considered to be high because scientific data and other technical information, which might support the addition of these pest species to the permit, is unavailable, unsatisfactory or insubstantial.

Instead, CPR recommends to HAL and the strawberry industry, that a seperate request is made to the APVMA once the permit is re-instated, or when the permit is next renewed. Furthermore, the request should only be made following the generation of, or collation of, scientific and technical data that would support the addition of these pests.

9. References

APVMA (Australian Pesticides and Veterinary Medicines Authority) (2008) Permit to allow minor use of an agvet chemical product for control of white-fringed weevil and garden weevil in Strawberries. Permit number PER 10264. Department of Agriculture, fisheries and forestry, Australian Government.

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

10. Acknowledgments

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