

Vegetable R&D Review 2006-2018

Hort
Innovation



National Vegetable
Extension Network

Introduction

The intention of this review is to make all regional extension staff aware of current and recent vegetable research and development projects, and, especially, to identify projects which have extension materials or components that can feed into regional extension activities.

Each project covered by the review will contain a short summary of the project and it will include links to the project final report and any extension materials currently available. These projects are also summarised in the attached spreadsheet, which also contains the links to project resources that can also be searched and prioritised in a way that makes the material more relevant to your local needs.

As projects are completed, final reports are added to this review. Alternatively, final reports can be ordered from Hort Innovation using the following link: horticulture.com.au/resources/final-report-order-form/

To request an electronic version of this review contact: adam.goldwater@ahr.com.au

Last updated 12/12/2018.

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**Hort
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Strategic levy investment

**VEGETABLE
FUND**

This project has been funded by Hort Innovation using the vegetable research and development levy and funds from the Australian Government. For more information on the fund and strategic levy investment visit horticulture.com.au

Agronomy / production / postharvest

Vision systems, sensing and sensor networks to manage risks and increase productivity in vegetable production systems

This project led by QDAF also involves CSIRO and QUT as key project collaborators. It is about the development of vision-system sensing and sensor networks in relation to vegetable crops, and is part of a suite of projects relating to precision agriculture for vegetables. Also refer to project VG15003. See the project update link below.

Discipline: Agronomy/production/postharvest **Ends:** 30/11/2018
Project code: VG15024
Contact person: **Email:**
Service provider: The Department of Agriculture and Fisheries (DAF)
Extension materials: [Project update](#)

Using autonomous systems to guide vegetable decision making on-farm

This project by the Australian Centre for Fields Robotics based at Sydney University. It is about the development of vision-system sensing and sensor networks in relation to vegetable crops, and is part of a suite of projects relating to precision agriculture for vegetables. Refer to project VG15024.

Discipline: Agronomy/production/postharvest **Ends:**
Project code: VG15003
Contact person: Salah Sukkarieh **Email:** salah.sukkarieh@sydney.edu.au
Service provider: University of Sydney
Extension materials: [Website](#)

Evaluation of automation and robotics innovations: Developing next generation vegetable production systems

This is one of a group of projects that is being conducted in the area of automation and robotics. At this stage these projects are strongly research-focused and unlikely to have extension materials available.

Discipline: Agronomy/production/postharvest **Ends:** 30/11/2016
Project code: VG13113
Contact person: Sue Heisswolf **Email:**
Service provider: The Department of Agriculture and Fisheries (DAF)
Extension materials: [Final report](#)

Review of current irrigation technologies

The project reviewed a range of innovations in relation to irrigation of vegetable crops. A factsheet and series of workshops were produced. The main areas covered were soil moisture monitoring, variable rate irrigation, drip irrigation, system automation, energy costs and the need for technical support. Non-drain sprinklers, solar pumping, automating surface irrigation systems, tracking nutrient movement to save money, the importance of an irrigation design and minimum tillage were also seen as viable options to improve water productivity in some areas.

Discipline: Agronomy/production/postharvest **Ends:** 29/07/2016
Project code: VG14048
Contact person: Mathew Plunkett **Email:** matthew.plunkett@ils.nsw.gov.au
Service provider: Irrigation Australia Ltd
Extension materials: [Factsheet, Vegenotes and final report](#)

Scoping Study of a disorder that reduces shelf-life and consumption of green beans

The cause of a bacterial disease in a crop in Victoria was identified as *Pseudomonas syringae*. There is no doubt that a significant infection of bean pods will, in its own right, reduce the quality of bean pods, a problem experienced by a number of growers. In this instance, however, the bacterium was isolated only from leaves, not from pods. There is detailed quality information available on chilling injury and on bacterial diseases. Growers would benefit from a summary of this material. The diagnosis of chilling injury was based mostly on anecdotal evidence.

Discipline: Agronomy/production/postharvest **Ends:** 10/07/2015
Project code: VG14040
Contact person: Dr Brendan Rodoni **Email:** brendan.rodoni@dpi.vic.gov.au
Service provider: Agriculture Victoria Services Pty Ltd
Extension materials: [Final report](#)

Pre-harvest practices that will increase the shelf-life and freshness of vegetables

This project involved a review of pre-harvest effects on post-harvest quality of vegetables. The project produced a detailed review document which is available for download by following the link below. The project also produced three factsheets and three articles, also available by following the link below.

Factsheets: Pre-harvest effects on babyleaf spinach quality; Pre-harvest effects on lettuce quality; Health benefits of eating brassicas.

Articles: The benefits of silicon and vegetable crops; Greenhouse cucumber quality; Health benefits of eating vegetables.

Discipline: Agronomy / production / postharvest **Completion Date:** 31/05/2016
Project code: VG14025
Contact person: Drs Roberto Marques and Gordon Rogers **Email:** gordon@ahr.com.au
Service provider: NSW Dept of Primary Industries and AHR
Extensions materials: [Vegenote, Factsheets on lettuce, babyleaf and brassica health. Articles on cucumber quality, silicon and heal effects of vegetables, Final report](#)

Evaluation of commercially available farm management software programs for the vegetable industry

The project provides a list of farm management software programs compiled for vegetable growers to identify the most appropriate tool they can buy to meet their farm-management needs – from crop management through to social media. A spreadsheet (link below) lists all the apps and farm management software available to growers.

Discipline: Agronomy / production / postharvest

Completion Date: 31/05/2015

Project code: VG13106

Contact person: Belinda Hazell **Email:** Belinda.hazell@tqaaustralia.com.au

Service provider: TQA Australia Inc

Extensions materials: [Final report and list of farm management software and programs available](#)

Identify process improvements for preserving peak freshness of broccoli

This study investigated the freshness of broccoli at retail and found that freshness at retail is highly variable, and that the quality does not correlate well to display method or price. The project recommended further studies on the cost of the effectiveness of cooling practices, production of training materials targeted at retailers, further evaluation of supply chains, particularly in relation to icing versus non-icing systems, and to test the effectiveness of 1– MCP (SmartFresh) as an alternative to top icing.

Discipline: Agronomy / production / postharvest

Completion Date: Mid 2017

Project code: VG13086/VG14062

Contact person: Jenny Ekman

Email: jenny.ekman@ahr.com.au

Service provider: Applied Horticultural Research

Extensions materials: [Final report 13086](#)

[Final report 14062](#)

Identifying and sharing postharvest best practice on-farm and online

This project has carried out postharvest research on new vegetable crops for which there was no data available. It has produced the ***Postharvest management of vegetables*** handbook and a series of product orientated fact sheets. The project has also conducted a series of workshops around the country, which will continue through VegPRO training. All of the content of the *Postharvest management of vegetables* handbook, fact sheets and new reference data for vegetable crops is available on the vegetable postharvest website at www.postharvest.net.au and by following the links below.

Discipline: Agronomy/production/postharvest

Ends: 7/07/2017

Project code: VG13083

Contact person: Jenny Ekman

Email: jenny.ekman@ahr.com.au

Service provider: Applied Horticultural Research Pty Ltd

Extension materials: [Postharvest manual](#)

[Website and product factsheets](#)

[Final report](#)

Prioritisation of vegetable crop commodities and activities for mechanisation

The objective of this project is to monitor and demonstrate the use of controlled traffic farming in vegetable production within the constraints of existing farm operations, with a focus on the north-west coast of Tasmania.

The take home messages from the project are:

- Tracking stability on compacted wheel tracks and side slopes remains an issue to be addressed for the implementation of controlled traffic farming (CTF)
- Undulating topography creates challenges for tillage operations and drainage under CTF
- Harvest traffic can cause soil compaction, even for summer harvested crops like poppies

For more information on this project view the brief factsheet by following the link below or, follow the link to the website below.

Discipline: Agronomy/production/postharvest **Ends:** 9/11/2015
Project code: VG13081
Contact person: John McPhee **Email:** john.McPhee@utas.edu.au
Service provider: Tasmanian Institute of Agriculture (TIA) - University of Tasmania
Extension materials: [Final report](#)

Global scan for vegetable innovation – Fresh and minimally processed

The Australian vegetable industry aims to increase its vegetables' attractiveness and competitiveness as exports to Asian markets. To achieve this, research into the various types of innovation used within the vegetable industry was conducted to identify new, relevant and commercially viable solutions to assist Australian growers. Seven innovations that presented the best opportunities were developed and are ready to be distributed to growers and relevant stakeholders. Each innovation has a brochure developed. The innovations are listed below. The brochures and the final report are available via the link below:

1. Micro-perforations
2. Compostable packaging
3. PCR-PET packaging
4. Peel and reseal lidding
5. Ethylene scavengers
6. QR codes on vegetable packaging
7. Vegetable snack packs

Discipline: Agronomy/production/postharvest **Ends:** 1/07/2015
Project code: VG13080
Contact person: Ben Dunsheath **Email:** Ben.Dunsheath@euromonitor.com
Service provider: Euromonitor International Ltd
Extension: [Final report and 7 innovation brochures](#)

Soil Wealth – Soil condition management – Extension and capacity building

The [Soil Wealth](#) project led jointly by AHR and Dr Doris Blaesing from [RMCG](#) have created a new national framework for the delivery of soil and crop-protection information to Australian vegetable growers.

They have resulted in new resources and approaches to communicate information and skills to the vegetable industry, including:

- Best-practice demonstration sites with leading growers in 10 Australian regions
- Website and Facebook sites
- A soil-borne disease masterclass run in September, 2015
- Field days, regional workshops and interest groups
- Videos, factsheets and social media deliver information and training to vegetable growers and agronomists
- A network of 1500 growers, agronomists, resellers and chemical companies interested in soil-borne disease management.

Discipline: Agronomy/production/postharvest **Ends:** 31/05/2017
Project code: VG13076
Contact person: Gordon Rogers **Email:** gordon@ahr.com.au
Service provider: RMCG + Applied Horticultural Research
Extension materials: [Website, factsheets, webinars and events](#)

An investigation of low-cost protective cropping

A range of low-cost predictive cropping measures were evaluated to help reduce the impact of adverse weather events on vegetable crop yields and quality. A range of measures was evaluated including: permanent shade structures, windbreaks, low-cost retractable roof structures and floating row covers.

The most promising structures were retractable rooms and floating row covers. Capsicum plants grown in the retractable roof Cravo® house were significantly larger and healthier than similar plants grown outside, and would be expected to have greatly increased yield over an extended cropping period.

Under cold conditions, however, fleece floating-row covers can provide major benefits. These materials can significantly improve germination and growth and protect crops from light frosts. Harvest of lettuce was brought forward 1–2 weeks using fleece materials. The lightest fabrics, which are also the cheapest, were sufficiently durable and gave results as good or better than more heavyweight fleeces. The floating-row covers were very promising in alleviating the effects of extreme heat and cold in babyleaf spinach crops.

The project produced a factsheet called “Blankets for vegetables”, which explains the use of floating recovers for frost protection. This is available via the link below and also from the ICP’s/Soil Wealth website. There are also two veg notes, a scientific paper and the final report available via the link below.

Discipline: Agronomy/production/postharvest **Ends:** 15/05/2016
Project code: VG13075
Contact person: Adam Goldwater **Email:** adam.goldwater@ahr.com.au
Service provider: Applied Horticultural Research Pty Ltd
Extension materials: [Final report, factsheet, conference paper and Vegnotes](#)

Guest worker scheme desktop study

The challenges faced by Australian growers are shared by others across the international community. The study, conducted by project leader Richard O'Brien, considered guest worker programs in countries with broadly similar market characteristics and employment needs to those in Australia. Specific examples were drawn from North America, Europe and Oceania. The study also considered guest worker schemes currently available within Australia and recommended some adjustment to those that apply to the horticultural sector.

WHM programs and SWPs are essential to maintaining and promoting a vibrant and profitable rural economy and must be constantly refined and reviewed to ensure that they incorporate best practice across all aspects of their implementation for the benefit of both, horticultural growers and seasonal workers. Refer to the link below for more information.

Discipline: Agronomy/production/postharvest **Ends:** 30/05/2014
Project code: VG13063
Contact person: Richard A. O'Brien **Email:** richardaobrien@gmail.com
Service provider: Richard O'Brien
Extension materials: [Final report and vege note](#)

Building codes and greenhouse construction

The aim of this project was to reduce the cost of compliance for the construction of Greenhouse and Growing Structures (G/GS) and to provide guidelines for a consistent building approval approach across Australia. The investigations and documentation determine where cost-reduction measures can be implemented to economically assist the protective cropping industry and provide a defined approval process throughout Australia.

The project found that with ever-increasing global and local populations, increased variability of the environment and consumer demand for high-quality produce, it is vital that growers are encouraged to develop greenhouse and growing structures. This project encourages development by creating an interstate code of practice providing guidelines for safe and economically responsible G/GS design, regulation and operation with regard to building classification and fire and egress. Project VG13055 was led by Marcel Olivetto and Project Administrator Eric Peter Osborn, both from Osborn Lane Consulting Engineers, QLD. Click on a link below for a copy of the veg note, or contact the project leader for more information and a copy of the final report.

Discipline: Agronomy/production/postharvest **Ends:** 30/09/2014
Project code: VG13055
Contact person: Marcel Olivetto **Email:** brisbane@osbornconsulting.com.au
Service provider: Osborn Lane Consulting Engineers
Extension materials: [Vege note](#)

Confirmation of ultra filtration as a viable low-cost water disinfection and nutrient solution recycling options

This project is about micro-filtration of water as a low-cost means of disinfestation of the nutrient solution, and of water supplied for protected cropping. There is a benefit-cost analysis tool available via the link below. Contact the project leader for more information about this project, and for any extension materials that may be available.

Discipline: Agronomy/production/postharvest **Ends:** 30/06/2016
Project code: VG13052
Contact person: Jeremy Badgery-Parker **Email:** info@primaryprinciples.com.au
Service provider: Primary Principles
Extension materials: [Cost-benefit analysis](#)
[Final report](#)

Production of fish food for aquaculture from vegetable waste feasibility study

Currently, a major factor limiting aquaculture is the continued reliance on wild caught fish to produce fishmeal. Much research has focused on replacing fishmeal with animal and/or plant-based products, however, with only partial success. Project VG13050 examined the potential use of vegetable wastes to grow insect larvae, which can be used in animal or aquaculture feeds. Feeding trials with larvae showed that pumpkin, carrot, eggplant, capsicum and even processed vegetable sludge were all readily consumed.

Around 25g of fresh pumpkin or 30g of fresh carrot would be needed to produce 1g of dried larval meal, or feed conversion ratios of 4.9:1 to 2.0:1 – the average being 3.3:1 (dry weights). Although investment in BSF would currently be a risky venture for an individual vegetable farmer, this industry has considerable potential and may well develop in the future as fishmeal prices continue to rise.

Discipline: Agronomy/production/postharvest **Ends:** 30/05/2014
Project code: VG13050
Contact person: Jenny Ekman **Email:** jenny.ekman@ahr.com.au
Service provider: Applied Horticultural Research Pty Ltd
Extension materials: [Final report and vegenote](#)

Integrating sustainable soil health practices into a commercial vegetable farming operation

The trials at Mulyan Farms have provided commercial scale validation that “softer” soil management practices can be integrated into large-scale vegetable production. For example, all cover crops produced a more profitable spinach crop, compared to a traditional fallowed system. Increases in profitability of 36% and 48% were obtained following the legume cover crops of Morgan Field peas or Balansa clover, respectively.

The project has successfully demonstrated and communicated that combining cover cropping with controlled traffic and reduced tillage will allow for sustainable improvement to the soil condition, which can maintain or improve yields, and reduce input costs.

The project delivered five factsheets which are all available on the Soil Wealth website, or by following the link below. The final report is also available by following the link.

- Biofumigation
- Carbon storage in vegetable
- Nitrous oxide emissions in vegetables
- Reduced till in vegetable production
- Winter cover crops.

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|-----------------------------|---|---------------|--|
| Discipline: | Agronomy/production/postharvest | Ends: | 31/05/2016 |
| Project code: | VG12115 | | |
| Contact person: | Gordon Rogers | Email: | gordon@ahr.com.au |
| Service provider: | Applied Horticultural Research Pty Ltd | | |
| Extension materials: | Factsheets and final report | | Soil Wealth website |

Enhancing best practice in vegetable production and business management in the Northern Territory

This project was an engagement project to identify vegetable growers in the NT and build relationships with the all commercial vegetable growers of the Top End who are predominantly Vietnamese or Cambodian in heritage. The project endeavoured to engage these growers by providing a dedicated engagement officer to be a stable and trusted point of contact on best-practice farming and farm business practices. The project produced a farm biosecurity planning document for managing CGMMV.

Discipline: Agronomy/production/postharvest **Ends:** 31/07/2016
Project code: VG12113
Contact person: Greg Owens **Email:** greg@ntfarmers.org.au
Service provider: Northern Territory Farmers Association Inc
Extension materials: [CGMMV biosecurity template, Vegenote and final report](#)

Increasing productivity and extending seasonality in soil-grown vegetables using capsicum as a candidate

The project evaluated rootstocks, varieties, ratooning and shading to increase the productivity of capsicums and chilli. A formal literature review was undertaken first, followed by field trials in Queensland. The project report is complicated and difficult to read, however, it appears an increase in yield of up to 30% is possible by grafting capsicums or chillies onto commercially available rootstocks. The use of shade has potential to also increase yield in capsicums and chillies. Suggest reading the report for more detail, and refer to project VG13075 for more information on shading.

Discipline: Agronomy/production/postharvest **Ends:** 31/05/2016
Project code: VG12103
Contact person: David Carey **Email:** david.carey@deedi.qld.gov.au
Service provider: The Department of Agriculture and Fisheries (DAF)
Extension materials: [Final report and Vegenote](#)

Identifying new products, uses and markets for Australian vegetables: A desktop study

Total waste from these crops was estimated at 278,000 tonnes, representing 25% of production and costing growers \$155 million annually. This figure includes crops that were grown to maturity and either not harvested or harvested and not marketed. The calculations take account of the value growers receive from alternative lower value uses for the crop such as processing using a stock food. The project produced six factsheets. Five of the fact sheets describe in detail potential alternative uses for vegetable waste. There is one factsheet detailing vegetable waste by crop. The six factsheets are listed here and can be downloaded by following the link below.

1. Summary of waste categories and amounts x crop
2. Biogas feasibility (*refer follow up project*)
3. Fish feed feasibility (*refer follow up project*)
4. Promoting health eating – more vegetables
5. Extraction of volatiles and flavour compounds
6. Extraction of antioxidants

Discipline: Agronomy/production/postharvest **Ends:** 30/04/2013
Project code: VG12046
Contact person: Gordon Rogers **Email:** gordon@ahr.com.au
Service provider: Applied Horticultural Research Pty Ltd
Extension materials: [Final report and factsheets](#)

Controlling multiple heading and transplant shock in lettuce

This project investigated the cause(s) of blindness in lettuce and produced a factsheet on how to minimise the issue in seeding production. The project also evaluated the use of additives at planting to reduce the impact of transplant shock in seedlings.

The key findings from both aspects of the project are presented in two separate factsheets. The first factsheet outlines the causes of blindness in the seedlings and describes how seedling growers can minimise blindness in lettuce seedling production. The second factsheet explains how transplant shock can be minimised by the drench of potassium in nitrate is transplanting. Both factsheets can be downloaded via the link below.

Discipline: Agronomy/production/postharvest **Ends:** 31/01/2016
Project code: VG12017
Contact person: Adam Goldwater **Email:** adam.goldwater@ahr.com.au
Service provider: Applied Horticultural Research Pty Ltd
Extension materials: [Final report, factsheets and Vegenotes](#)

Benchmarking uptake of soil health practices

This project reviewed the soil health program for the vegetable industry in Australia and includes recommendations for future research and extension required by growers in relation to managing the soils in a sustainable and profitable way. The project also directly surveyed 72 growers and collected their views on the major soil health issues, preferred communication styles and prioritised soil health issues for further study. The project also contains a list of relevant soil health publications and research outputs, and an analysis of vegetable cropping areas and production timeslots by region.

Discipline: Agronomy/production/postharvest **Ends:** 30/09/2012
Project code: VG11034
Contact person: Dr Gordon Rogers **Email:** gordon@ahr.com.au
Service provider: Applied Horticultural Research Pty Ltd
Extension materials: [Final report](#)

On-farm demonstration of controlled traffic farming for vegetables

This project outlines the use of controlled traffic cropping systems for vegetable production. The focus of the project is in Tasmania, especially on processing vegetables. It links to a larger DAFF funded project showcasing controlled traffic and deep organic matter use in vegetable crops. The project produced a factsheet and there are links to other relevant information below.

Discipline: Agronomy/production/postharvest **Ends:** 30/06/2013
Project code: VG10080
Contact person: John McPhee **Email:** john.McPhee@utas.edu.au
Service provider: Tasmanian Institute of Agriculture (TIA) - University of Tas
Extension materials: [Factsheet](#) [Link to other controlled traffic resources](#)

Issues facing vegetable production in peri-urban areas – review and scoping study

This project reviewed issues facing peri-urban vegetable production, and this will have relevance to groups operating in production areas close to large urban centres. The report is well written, and contains useful information.

Discipline: Agronomy/production/postharvest **Ends:** 15/07/2011
Project code: VG10059
Contact person: Charles Drew **Email:** srhs@srhs.com.au
Service provider: Scholefield Robinson Horticultural Services Pty Ltd
Extension materials: [Final report](#)

The production of baby-leaf lettuce under floating crop covers

This project investigated the use of floating row covers in the production of baby leaf lettuce, with a focus on south-east Queensland for the fresh-cut sector. Refer also to project **VG12108** which investigated the use of floating and on floating covers to exclude insects from leafy vegetables and produced a factsheet on managing insect contaminants. Refer to project **VG13075** which evaluated the use of floating row covers on leaf vegetables for frost protection and insect exclusion, and produced a factsheet called “Blankets for vegetables” on using floating row covers to minimise frost damage. These factsheets can also be downloaded from the link below.

Discipline: Agronomy/production/postharvest **Ends:** 31/05/2013
Project code: VG09188
Contact person: Robert Munton **Email:** robmunton2@optusnet.com.au
Service provider: Britton Produce
Extension materials: [Final report VegeNote and Factsheets](#)

Increasing energy efficiency and assessing an alternate energy option for Australian Protected Cropping

This project is focused on energy-efficiency in greenhouse production. The resource materials include a website with some information about saving energy and includes a link to an energy assessment tool for greenhouses.

Discipline: Agronomy/production/postharvest **Ends:** 30/05/2014
Project code: VG09124
Contact person: Joshua Jarvis **Email:** joshua.jarvis@dpi.nsw.gov.au
Service provider: NSW Dept of Primary Industries
Extension materials: [Final report and vegenote](#) [Website with factsheets](#)

Evaluation of vegetable washing chemicals

This project is about an evaluation of sanitisers for washing vegetable crops with a focus on processing. There is a report and a PowerPoint presentation available. Growers who produce leafy vegetables that are sold as pre-washed and ready-to-eat should consider using peroxyacetic acid-based sanitisers. However, these sanitisers are considerably more expensive and may contribute to a lower shelf-life of the product. The trials showed that electrified oxidised water to have superior efficacy to any of the other products tested, and extended product shelf-life.

Discipline: Agronomy/production/postharvest **Ends:** 31/05/2012
Project code: VG09086
Contact person: Robert Premier **Email:** robert.premier@consultant.com
Service provider: Global F.S.
Extension materials: [Final report and presentation](#)

Managing a greenhouse capsicum crop – interactive DVD demonstration and resource package

This project has produced resource information in relation to capsicum greenhouse production. The resources include fact sheets on essential knowledge, preparing and planting, managing the crop and an economic benefit cost analysis. There are also seven factsheets covering major technical areas including: nutrition, greenhouse design, pests and diseases (2), soil health management, irrigation and salinity. Follow the links below for more information.

Discipline: Agronomy/production/postharvest **Ends:** 31/03/2013
Project code: VG09070
Contact person: Trevor Linke **Email:**
Service provider: Trevor Linke
Extension materials: [Final report and list of resources](#) [Factsheets and videos](#)

Evaluating sweet potato varieties to meet market needs

The project assessed a range of sweet potato varieties in Qld to replace current standards. The most promising varieties were: *Evangeline* (gold sweet potato), *Southern Star* (white-fleshed sweet potato) and two new purple-fleshed cultivars *Eclipse* and *Philipino White*. For more details follow the links below.

Discipline: Agronomy/production/postharvest **Ends:** 31/01/2014
Project code: VG09009
Contact person: Rodney Wolfenden **Email:** Sandra.dennien@daff.qld.gov.au
Service provider: Australian Sweetpotato Growers Inc
Extension materials: [Final report](#)

Developing a sustainable soil management model to increase farmgate returns in Tasmania

A large number of soil properties and management practices were analysed against carrot and potato crop performance over a three-year period in Tasmania. Soil organic carbon, aggregate stability and soil type were found to have an influence on potato quality. On average, potatoes performed better when produced in red Ferrosol soils compared with other soil types.

Soils other than Ferrosols produced higher quality potatoes with higher organic carbon and aggregate stability levels. Sampling of paddocks using PCR testing revealed a good correlation between disease expression on washed tubers and the levels of soil DNA for black dot (*Colletotrichum coccodes*) and powdery scab (*Spongospora subterranea*). Relationships between carrot quality, sap nitrate and soil compaction were found in the first two seasons but not in year 3, probably due to extreme weather events in that year.

Discipline: Agronomy/production/postharvest **Ends:** 30/09/2011
Project code: VG08106
Contact person: Kevin Clayton-Greene **Email:** kevin@harvestmoon.com.au
Service provider: Harvest Moon
Extension materials: [Final report](#)

Design and demonstration of precision agriculture irrigation applied to different vegetable crops

The project found that using a pressure control retro-fitted system to a travelling gun irrigator showed an energy saving of 17–21.8% and water savings of 5–10%. With the proven savings in water expenditure and energy consumption displayed in the project, it is reasonable to estimate that the cost of the modified irrigation system could be recovered in 2–3 years. Variable rate irrigation (VRI) using a network of soil sensors and a modified linear move irrigator also led to water savings.

Discipline: Agronomy/production/postharvest **Ends:** 2/07/2012
Project code: VG08029
Contact person: Dr Susan Lambert **Email:** Susan.Lambert@utas.edu.au
Service provider: University of Tasmania
Extension materials: [Final report and vegenote](#)

Improving greenhouse systems and production practices (greenhouse production practices component) (Parent - VG07096)

A best-practice manual for conversion to simple hydroponics from soil-based production systems was developed in project VGO7144 and was released in August/September of 2012.

Demonstration sites exhibiting conversion to hydroponic systems were set up to compare yields and productivity with soil-based systems and facilitate communication with other growers – in some cases, yields were three to four times higher in simple hydroponic systems. Water use efficiency was also significantly higher when compared with soil-based crops. Hydroponic systems are often favoured for their high levels of efficiency in their utilisation of inputs including water, fertilisers, labour, land and energy.

Discipline: Agronomy/production/postharvest **Ends:** 29/02/2012
Project code: VG07144
Contact person: Barbara Hall **Email:** barbara.hall@sa.gov.au
Service provider: South Australian Research and Development Institute (SARDI)
Extension materials: [Final report and Vegenote](#)

Beetroot Stand Management

This project was aimed at evaluating new processing beetroot varieties with a view to increasing yield. Essentially, the project found new varieties were not significantly better than the current standard. Most of the varieties were globe-shaped, but a cylinder-shaped variety trialled yielded as well as the industry standard, and could be suitable for the industry except for the need to re-engineer the method of slicing. The details of the New South Wales-based trials are included in the project final report. See link below.

Discipline: Agronomy/production/postharvest **Ends:** 1/05/2012
Project code: VG06117
Contact person: Dr Donald Irving **Email:** donald.irving@dpi.nsw.gov.au
Service provider: NSW Dept of Primary Industries, an office of Dept of Industry
Extension materials: [Final report and VegeBites](#)

Data Analytics and App Technology to Guide On-Farm Irrigation

This project was contracted during 2016/17 to develop and improve a mobile phone application to help guide irrigations decisions on-farm. Growers can download the current version of the free app by searching it by name – ‘The Yield’ – in the Google Play or Apple App Store on mobile devices. It allows users to see evapotranspiration, rainfall and water balance data for the day, for the past week, and an estimate for the week ahead. It is expected that, ultimately, an iteration of the app will allow growers to enter a location, crop type and crop growth stage to get a quick and easy estimate of vegetable crop water use and soil water balance to help take away some of the uncertainty when it comes to knowing when and how much to irrigate.

Discipline: Production **Ends:** 31/07/2018
Project code: VG15054
Contact person: Ros Harvey
Service provider: The Yield Technology Solutions Pty Ltd
Extension materials: [App download for Android](#) [App download for Apple](#) [Project info](#)

Investigating novel glass technologies and photovoltaics in protected cropping

This project aims to improve energy-efficient design and energy use in greenhouses, with a focus on the use of smart glass and semi-transparent photovoltaic glass (STPVG). The project will begin with a review of existing and in-development smart glass and STPVG technologies, prior to trials to assess their use and value under Australian conditions.

Discipline: Production **Ends:** 1/04/2017
Project code: VG15038
Contact person: Baohua Jia **Email:** bjia@swin.edu.au
Service provider: Swinburne University of Technology
Extension materials: [Project details](#) [Review summary](#)

Optimising the benefits of vermiculture in commercial-scale vegetable farms

This three-year project will identify practical and cost-effective ways vegetable growers can use earthworms and vermiculture products in their growing systems. Vegetable growers at sites across Australia will be involved in field research over the next three years, and the project managers would like to hear from interested growers.

Discipline: Production **Ends:** 1/04/2018
Project code: VG15037
Contact person: Bill Grant **Email:** bill.grant@blueenvironment.com.au
Service provider: Blue Environment Pty Ltd and SESL
Extension materials: [Project details](#) [Website](#) [Factsheet](#)

Advanced greenhouse horticulture research facility designed for research, education and training.

With a bold vision to enhance national and international food security for an energy and water constrained future, this new facility will help Australian growers tap into the latest research and practices within greenhouse crop production to make their operations more efficient, and meet the increased demand for fresh food that can be delivered quickly to markets. The facility has a strong education and training focus, working in partnership with industry and TAFE to produce career-ready graduates through engaged learning, projects and research in their studies. Learnings will also be shared with industry.

Discipline: Agronomy/production/postharvest **Ends:** 30/12/2016
Project code: MT13041
Contact person: Prof Deborah Sweeney **Email:** D.Sweeney@westernsydney.edu.au
Service provider: University of Western Sydney
Extension materials: [Website](#)

Precision Seeding Benefits for Processing Pea Production

This project commenced in late 2016 and will help improve the productivity and profitability of processing peas in Tasmania specifically, to underpin an industry average yield of eight tonnes/hectare. It will evaluate stand density and plant spatial arrangements, and explore ways to modify plant structure from single to multiple stems at establishment to increase overall number of pods on the first and second nodes that flower (these are the nodes which contribute to over 90 per cent of overall yield). The project will also evaluate commercial seeders and establishment practices.

Discipline: Production **Ends:** 31/03/2018
Project code: VG15039
Contact person: Alistair Gracie **Email:** Alistair.Gracie@utas.edu.au
Service provider: University of Tasmania
Extension materials: [Article](#) [Factsheet](#)

The Effects of Using Anhydrous Ammonia to Supply Nitrogen to Vegetable Crops

This project reviews the use of anhydrous ammonia in vegetable crops in Australia, and provides an observational trial comparing anhydrous ammonia with calcium nitrate.

Anhydrous ammonia is supplied in Australia by Incitec- Pivot Fertilisers, predominantly to the cotton and grain industries, and supply locations are focused around the areas these crops are produced.

Anhydrous ammonia can have beneficial effects on soil microbes, nitrifying bacteria and worms. It can also increase N retention in the soil, reducing nitrate leaching, resulting in yield and nitrogen-use-efficiency benefits.

Discipline: Production **Ends:** 31/11/2016
Project code: VG15062
Contact person: Adam Harber **Email:** adam.harber@ahr.com.au
Service provider: Applied Horticultural Research Pty Ltd
Extension materials: [Factsheet and final report](#) [Website](#)

Evaluating and testing autonomous systems developed in VG15003 in Australian vegetable production systems

A key facet of this project is to help translate the research done to date into tangible commercial outcomes for end users. This will involve undertaking economic, market and IP evaluations of these technologies in order to define potential commercial pathways, along with identifying potential commercial partners.

This project will also involve designing, building, demonstrating and evaluating robotic platforms and utilising them across varied growing regions to prove operational effectiveness.

Discipline: Production **Ends:** 21/06/2021
Project code: VG15059
Contact person: Salah Sukkarieh **Email:** salah.sukkarieh@sydney.edu.au
Service provider: The University of Sydney
Extension materials: [Project details and event updates](#) [YouTube video](#)

Adoption of precision systems technology

This is a new project to support the vegetable industry in adopting precision agriculture technologies. Industry investment in machine guidance and controlled traffic systems means it is primed to develop and optimise precision approaches. The project will develop case-study farms in each state for research and extension, including training events and field days, and will develop video and fact-sheet resources to showcase potential applications of relevant precision technologies.

Discipline: Production **Ends:** 31/12/2019
Project code: VG16009
Contact person: Rod Edmonds **Email:** rod.edmonds@daf.qld.gov.au
Service provider: The Department of Agriculture and Fisheries (DAF)
Extension materials: [Webinar recording](#) [Articles](#)

New Breeding Technologies and opportunities for Australian vegetable industry

Plant breeding technologies available for the improvement of vegetable and other crop plants are advancing rapidly. This study considered the current status of the Australian vegetable industry in relation to New Breeding Technologies (NBTs) is outlined, and a wide range of industry and researcher consultations were undertaken.

Leading Australian researchers working on NBTs for plant improvement are, in general, strongly positive regarding the potential of NBTs to contribute to Australian vegetable production. Vegetable seed merchants and breeders held a more conservative but open stance toward NBTs. Breeders believed that growers were much more focused on the performance of a variety in the field than on the technology used to develop it. Leading growers were less positive on the potential for NBTs to contribute to the Australian vegetable industry. The major concern was consumer acceptance, followed by the cost of applying NBTs to the relatively small vegetable market in Australia.

The final report outlines these perceptions from vegetable industry stakeholders, as well as current regulatory systems covering NBTs.

Discipline: Production **Ends:** 30/06/2017
Project code: VG16010
Contact person: Michael Jones **Email:** m.jones@murdoch.edu.au
Service provider: Murdoch University
Extension materials: [Final report](#) [Factsheet](#)

Developing technical guidelines and a best practice extension toolbox for greenhouse construction and safe operation

This project has developed a suite of information in relation to building and operating greenhouses and other grow structures for growers and the vegetable protected cropping industry. The resources are housed at www.greenhousetoolbox.com and include fact sheets on:

- Safe management practices, including fire prevention and working at heights
- Local government approval processes
- Design requirements and considerations
- Access and egress requirements
- Other issues and common grower concerns.

The project also developed a national greenhouse standard for inclusion in Australia's National Construction Code (NCC).

Discipline: Production **Ends:** 22/05/2017
Project code: VG16004
Contact person: Marcel Olivotto **Email:** marcel.o@osbornconsulting.com.au
Service provider: Osborn Consulting Engineers Pty Ltd
Extension materials: [Website](#) [VegeNotes](#)

Improving processing vegetable yields through improved production practices

This project aims to improve production practices for Australia's vegetable processing industry. The first part of the project involves reviewing current production practices and identifying new innovations that could be implemented to increase productivity or reduce input costs. The second phase of the project involves field trials of key innovations.

Five factsheets have been produced, and include research findings and recommendations on:

- Maximising uniformity at harvest maturity in processing broccoli
- Optimising crop establishment in processing carrots
- Sclerotinia rot of green beans
- Irrigation management in sweet corn
- Winter crane fly

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|-----------------------------|--|---------------|--|
| Discipline: | Production | Ends: | 10/09/2017 |
| Project code: | VG16011 | | |
| Contact person: | Sue Hinton | Email: | sue.hinton@utas.edu.au |
| Service provider: | University of Tasmania | | |
| Extension materials: | Factsheets and VegeNotes | | |

Optimising cover cropping for the Australian Vegetable Industry

This project delivers research and extension on cover crops and practical agronomy to maximise their benefit for Australian vegetable growers. There are 7 cover crop trial sites, which include NSW, Tas, Vic, SA, WA and Qld. Trials will consider practices to better integrate cover crops into production systems, the potential to build disease suppressive soils, biofumigation and the impact on weeds. There will be a number of regional guides produced in years 2-3, as well as webinars, farm walks and videos. There will also be a series of practical cover crop coaching clinics to help growers integrate cover crops in to their farms.

The project is looking for growers to host short-term cover crop demonstration sites.

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| Discipline: | Production | Ends: | 15/07/2020 |
| Project code: | VG16068 | | |
| Contact person: | Kelvin Montagu | Email: | kelvin.montagu@gmail.com |
| Service provider: | AHR, QDAF, TIA, UNE | | |
| Extension materials: | Factsheets, videos, and casestudies | | |

On farm evaluation of vegetable seed viability using non-destructive techniques

This project commenced in early 2017 and will conduct a comprehensive review of the range of available technologies that may assist the Australian vegetable industry screen seed viability on farm. It will provide recommendations identifying fit-for-purpose situations where certain technologies would be best applied to the Australian vegetable industry.

Additionally, it will provide recommendations for the development of novel technologies via new R&D investment/s with the potential for real time grading of seed for viability pre planting.

Extension and communication materials will be produced and presented to industry.

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| Discipline: | Production | Ends: | 28/07/2017 |
| Project code: | VG16028 | | |
| Contact person: | Jitka Kochanek | Email: | j.kochanek@uq.edu.au |
| Service provider: | The University of Queensland | | |
| Extension materials: | Final report summary | VegeNotes | |

Gap Analysis and Economic Assessment for Protected Cropping Vegetables in Tropical Australia

While there has been significant expansion of protected cropping production systems in Australia, much of this growth has been in the country's temperate regions. Beginning in March this year, this six-month project will increase awareness of, and information about, protected cropping opportunities and technology options specifically for the vegetable industry in Australia's tropics. It will identify gaps in current information, and assess the practical and economic viabilities of protected cropping options in these regions.

As well as providing decision-making information to growers and other industry stakeholders, it is expected the project will help in the prioritisation of future R&D efforts for the industry.

Discipline: Production **Ends:** 1/09/2017
Project code: VG16024
Contact person: Elio Jovicich **Email:** elio.jovicich@daf.qld.gov.au
Service provider: The Department of Agriculture and Fisheries (DAF)
Extension materials: [Final report and VegeNotes](#)

Protected Cropping - Literature Review and Gap Analysis for Levied Vegetables

This project set out to better understand the R&D needs of the levy-paying component of the protected cropping sector. It involved an extensive literature review and gap analysis of protected cropping research needs. Light levels and condition, root zone management, biostimulates, pollination and the real-time monitoring of plant conditions were just some of the research gaps identified as part of the project, and are set to inform future investments in the protected cropping space.

Discipline: Production **Ends:** 1/08/2017
Project code: VG16083
Contact person: Kelvin Montagu **Email:** kelvin.montagu@gmail.com
Service provider: EcoXchange Pty Ltd trading as Colo Consulting
Extension materials: [VegeNotes](#) [0](#)

Research and Operations to Trial Innovation Glass and Photovoltaic Technologies in Protected Cropping

This project follows on from the results of the review conducted in VG15038. The project involves the real-world assessment of smart glass, STPVG and STC on plant growth, physiology, crop yield and quality, using the state-of-the-art glasshouse research facility at Western Sydney University.

Discipline: Production **Ends:** 11/05/2020
Project code: VG16070
Contact person: David Tissue **Email:** d.tissue@westernsydney.edu.au
Service provider: University of Western Sydney
Extension materials: [0](#) [0](#)

Stingless Bees as Effective Managed Pollinators for Australia Horticulture

This project will develop the use of stingless bees as alternate pollinators to honeybees for horticultural crops. Existing research on stingless bees will be reviewed, and studies will be undertaken with stingless bees on a range of fruit and vegetable crops to test their effectiveness. Vegetable crops will include glasshouse solanaceous and cucurbit crops.

Discipline: Production **Ends:** 30/8/2022
Project code: PH16000
Contact person: James Cook **Email:** james.cook@westernsydney.edu.au
Service provider: University of Western Sydney
Extension materials:

National Vegetable Protected Cropping Centre

With a bold vision to enhance national and international food security for an energy and water constrained future, this new facility will help Australian growers tap into the latest research and practices within greenhouse crop production to make their operations more efficient, and meet the increased demand for fresh food that can be delivered quickly to markets. The facility has a strong education and training focus, working in partnership with industry and TAFE to produce career-ready graduates through engaged learning, projects and research in their studies. Learnings will also be shared with industry.

Discipline: Production **Ends:** 30/06/2022
Project code: VG17003
Contact person: Ian Anderson **Email:** i.anderson@westernsydney.edu.au
Service provider: University of Western Sydney
Extension materials: [Vegetables](#)
[Australia](#) [Website](#)
[article](#)

Soil Wealth and Integrated Crop Protection - Phase 2

The new combined project delivering the next phase of both the Soil Wealth and ICP programs will respond to increasing economic, consumer, environmental and technological demands on vegetable producers. It will deliver integrated, independent, research-based information to growers and advisers to support business decisions on soil management and plant health.

The project will be guided by four themes:

- proactively scanning and reviewing new technological developments and presenting this information to growers;
- taking a production systems approach reflecting the increase in challenges and sophistication of vegetable farming;
- innovations in soil and crop health management which can increase productivity and/or reduce costs; and
- improving sustainability and robustness of vegetable farming systems, especially under adverse conditions (including the impacts of increased climate variability).

Discipline: Agronomy and Pest/disease **Ends:** 1/12/2020
Project code: VG16078
Contact person: Gordon Rogers **Email:** gordon@ahr.com.au
Service provider: Applied Horticultural Research Pty Ltd
Extension materials: [Summary of program](#) [Website](#)

Pest and Disease Management

Facilitating adoption of IPM through a participatory approach with local advisors and industry

This project aims to demonstrate IPM in commercial vegetable crops in order to give advisors (chemical resellers as well as independent pest management advisors) more confidence in IPM. Angelica Cameron and Paul Horne from IPM Technologies are running initial theory training sessions and then in-field demonstrations on the farms of collaborating growers. These activities are backed up by regular phone and email support as required for each advisor or farmer, to help them with the IPM decision-making process week-by-week

This project has four components there is an IPM training component led by IPM Technologies Pty Ltd (Dr Paul Horne), a coordination component led by AUSVEG SA, an evaluation component led by clear horizon consulting and with a parent project led by Horticulture Innovation Australia. For more information about this project contact Hort Innovation or Paul Horne of IPM Technologies Pty Ltd.

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| Discipline: | Pest and disease | Ends: | 28/02/2019 |
| Project code: | VG15033-VG15036 | | |
| Contact person: | Paul Horne | Email: | paul@ipmtechnologies.com.au |
| Service providers: | AUSVEG SA, IPM Technologies, Clear Horizon Consulting Pty Ltd and Hort Innovation Australia. | | |
| Extension materials: | Case study videos: https://vimeo.com/302539603/33f95975ef https://vimeo.com/302169280/0d7b57b45f https://vimeo.com/302016877/e747a877aa | | |

Improved management options for cucumber green mottle mosaic virus

This project is being run by the Northern Territory Department of Primary Industries and is researching control and management of cucumber green mottle mosaic virus. For more information about this project contact the NT Department Primary Industry & Fisheries or Greg Owens from NT Farmers.

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| Discipline: | Pest and disease | Ends: | 18/01/19 |
| Project code: | VG15013 | | |
| Contact person: | Greg Owens (info only) | Email: | edm@ntfarmers.com.au |
| Service provider: | Department of Primary Industry & Fisheries, NT | | |
| Extension materials: | Factsheet | Website | |

A multi-faceted approach to soil-borne disease management

This three-year project aims to provide Australian vegetable growers with the tools, information and skills they need to manage the risk of crop losses due to soil-borne disease in the major vegetable growing regions in Australia. There are five soil-borne disease groups that continue to be a major problem for Australian vegetable growers: *Sclerotinia* spp. (*S. sclerotiorum* and *S. minor*); *Fusarium* spp.; (*F. oxysporum* and *F. solani*), water moulds (primarily *Pythium* spp.), nematodes and *Rhizoctonia* spp. The project, being run jointly between RMCG and AHR are delivering an effective soil-borne disease management service to Australian growers, utilising the successful extension and delivery framework already developed under the Soil Wealth and Integrated Crop Protection projects. A best practice guide is being developed.

Five videos have been produced, including:

- [Summer root rot](#)
- [Club root](#)
- [Bottom rot](#)
- [Black rot](#)
- [Big Vein](#)

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|-----------------------------|---------------------------------------|------------------------|--|
| Discipline: | Pest and disease | Ends: | 1/11/2018 |
| Project code: | VG15010 | | |
| Contact person: | Gordon Rogers | Email: | gordon@ahr.com.au |
| Service provider: | RMCG + Applied Horticultural Research | | |
| Extension materials: | Vegenote | Videos | Factsheets, videos, webinars, training, demo sites on Soil Wealth website. |

Improved soil-borne disease diagnostic capacity for the Australian Vegetable Industry

This project is being run by the SARDI who developed the PreDicta B molecular soil tests for the detection and quantification of soil-borne disease organisms for cereals. The project will focus on the development of molecular diagnostic probes for the identification of soil-borne disease for vegetables. The focus will be on developing new diagnostic techniques for club root in brassicas and cavity spot disease in carrots. In addition there will be calibration studies undertaken on a wider range of soil-borne disease organisms that affect vegetable crops, including *Sclerotinia*, *Fusarium*, *Pythium*, *Rhizoctonia* and nematodes. The project is coordinating with VG15010.

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| Discipline: | Pest and disease | Ends: | 6/12/2018 |
| Project code: | VG15009 | | |
| Contact person: | Michael Rettke | Email: | Michael.Rettke@sa.gov.au |
| Service provider: | South Australian Research and Development Institute (SARDI) | | |
| Extension materials: | | | |

Viruses of national importance to the vegetable industry

This project is a desktop review, considering viruses of national importance in relevant leviabile vegetable crops. It covers aspects of virus epidemiology such as host range, transmission rates and mechanisms, influencing factors (e.g. environmental factors), diagnostic capacity and potential management options. The review includes a prioritisation of future R&D in this area, considering potential for improvements in management practices of viruses of national importance and reduction of impacts of these viruses that would contribute to improvements in productivity and profitability of vegetable production in Australia.

Discipline: Pest and disease **Ends:** 25/01/2017
Project code: VG15008
Contact person: Byron de Kock (HIA) **Email:** byron.dekock@horticulture.com.au
Service provider: The Department of Agriculture and Fisheries (DAF)
Extension materials: [Vegenotes](#) [Final report](#)

Innovative solutions to management of tospoviruses of vegetable crops

This project aims to address gaps in DNA sequence information for Australian tospoviruses, which infect a broad range of horticulture crops. This information is critical for the development of diagnostics and for management. The project also aims to generate information on host-pathogen interactions that may lead to identification of novel genes for resistance and help deliver broad-spectrum resistance to tospoviruses.

Discipline: Pest and disease **Ends:** 28/05/2018
Project code: VG14063
Contact person: Neena Mitter **Email:** n.mitter@uq.edu.au
Service provider: The University of Queensland
Extension materials:

Management and detection of bacterial leaf spot in capsicum and chilli crops

This project aims to increase the capacity of the vegetable industry to implement integrated disease management programs for bacterial leaf spot of capsicum and chilli field crops. It identified causal agents of the disease, reviewed existing research, and aimed to fill knowledge gaps, and investigate control measures. Key findings included:

- The testing of Australian isolates revealed all of the pathogens were tolerant to highly tolerant of copper. The researchers report that “copper may still have some role in management of bacterial leaf spot, however, alternative methods are needed to address the ineffectiveness of using copper alone.”
- Essential oils may be a suitable avenue of alternative treatments, with the researchers noting that preliminary testing indicated oils tested had a strong antibacterial effect against *X. vesicatoria* and *X. euvesicatoria*, both as volatile gases and through direct contact. Further work is needed to explore this area.
- Management of bacterial leaf spot – apart from the use of resistant lines where possible – includes heat treatment of seed to prevent primary introduction of pathogens into crops and to mitigate the risk of introduction of new bacterial races, which may circumvent existing plant host resistance genes.

Discipline: Pest and disease **Ends:** 31/05/2018
Project code: VG14010
Contact person: Denis Persley **Email:** denis.persley@daff.qld.gov.au
Service provider: The Department of Agriculture and Fisheries (DAF)
Extension materials: [Vegetables Australia article](#)

Field Guide to Tropical Pests and Diseases in print

This field guide covers pests and diseases of a wide range of vegetable crops with a focus on the Northern Territory. It is comprehensive, contains many photographs and has been produced in English and Vietnamese. The guide is available in hard copy and also print-quality PDF versions of this guide are available from the Northern Territory Department of Primary Industries and Fisheries or by following the link.

Discipline: Pest and disease **Ends:** 1/06/2015
Project code: VG13114
Contact person: Greg Owens **Email:** greg@ntfarmers.org.au
Service provider: Department of Primary Industry & Fisheries, NT
Extension materials: [Field guide](#)

Effective management of parsley summer root rot

Parsley summer root rot (SRR) affects all parsley-growing regions of Australia, and can lead to crop losses of up to 100 per cent. Running from 2014 and now concluded, this study aimed to determine the causal pathogens of SRR and to understand the disease's epidemiology, particularly in relation to environmental conditions and practices. It also aimed to develop robust and integrated disease management strategies. Research from this project confirmed that *Pythium sulcatum* is the most important cause of parsley SRR. This knowledge means growers can now apply more appropriate and effective management strategies targeting the pathogen. It was also found that longer crop rotations are needed in soil-based parsley production systems, particularly on farms where other apiaceous crops are grown.

Discipline: Pest and disease **Ends:** 31/07/2017
Project code: VG13101
Contact person: Len Tesoriero **Email:** len.tesoriero@dpi.nsw.gov.au
Service provider: NSW Dept of Primary Industries
Extension materials: [Presentation](#)

Summer root rot in parsley scoping study

Previous investigations into root rots in parsley crops have largely focused on winter root rots caused by *Pythium* and *Phytophthora*, and not summer root rots. The incidence of summer root rots is variable, growers do not know when they will lose a crop to summer root rot, and crop losses of up to 90% or greater can occur.

Summer roots generally occur after a period of increased irrigation applications or a significant rainfall event. *Fusarium* was identified as the only common root rot pathogen identified in all three plant and soil samples, which underwent plant pathology assessment. For more information see the final report below. There is a follow-on project (VG13101) investigating control methods (see next panel).

Discipline: Pest and disease **Ends:** 1/07/2013
Project code: VG12102
Contact person: Stuart Grigg **Email:** stuart@sgaghortconsulting.com.au
Service provider: Stuart Grigg Ag-Hort Consulting Pty Ltd
Extension materials: [Final report and vegenote](#)

Weed management for the vegetable industry –scoping study

This project is a review of weed management for the vegetable industry. The final report from the project is available by following the link below. There is now a follow-on project that is being conducted by Paul Kristiansen which covers both research and extension in relation to weed management for Australian vegetable growers. At this stage people should contact Paul Kristiansen directly in relation to this project. There is a webinar and presentation by Paul available via the soil wealth website, and can be accessed by clicking on the link below.

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|-----------------------------|------------------------------|---------------|--|
| Discipline: | Pest and disease | Ends: | 4/08/2014 |
| Project code: | VG13079 | | |
| Contact person: | Paul Kristiansen | Email: | paul.kristiansen@une.edu.au |
| Service provider: | University of New England | | |
| Extension materials: | Final report | | Weed management webinar and resources |

Integrated crop protection: Extension of integrated crop protection information

This project is focused on communicating information about pest, disease and weed management to vegetable growers and their advisers. It is being run in collaboration with the soil wealth project jointly by applied horticultural research and RMCG. Topics covered include: weeds, pest management, disease management, soil-borne disease, pesticide application, integrated pest management (IPM). This is being achieved through a combination of training, webinars, factsheets, videos and field demonstration. All this information is available on the innovative crop protection website by following the link below. The resources on the *Integrated Crop Protection* website is a key input for the VegNET project.

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|-----------------------------|---|---------------|--|
| Discipline: | Pest and disease | Ends: | 31/05/2017 |
| Project code: | VG13078 | | |
| Contact person: | Anne-Maree Boland | Email: | anne-mareeb@rmcg.com.au |
| Service provider: | RMCG + Applied Horticultural Research | | |
| Extension materials: | Resources on SW/ICP website | | |

Double knock low dose fenthion treatment of zucchinis as a quarantine treatment against cucumber fly

A new method of applying fenthion to acquire quarantine security was devised by Hannay-Douglas Pty Ltd using a much lower concentration of fenthion (100mg/L) but applied twice (24h apart). This ensures residues that are well below the maximum residue limit stipulated by the APVMA. This report describes the results of efficacy tests of this prototype treatment carried out on the main quarantine fruit fly pest of zucchinis, the cucumber fly (*Bactrocera cucumis*, French). The data generated in this project would be used to support a local registration or permit from APVMA. Refer to the report for further details.

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| Discipline: | Pest and disease | Ends: | 1/07/2014 |
| Project code: | VG13066 | | |
| Contact person: | Andrew Jessup | Email: | andrew.jessup@dpi.nsw.gov.au |
| Service provider: | NSW Dept of Primary Industries | | |
| Extension materials: | Final report | | |

Identification of potential alternatives to metham sodium

Metham sodium (MS) is a broad-spectrum fumigant used to control a variety of soil-borne pests and diseases including nematodes, fungi, insects and weeds. The project has produced a factsheet which outlines the alternatives to meet them sodium. The factsheet (link below) proposes an integrated crop protection approach involving: biofumigation; proven amendments or "soil/plant health enhancers"; rotation or break crops such as seed crops / pasture breaks, and biocides/biological control.

Discipline: Pest and disease **Ends:** 5/05/2014
Project code: VG13045
Contact person: Doris Blaesing **Email:** dorib@rmcg.com.au
Service provider: RMCG
Extension materials: [Final report and factsheet](#)

Fruit Fly research: Gap analysis

This project reviewed current methods available for managing fruit flies in vegetable crops. The two highest priorities for in-field control research were the use of perimeter baiting and exclusion netting. Exclusion of flies from a production area by physical or chemical means is certainly the best strategy in fruit fly management. If successfully applied, they avoid any need to treat the products in-field or add damaging and costly postharvest treatments. As such measures effectively produce a pest-free place of production (PFPP) they are also likely to be accepted for domestic market access. The methods for managing fruit fly identified in this project are now being evaluated a subsequent project VG13042 (see below).

Discipline: Pest and disease **Ends:** 20/02/2015
Project code: VG13040
Contact person: Jenny Ekman **Email:** jenny.ekman@ahr.com.au
Service provider: Applied Horticultural Research Pty Ltd
Extension materials: [Final report](#)

New in-field treatment solutions to control Fruit Fly (1)

This project successfully demonstrated a combination of perimeter protein baiting and male annihilation technique, applied on a farm-wide scale, for control of fruit fly in a commercial chilli crop. When assessed on a small scale under high fruit fly pressure this system was less effective, but successful control was achieved during winter when pressure was low. The project also evaluated alternative chemical options to dimethoate and fenthion for Queensland fruit fly and cucumber fly, and has developed data on seasonal fruit fly activity.

Discipline: Pest and disease **Ends:** 18/05/2017
Project code: VG13041
Contact person: Lara Senior **Email:** Lara.Senior@daf.qld.gov.au
Service provider: The Department of Agriculture and Fisheries (DAF)
Extension materials: [Final report](#)

New in-field treatment solutions to control Fruit Fly (2)

This project has evaluated the use of perimeter baiting and exclusion netting for the control of fruit fly in vegetable crops, particularly capsicum. The results of these trials are presented in the form of five short videos aimed at explaining these techniques to growers. There is also a printed best practice guide that is free on request from AHR. Videos are available from the link below or AHR YouTube Channel and are:

- Video 1 Life cycle
- Video 2 Monitoring
- Video 3 Food-based baits
- Video 4 Male annihilation and Mass trapping
- Video 5 Netting and repellent

Discipline: Pest and disease **Ends:** 31/01/2017
Project code: VG13042
Contact person: Jenny Ekman **Email:** jenny.ekman@ahr.com.au
Service provider: Applied Horticultural Research Pty Ltd
Extension materials: [Videos, best practice guide and final report](#)

Adaptive pest management for horticulture under climate change – pilot pest scoping

The two case studies were silverleaf whitefly (*Bemisia tabaci*) in Bundaberg and diamondback moth (*Plutella xylostella*). Both pests were modelled to explore how their climate suitability might change under climate change scenarios. We found that both pests could increase the number of lifecycles they can complete each year by approximately 50%. The report made three recommendations:

1. Determine if it is feasible to make periodic assessments of pest densities (e.g. every 5 years) to monitor how pest abundance changes over time
2. Investigate the reasons for poor adoption of existing pest management recommendations
3. Improve grower understanding of the nature of climate changes and no regrets options for adapting management practices to changing conditions.

Discipline: Pest and disease **Ends:** 31/07/2014
Project code: VG13029
Contact person: Darren Kriticos **Email:** darren.kriticos@csiro.au
Service provider: CSIRO Climate Adaption Flagship
Extension materials: [Final report](#)

Alternative options to Fenthion and Dimethoate education project

This was an education project aimed at informing Australian vegetable growers about alternatives to Dimethoate and Fenthion, which are used to control Queensland fruit fly in Australia. The link to the project report contains useful resource information and a PowerPoint presentation about current alternatives to these two insecticides.

Discipline: Pest and disease **Ends:** 1/09/2012
Project code: VG11031
Contact person: Jessica Lye **Email:** jessica.lye@ausveg.com.au
Service provider: AUSVEG Ltd
Extension materials: [Final report](#)

Updating and republishing valuable vegetable industry resources

This project has resulted in the publication of five pest and disease identification unit guides covering:

- Pests, Diseases and Disorders of Carrots, Celery and Parsley
- Pests, Diseases and Disorders of Sweet Corn
- Pests, Diseases and Disorders of Sweetpotato
- Pests, Diseases and Disorders of Brassicas
- Pests, Diseases and Disorders of Babyleaf Crops

The project has also developed a pest and disease identification app called **VegPestID** which can be downloaded for Android or Apple phones and tablets from the Play Store or App Store, or using the link below.

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| Discipline: | Pest and disease | Ends: | 30/04/2015 |
| Project code: | VG12087 | | |
| Contact person: | Gordon Rogers | Email: | gordon@ahr.com.au |
| Service provider: | Applied Horticultural Research Pty Ltd | | |
| Extension materials: | Ute Guides | | Veg Pest ID App |

Innovating new virus diagnostics and planting bed management in the Australian sweet potato industry

This project has developed grower guides and five factsheets, which are outlined below and can be accessed by the following link on this page.

1. Sweet potato viruses and phytoplasmas in Australia, worldwide, and their current methods of detection
2. Managing sweet potato plant beds in Australia
3. Sweet potato sample collection and virus diagnostic protocol
4. Managing sweet potato viruses in Australia
5. Managing sweet potato plant beds in Australia
6. What is Sweet potato chlorotic stunt virus (SPCSV)?

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| Discipline: | Pest and disease | Ends: | 31/03/2018 |
| Project code: | VG13004 | | |
| Contact person: | Sandra Dennien | Email: | Sandra.dennien@daff.qld.gov.au |
| Service provider: | Australian Sweetpotato Growers Inc | | |
| Extension materials: | Factsheets, grower guide and reviews and final report | | |

Low dose methyl bromide treatment of capsicum to control fruit fly

This project investigated the use of low-dose methyl bromide treatment of capsicums to control Queensland fruit fly. We were unable to find a final report or any extension materials produced, however this project appears to have direct relevance to the Australian capsicum growers. We suggest contacting Queensland Department of Agriculture and fisheries in if you are seeking more information about this project.

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| Discipline: | Pest and disease | Ends: | 28/02/2014 |
| Project code: | VG10126 | | |
| Contact person: | ? | Email: | |
| Service provider: | The Department of Agriculture and Fisheries (DAF) | | |
| Extension materials: | | | |

Management of insecticide resistance in the green peach aphid

Green peach aphid is a widespread and damaging pest in a broad range of horticultural crops, and for effective management growers should:

- Have resistance management strategies in place for this pest. High levels of resistance to synthetic pyrethroids, carbamates and organophosphates are widespread across Australia
- Due to the way aphids reproduce, resistant individuals can soon dominate a landscape with widespread use of the same insecticide
- Incorporating non-chemical control methods is critical to GPA management.

More information is available from the VegeNote available below.

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| Discipline: | Pest and disease | Ends: | 30/09/2016 |
| Project code: | VG12109 | | |
| Contact person: | Paul Umina | Email: | pumina@unimelb.edu.au |
| Service provider: | Cesar Pty Ltd | | |
| Extension materials: | VegeNote and final report | | |

Improving the management of insect contaminants in processed leafy vegetables

Insect contaminants in harvested leafy vegetable crops is a major source of rejection for Australian vegetable growers. This project, conducted in collaboration with one harvest, assessed the effectiveness of ways to remove insect contaminants from leafy vegetables, especially baby leaf spinach and lettuce. The findings are outlined in this practice guide which can be accessed via the link below.

The most effective practices were:

- Remove from the crop prior to harvest by using a combination of blowers, chains in the crop and shaking tables
- Removing moths from crops using the Vortex insect trapping system prior to harvest
- Floating row covers as a physical barrier to exclude insects
- Low toxicity, short withholding period insecticides can be also be beneficial
- Removing insects from leafy vegetables in the field is better than removing them on the processing line
- dead insects (moths) were easier to remove in the processing line than live moths.

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| Discipline: | Pest and disease | Ends: | 30/11/2015 |
| Project code: | VG12108 | | |
| Contact person: | Gordon Rogers | Email: | gordon@ahr.com.au |
| Service provider: | Applied Horticultural Research Pty Ltd | | |
| Extension materials: | Best practice guide, VegNote and Final Report | | |

Plant Health desktop study

Key study - resource lists all VG Plant Health Projects - key document to assist locate previous R&D recommend all NVEN staff read the review. Also available is the detailed database of all previous crop protection projects, and economic evaluation tool spreadsheet and instruction guide and a separate document which outlines the smart phone apps that are available to assist in managing vegetable crop protection. The implementation of this strategy has been achieved through the integrated crop protection project (VG 13070) and the soil wealth project (VG 13076). Refer to the Soil Wealth/ICP website link below for more information.

Discipline: Pest and disease **Ends:** 30/04/2013
Project code: VG12048
Contact person: Doris Blaesing **Email:** dorisb@rmcg.com.au
Service provider: RMCG
Extension materials: [Review report, database, SmartPhone Apps, EVA tool](#) [ICP Website](#)

Review of Soil-borne Disease Management in Australian Vegetable Production

This is a key study in relation to managing soil-borne disease in vegetable crops in Australia. This study reviews all previous work in relation to soil-borne disease management and research as of 2012, in Australia. The report should be seen as a significant resource document, and should be downloaded and read by all NVEN staff. This study informed the new soil borne disease project (VG15010) which is currently involved in research and extension in vegetable soil borne disease in Australia. Highly recommended as a resource document.

Discipline: Pest and disease **Ends:** 30/09/2012
Project code: VG11035
Contact person: Prue McMichael **Email:** srhs@srhs.com.au
Service provider: Scholefield Robinson Horticultural Services Pty Ltd
Extension materials: [Final report](#)

Developing a strategy to control Anthracnose in lettuce

The project reviewed current Australian and international best practice in relation to managing anthracnose in head lettuce, with a focus on iceberg and cause lettuce. The project included an industry consultation workshop with input from Australian plant pathologists, the vegetable seed industry, processors and major vegetable growers in Australia. The results of the review and industry consultation are presented in a fact sheet which is available via the link below, and also via the ICP website.

Discipline: Pest and disease **Ends:** 30/11/2011
Project code: VG10123
Contact person: Gordon Rogers **Email:** gordon@ahr.com.au
Service provider: Applied Horticultural Research Pty Ltd
Extension materials: [Final report and factsheet](#)

Management of virus diseases in vegetables

No final report or extension materials except for the VegeNote (link below) could be located for this project. We suggest contacting the project leader for more information.

This project reviewed control measures for viral diseases in capsicum and cucurbit crops in Australia. Diseases covered included cucumber mosaic virus (CMV), zucchini yellow mosaic virus in WA, Tomato spotted wilt virus (TSWV) in greenhouse grown capsicum in Adelaide. Tolerant zucchini varieties were identified for Gatton, Queensland, producing up to 90% marketable fruit compared to susceptible varieties (20% marketable). Biological control of thrips is reducing TSWV in Adelaide. Control should also include planting upwind from existing crops to reduce insect vector movement and destroying harvested, infected crops prior to planting new crops.

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| Discipline: | Pest and disease | Ends: | 28/02/2014 |
| Project code: | VG10104 | | |
| Contact person: | Denis Persley | Email: | denis.persley@daff.qld.gov.au |
| Service provider: | The Department of Agriculture and Fisheries (DAF) | | |
| Extension materials: | VegeNote | | |

Breeding Capsicum for tospovirus resistance

No information or final report could be located for this project. We recommend contacting the Queensland Department of Agriculture and Fisheries for more information.

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| Discipline: | Pest and disease | Ends: | 1/05/2016 |
| Project code: | VG10081 | | |
| Contact person: | Des McGrath | Email: | |
| Service provider: | The Department of Agriculture and Fisheries (DAF) | | |
| Extension materials: | Final report | | |

Scoping study for sustainable broadleaf weed control in cucurbit crops

This project reviewed the current research and information available in relation to weed control on cucurbit crops. The issues for weed management are a sprawling plant habit and the lack of this registered herbicides available for broadleaf weed control. The study identified recent innovative approaches including soil solarisation, biofumigation, cover crops, bio herbicides and biodegradable mulch films. There are also several herbicides registered overseas for use in cucurbit crops that are not currently registered in Australia. The detailed report and appendices covering in excess of 200 pages can be found by clicking on the link below. There is a currently (2016) research and extension project on weed management in vegetables (VG15070 – A strategic approach to weed management for the Australian Vegetable Industry).

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| Discipline: | Pest and disease | Ends: | 15/11/2011 |
| Project code: | VG10048 | | |
| Contact person: | Brian Sindel | Email: | bsindel@une.edu.au |
| Service provider: | University of New England | | |
| Extension materials: | Final report | | |

Cold disinfection of capsicum fruit from Queensland fruit fly

Until recently the most common method of ensuring fruit were fruit fly-free was postharvest treatment with dimethoate insecticide. However, this product has now been withdrawn from this use and growers must find an alternative method. This research demonstrated that 10 days at 3°C provides an extremely high level of quarantine security against Qfly in red and green capsicums, Cayenne chillies and Birdseye chillies. For more information contact the project leader.

Discipline: Pest and disease **Ends:** 31/12/2012
Project code: VG10028
Contact person: Jenny Ekman **Email:** jenny.ekman@ahr.com.au
Service provider: NSW Dept of Primary Industries, an office of Dept of Industry
Extension materials: [Final report](#)

Integrated weed management in vegetable brassicas

The project has produced the factsheet "A guide to effective weed control in Australian brassicas", which can be downloaded by following the link below. There is also a final report and a VegeNote available for download for more information. Please note that your Eurofins Agrisearch have now changed their name and the email address for Les Mitchell may no longer be functional.

Discipline: Pest and disease **Ends:** 1/07/2011
Project code: VG09137
Contact person: Les Mitchell **Email:** les.mitchell@agrisearch.com.au
Service provider: Eurofins Agrisearch
Extension materials: [Final report, grower guide and vege note](#)

Brassica stem canker: Phase 2

This project investigated the use of fungicides and plant growth products in the management of Brassica stem canker. None of the products evaluated provided complete control of stem canker. The fungicides Impact-In-Furrow® (flutriafol) and Jockey (fluquinconazole) in combination with Amistar® (axoystrobin) reduced stem canker in both greenhouse and field evaluations, and registration of these products for use on vegetable Brassica crops was recommended. The research showed the use of plant growth products and fungicides in low disease situations did not significantly reduce stem canker severity, but could improve plant growth.

Discipline: Pest and disease **Ends:** 30/11/2011
Project code: VG09129
Contact person: Barbara Hall **Email:** barbara.hall@sa.gov.au
Service provider: South Australian Research and Development Institute (SARDI)
Extension materials: [Final report](#)

Integration of crop and soil insect management in sweet potatoes

This project summarises techniques for managing the crop and soil insects and sweet potatoes. The project was delivered by Australian Sweetpotato Growers Inc. The results from the project are presented in a final report and a 17-minute video documentary which shows the techniques in a practical and accessible way. The use of the video as an extension tool is recommended.

Discipline: Pest and disease **Ends:** 1/05/2014
Project code: VG09052
Contact person: Russell McCrystal **Email:** rmccrystal@gmail.com
Service provider: Australian Sweetpotato Growers Inc
Extension materials: [Final report](#) [Video documentary](#)

Alternative fruit fly control for market access and IPM enhancement in eggplant

This project gathered information to support new ways of managing fruit fly in eggplant to enhance future market access. The research project gathered baseline data on fruit fly seasonal activity in Bundaberg, Bowen and Burdekin regions and examined the effectiveness of several alternate chemistry groups applied prior to fruit harvest. The project found that current (2013) production systems with preharvest cover sprays (bifenthrin, abamectin and spinosad), pack-house sorting procedures and low fruit fly prevalence on eggplant farms greatly reduces the risk of fruit fly infestation in eggplant. Refer also to project VG10028 (Cold disinfestation of capsicum fruit from Queensland fruit fly) described above.

Discipline: Pest and disease **Ends:** 31/05/2013
Project code: VG09023
Contact person: Dr Siva Subramaniam **Email:** siva.subramaniam@daff.qld.gov.au
Service provider: The Department of Agriculture and Fisheries (DAF)
Extension materials: [Final Report](#)

Investigations for mass rearing of *Orius armatus* for controlling western flower thrips in the Australian vegetable industry

The project report explains how to rear the biological control agent *Orius armatus* for the control of western flower thrips in the Australian vegetable industry. The report includes information on laboratory and greenhouse bioassays, how to breed and use the biological control agent, with a focus on greenhouse vegetable production. Refer to the final report for detail.

Discipline: Pest and disease **Ends:** 30/01/2012
Project code: VG08186
Contact person: Lachlan Chilman **Email:** lachlanchilman@hotmail.com
Service provider: Manchil IPM Services
Extension materials: [Final report](#)

Mechanisms and management of insecticide resistance in Australian diamondback moth

Diamondback moth (DBM) (*Plutella xylostella* L.) is the main pest of Brassica vegetable crops in Australia, and has international notoriety for rapidly acquiring insecticide tolerance, which then leads to field control failures. DBM resistance to older insecticide classes is widespread in Australia; hence the choices for DBM control are increasingly limited to several newer synthetic pesticides and *Bacillus thuringiensis* products. This project investigated mechanisms and options for managing resistance to diamondback moth control measures. Refer to the project report for more detail.

Discipline: Pest and disease **Ends:** 30/03/2013
Project code: VG08062
Contact person: Greg Baker **Email:** greg.baker@sa.gov.au
Service provider: South Australian Research and Development Institute (SARDI)
Extension materials: [Final report](#)

Getting the most out of Eretmocerus hayati, an effective natural enemy of silverleaf whitefly

The research focused on how to get more out of the parasitoid, and better silverleaf whitefly (SLW) control by investigating: What management practices and decisions influence the abundance and distribution of the parasitoid; what features of the landscape influence the capacity of the parasitoid to achieve early colonisation of at-risk crops; and why the introduced *E. hayati* provides better control than the native *E. mundus*. Results were used to provide guidelines to growers that help to integrate control options for SLW. These guidelines were summarised in a user guide which identified a set of practical approaches that growers could adopt and integrate into their farming practice. The guide was prepared in consultation with growers so that the content and layout made sense to them. The user guide and final report can be downloaded from the link below.

Discipline: Pest and disease **Ends:** 31/08/2012
Project code: VG08051
Contact person: Paul de Barro **Email:** Paul.Debarro@csiro.au
Service provider: CSIRO Ecosystem Sciences
Extension materials: [Final report and factsheet](#)

Identification of immune-suppressors of diamond-back moth (DBM)

This research suggests that immune-suppression could be utilised as part of integrated pest and resistance management strategies, for Brassica caterpillar pests. In addition, as the immune-suppressive compounds are not inherently toxic per se, they would have less environmental impact and be seen as a greener option compared to traditional insecticides and/or could be used synergistically with traditional insecticides and other existing management options. We estimate that a further 1–2 years research would be needed to provide the level of understanding (of the compounds) required to investigate commercial development with relevant partners such as agrichemical companies. Final report available for download.

Discipline: Pest and disease **Ends:** 29/07/2011
Project code: VG08048
Contact person: Richard Glatz **Email:** richard.glatz@sa.gov.au
Service provider: South Australian Research and Development Institute (SARDI)
Extension materials: [Final report](#)

Investigations and developing integrated management strategies for carrot powdery mildew

Powdery mildew has been found on a carrot crops in three states of Australia. The first finding of the disease was in the Murrumbidgee Irrigation Area (MIA) of NSW in 2007. It has subsequently been found in Tasmania and South Australia in 2008. A factsheet outlining the cultural and chemical control options can be downloaded by following the link below. Permits are now (2016) available for: AMISTAR 250 SC FUNGICIDE (Permit 14816) and FOLICUR 430 SC FUNGICIDE and HORNET 500 SC 430SC (Permit 13091). These permits can be downloaded from the link below. More information on the status of permits and registration is available at www.apvma.gov.au

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| Discipline: | Pest and disease | Ends: | 31/05/2012 |
| Project code: | VG08044 | | |
| Contact person: | Andrew Watson | Email | andrew.watson@dpi.nsw.gov.au |
| | | : | u |
| Service provider: | NSW Dept of Primary Industries | | |
| Extension materials: | Final report, vegenote, factsheet and permits | | |

Development of methods to monitor and control Aphanomyces root rot and black root rot of beans

Refer to the link below for a copy of the final report and a detailed FAQ sheet which outlines the biology of the disease, photographs of symptoms and current control practices.

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| Discipline: | Pest and disease | Ends: | 16/07/2012 |
| Project code: | VG08043 | | |
| Contact person: | Andrew Watson | Email: | andrew.watson@dpi.nsw.gov.au |
| Service provider: | NSW Dept of Primary Industries | | |
| Extension materials: | Final report and factsheets | | |

Identification of IPM strategies for Pythium induced root rots in Apiaceae vegetable crops

Identification of IPM strategies for Pythium induced root rots in Apiaceae vegetable crops. The project was aimed at determining the role of Pythium in causing root rot and canker, identifying predisposing factors to disease and disease control strategies. Chemical control options are briefly outlined in the fact sheet with more detail in the final report. both the final report and the factory can be downloaded from the link below.

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| Discipline: | Pest and disease | Ends: | 31/07/2012 |
| Project code: | VG08026 | | |
| Contact person: | Elizabeth Minchinton | Email: | liz.minchinton@dpi.vic.gov.au |
| Service provider: | The Dept of Economic Development Jobs, Transport & Resources | | |
| Extension materials: | Final report and factsheet | | |

Identification and monitoring of resistance in vegetable crops in Australia

Findings from this study contributed to the development of guidelines for improved resistance management which were published through VG07110 (Best practice production models in lettuce, brassica) and VG07109 (Development of effective pesticide strategies compatible with IPM management used on farm). A key recommendation is that growers should continue to follow resistance strategies to minimise further development of resistant populations. It is critical that availability of alternative fungicides from different classes be available for these strategies to be sustained.

Please note: We were unable to find the final reports for VG07110 or VG07109. We suggest you contact the project leader information about these follow-on projects.

Discipline: Pest and disease **Ends:** 1/07/2011
Project code: VG07119
Contact person: Len Tesoriero **Email:** len.tesoriero@dpi.nsw.gov.au
Service provider: NSW Dept of Primary Industries
Extension materials: [Final report](#)

The delivery of IPM for the lettuce industry – an extension to VG05044

This project set out to establish the resistance status of several important fungal and bacterial pathogens from Australian vegetable crops. Findings from this study contributed to the development of guidelines for improved resistance management which were published through VG07110 (Best practice production models in lettuce, brassica) and VG07109 (Development of effective pesticide strategies compatible with IPM management used on farm). A detailed factsheet on Lettuce Integrated Pest Management along with the final report can be accessed from the link below.

Discipline: Pest and disease **Ends:** 6/02/2012
Project code: VG07076
Contact person: Sandra McDougall **Email:** sandra.mcdougall@dpi.nsw.gov.au
Service provider: NSW Dept of Primary Industries
Extension materials: [Final report and factsheet \(factsheet includes links to further materials\)](#)

Benchmarking predictive models, nutrients and irrigation for management of downy and powdery mildews and white blister

This project focused on white blister on brassicas, powdery mildew on cucurbits and downy mildew and anthracnose on lettuce. The project determined the efficacy and economics which could be achieved with weekly fungicide sprays, disease predictive models, irrigation timing and growing a resistant variety, but the latter was the most superior IPM tool. It evaluated the benefits of nutrient management; developed a disease predictive model for powdery mildew of cucurbits and a detection kit for airborne spores of white blister.

The outcomes of this project, methodology conclusions and recommendations are outlined in a **VegeNote** entitled "Benchmarking predictive models, nutrients and irrigation for management of downy and powdery mildews and white blister". There is also a separate **factsheet** entitled "Benchmarking Models, Aerial Spore Sampling, Irrigation and Nutrients for downy mildew of lettuce and white blister on brassicas".

Discipline: Pest and disease **Ends:** 30/11/2011
Project code: VG07070
Contact person: Elizabeth Minchinton **Email:** liz.minchinton@dpi.vic.gov.au
Service provider: The Dept of Economic Development Jobs, Transport & Resources
Extension materials: [Final report, poster, summaries and vege note](#)

Thrips management in the green beans industry

Thrips can attack green beans from the moment the seedlings emerge from the ground through to flowering, but it is the damage some do during flowering that has the greatest impact. This project investigated the management of thrips in green beans. The outcomes of the project are summarised in a fact sheet which can be downloaded from the link below. More detail is available in the final project report.

Discipline: Pest and disease **Ends:** 31/08/2011
Project code: VG07017
Contact person: John Duff **Email:** john.duff@daff.qld.gov.au
Service provider: The Department of Agriculture and Fisheries (DAF)
Extension materials: [Final report and factsheet](#)

Increasing adoption of IPM by WA vegetable growers and development of an ongoing technical support service

Grower uptake of IPM in Western Australia was poor before this project commenced in 2007, with lettuce and capsicum growers spraying prophylactically for western flower thrips (WFT). Additional management tools were developed during the project, including the evaluation of a native WFT predator (*Orius armatus*) and a thrips predatory mite (*Neoseiulus cucumeris*) in greenhouse capsicum, and bioassays to determine which commonly used pesticides could be safely used with *O. armatus*. The potential of a non-chemical control method using thrips attractants was also evaluated. For more information download the final report.

Note: Refer to the related project VG08186 (Investigations for mass rearing of *Orius armatus* for controlling Western Flower Thrips in the Australian Vegetable Industry) which is listed above.

Discipline: Pest and disease **Ends:** 31/10/2011
Project code: VG06037
Contact person: Sonya Broughton **Email:** sonya.broughton@agric.wa.gov.au
Service provider: Western Australian Agriculture Authority (WAAA)
Extension materials: [Final report](#)

Improved management of pumpkin brown etch

This project will first confirm the cause and the environmental conditions conducive to brown etch throughout pumpkin growing regions of Australia.

It will then quantify varietal resistance/susceptibility among current commercial varieties and examine some of the environmental factors affecting brown etch.

Once the precise cause of the disease in Australia has been identified, control measures will be developed, costed, and evaluated in the field with commercial pumpkin growers and confirmed under controlled conditions. Finally, the most promising and cost efficient methods will be communicated to growers and supply-chain partners in Australia.

Discipline: Pest and disease **Ends:** 1/07/2019
Project code: VG15064
Contact person: Jenny Ekman **Email:** jenny.ekman@ahr.com.au
Service provider: Applied Horticultural Research Pty Ltd
Extension materials: [VA Articles](#)

Characterisation of a Carlavirus of French Bean

This project was established at the end of 2016 to characterise a new carlavirus found infecting Fabaceae crops in in South East Queensland, and identify potential distribution and incidence of the virus in other French bean production regions of Australia. Importantly, the project will develop and help growers adopt management strategies for the virus, resulting in improved pack-out, increased marketable yield and a reduction in the impact of the disease.

Discipline: Pest and disease **Ends:** 31/05/2019
Project code: VG15073
Contact person: Rod Edmonds **Email:** rod.edmonds@daf.qld.gov.au
Service provider: The Department of Agriculture and Fisheries (DAF)
Extension materials:

Improved knowledge of factors contributing to carrot rot

Carrot crown rot has been identified as a major constraint to carrot production in Tasmania as the varieties that are in high demand in domestic and overseas markets are more prone to reduced pack-outs due to crown rot. Conducted by Peracto and Serve-Ag, this project will enable us to better understand the complex interactions involved in crown rot development. This will be achieved by carrying out intensive crop monitoring and diagnostics to better understand how field factors affects crown rot development and to quantify the effect on pack out and grower returns.

Discipline: Pest and disease **Ends:** 15/08/2018
Project code: VG15066
Contact person: Philip Frost **Email:** pfrost@peracto.com
Service provider: Peracto Pty Ltd
Extension materials:

Impact of Pesticides on Beneficial Arthropods of Importance in Australian Vegetable Production

As its name suggests, this project will be developing information on the impact of pesticides on insects and mites that play a beneficial role in the Australian vegetable industry. This information is essential for making decisions about the use of pesticides in vegetable crops that are grown using integrated pest management. To help improve pest management with minimal and appropriate use of insecticides, for growers and their advisor the project will develop a user-friendly management guide around this information, based on crop type.
Extension materials will be available later in the project.

Discipline: Pest and disease **Ends:** 19/04/2020
Project code: VG16067
Contact person: Jessica Page **Email:** jpage.ipm@gmail.com
Service provider: IPM Technologies Pty Ltd
Extension materials: [Website](#) [Project update](#)

Generation of Residue, Efficacy & Crop Safety Data for Pesticide Applications in Horticulture Crops 2017

This project is responsible for generating data to support a range of permit applications for a range of industries. This supports project VG16020 'Vegetable industry minor use program' which is used to renew and apply for new minor use permits for the vegetable industry. New minor use permits are published in the weekly AUSVEG newsletter, and current permits can be found on the APVMA website (link below).

Discipline: Pest and disease **Ends:** 1/02/2020
Project code: ST16006
Contact person: Damian Bougoure **Email:** damianbougoure@eurofins.com
Service provider: Eurofins Agrisearch Services
Extension materials: [Link to current minor use permits](#)

Vegetable agrichemical pest management needs and priorities

This project aims to prioritise agrichemical efforts. With close consultation with growers, it will identify pest priorities for vegetable commodities. These outcomes will aid in updating industry Strategic Agrichemical Review Processes (SARPs), inform industry direction at the annual AgChem Collaborative Forum, and lead the progression of minor use permits and chemical registrations. Patrick is keen to engage with growers and agronomists throughout Australia, and would like to come and talk at VegNET workshops (contact Patrick to arrange).

Discipline: Pest and disease **Ends:** 3/04/2020
Project code: VG16060
Contact person: Patrick Arratia **Email:** patrick.arratia@ausveg.com.au
Service provider: AUSVEG Ltd
Extension materials: [Project update](#)

A strategic approach to weed management for the Australian Vegetable industry

This project is being run by the University of New England weed research team and involves research. A weed management webinar was conducted in 2016 and recording of this webinar is available on the Integrated Crop Protection (ICP) website and there is also a factsheet produced by the ICP project. Both are available by following the link below. For more information contact the project leader.

A weed management guide for 'Fat Hen' is now available. Guides on stinging nettle, nutgrass, pigweed, and blackberry nightshade are to come.

A study of the economics of weed management has commenced.

Discipline: Pest and disease **Ends:**
Project code: VG15070
Contact person: Paul Kristiansen **Email:** paul.kristiansen@une.edu.au
Service provider: University of New England
Extension materials: [Webinar and factsheet](#) [Weed management guide](#) [Cover crop trial video](#)

New end-point treatment solutions to control Fruit Fly (2)

This project is developing a new export protocol for the export of Australian capsicums to New Zealand, replacing the current methyl bromide (MB) fumigation with low-dose fumigation. Research against Queensland fruit fly has shown that a treatment of 18g/m³ MB at 18°C for 5 hours was efficacious. This is less than half the current protocol which requires 40g/m³ MB at 17°C for 2 hours. Physiology trials showed that the low-dose methyl bromide did not reduce the fruit quality. The data package was submitted to the Department of Agriculture and Water Resources (DAWR), who are currently negotiating the new protocol with Ministry of Primary Industries (MPI) New Zealand. Research is continuing to generate data packages on other fruit fly species of concern.

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| Discipline: | Pest and disease / Market access | Ends: | 31/05/2018 |
| Project code: | VG13044 | | |
| Contact person: | Pauline Wyatt | Email: | pauline.wyatt@daf.qld.gov.au |
| Service provider: | The Department of Agriculture and Fisheries (DAF) | | |
| Extension materials: | Presentation | | |

Field and landscape management to support beneficial arthropods for IPM on vegetable farms

This new program is designed to support Australian vegetable growers in harnessing the power of beneficial arthropods in integrated pest management (IPM) approaches. Specifically, it brings together a range of researchers and professionals in the field, who will capture information, develop and test strategies, and produce crop-specific and region-specific guidelines for field and landscape management to support beneficials. To kick things off, the project is beginning with a review of habitat management within the industry and in relevant literature.

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|-----------------------------|---|--|--|
| Discipline: | Pest and disease | Ends: | 30/06/2020 |
| Project code: | VG16062 | | |
| Contact person: | Geoff Gurr | Email: | ggurr@csu.edu.au |
| Service provider: | Charles Sturt University | | |
| Extension materials: | Project information sheet | Vegetables Australia article | |

Area wide management for vegetable diseases: viruses and bacteria

This project will be responsible for developing an 'area wide management' (AWM) strategy to address high-priority viral and bacterial diseases affecting vegetable crops. This strategy will include viral diseases transmitted by thrips, aphid and whitefly pests, and phytoplasmas transmitted by leafhoppers, and will involve pest management approaches. The project will also be keeping track of surveillance of tomato potato psyllid (TPP), through linkages with other industry TPP work.

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|-----------------------------|---|---------------|--|
| Discipline: | Pest and disease | Ends: | 30/05/2022 |
| Project code: | VG16086 | | |
| Contact person: | Cherie Gambley | Email: | cherie.gambley@daf.qld.au |
| Service provider: | The Department of Agriculture and Fisheries (DAF) and Research and Development for Primary Industries Pty Ltd | | |
| Extension materials: | Factsheet | | |

Review of issues and options for preventing and removing red back spiders in broccoli

This review examined factors that may be contributing to red back spiders entering broccoli crops and / or contaminating broccoli after harvest. It provides growers with some tools to identify potential sources of contamination and reduce the risk that red back spiders will contaminate crops. The factsheet provides a useful summary.

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|-----------------------------|--|------------------------------|--|
| Discipline: | Pest and disease | Ends: | 24/07/18 |
| Project code: | VG17014 | | |
| Contact person: | Jenny Ekman | Email: | jenny.ekman@ahr.com.au |
| Service provider: | Applied Horticultural Research Pty Ltd | | |
| Extension materials: | Factsheet | Final report | |

Marketing/supply chain

Consumer and market program for the vegetable industry (Project Harvest) – Stage 2

Colmar Brunton has been tracking consumer perceptions and behaviour in relation to vegetables through Project Harvest. Twenty-eight vegetables were analysed on a quarterly rotational basis – monthly tracker reports are available on the AUSVEG website. This work provides feedback and insights for vegetable growers who can use it to better understand their customer.

| | | | |
|-----------------------------|------------------------------|---|--------------------------------|
| Discipline: | Marketing/supply chain | Ends: | 30/06/2016 |
| Project code: | VG14060 | | |
| Contact person: | Denise Hamblin | Email: | denise.hamblin@colmarbrunt.com |
| Service provider: | Colmar Brunton | | |
| Extension materials: | Final report | Monthly reports on AUSVEG website | |

New product development information for the vegetable industry

The aim of the project was to help equip Australian vegetable growers and producers with the tools required to innovate and develop new products to maximise the value of their crops. Resources include a how-to guide for developing new, added-value vegetable products; a guide to find Australian companies that could help the grower; and videos from the workshop held during this project.

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| Discipline: | Marketing/supply chain | Ends: | 4/04/2016 |
| Project code: | VG14031 | | |
| Contact person: | Hazel MacTavish-West | Email: | hazel@mactavishwest.com |
| Service provider: | MacTavish West Pty Ltd ATF MacTavish West Family Trust No. 1 | | |
| Extension materials: | | A great resource guide and videos on veg innovations website | |

Market research around the opportunity to create more vegetable snacking options to quantify market size

The project aim was to determine the size of the opportunity for vegetables in the Australian snack food market by quantifying the total snack food market and to identify opportunities for vegetables within it. Information could be summarised further for growers/processors, including new snack product opportunities and market size/buyer profile.

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|-----------------------------|---|---------------|--|
| Discipline: | Marketing/supply chain | Ends: | 31/07/2015 |
| Project code: | VG14024 | | |
| Contact person: | Martin Kneebone | Email: | info@freshlogic.com.au |
| Service provider: | Freshlogic Pty Ltd | | |
| Extension materials: | Final report and vegenote | | |

Vegetable industry market access and development program

AUSVEG undertakes activities including reverse trade missions, tradeshows, seminars and symposiums to develop export markets and increase market availability for Australian produce. Market development resources including export market snapshots are available on the AUSVEG website link below.

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|-----------------------------|-----------------------------------|---------------|------------------------------|
| Discipline: | Marketing/supply chain | Ends: | 31/03/2017 |
| Project code: | VG13097 | | |
| Contact person: | | Email: | |
| Service provider: | AUSVEG Ltd | | |
| Extension materials: | Website promotion | | Final report |

Baseline demographic research for the vegetable industry

The aim of the project was to supply growers and other key industry stakeholders with data and insights to support their already extensive knowledge; to enable them to have an informed discussion with their retail partners and with their end client – the consumer. The project provided the vegetable industry with a baseline demographic read of the vegetable industry, by which growers can measure performance of the 15 participating commodities. Monthly reports are available on the AUSVEG website. Also on the website are opportunity calculators, which identify retail opportunities for particular vegetables.

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| Discipline: | Marketing/supply chain | Ends: | 31/08/2015 |
| Project code: | VG13088 | | |
| Contact person: | | Email: | |
| Service provider: | The Nielsen Company | | |
| Extension materials: | Final report | | Monthly reports on AUSVEG website |

Benchmarking Australian vegetable industry points of difference

In order to gain a better understanding of what attributes are required to place Australian produce at an advantage in export markets, a benchmarking study was carried out across key export markets into local consumer behaviours and preferences. Australian imports attained a strong, positive brand image, and the country should leverage on the quality of specific produce while improving on price and freshness. Details from the market analysis are available in the final report and could be incorporated into an export workshop.

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| Discipline: | Marketing/supply chain | Ends: | 21/07/2014 |
| Project code: | VG13085 | | |
| Contact person: | Ben Dunsheath | Email: | Ben.Dunsheath@euromonitor.com |
| Service provider: | Euromonitor International Ltd | | |
| Extension materials: | Final report and vegenote | | |

Evaluation of quality assurance software for the vegetable industry

This project provided information for the vegetable industry by identifying a range of QA tools that can assist vegetable growers, including packers, in deciding on the selection and purchase of tools to assist in managing their QA systems.

The final report contains summary tables of QA software and tools, with details of their potential uses and ease of use. It also provides a decision aid for use in the selection of QA software/tools.

QA is a time consuming process for growers and packers, so any software they can use to reduce time input is beneficial and can increase traceability.

Discipline: Marketing/supply chain **Ends:** 30/03/2015
Project code: VG13082
Contact person: Belinda Hazell **Email:** belinda.hazell@tgaaustralia.com.au
Service provider: TQA Australia Inc
Extension materials: [Final report and vege note](#)

Financial Performance of Australian Vegetable Farms 2013-14 to 2015-16

Reports are available from this project which detail financial performance of vegetable farms by state and size for 2013–2014. Updated data for 2015–16 is now available and would be a useful benchmarking tool for growers.

Discipline: Marketing/supply chain **Ends:** 31/12/2016
Project code: VG13068
Contact person: Milly Lubulwa **Email:**
Service provider: Aust Bureau of Agricultural & Resource Economics & Sciences
Extension materials: [Final and interim reports](#) [Results from surveys](#)

Market analysis and strategy: Broccoli to Japan

This project undertook an in-depth market analysis to determine if potential existed for Australian broccoli exports to Japan. The research focused on the current market size and growth trends of the broccoli market (fresh and frozen); market access; market segments; competitors; supply chains; consumer research; and economic analysis. The project concluded that a combination of factors had placed Australia in a position to re-enter the Japanese fresh broccoli market. A desktop research booklet provides a useful summary of the market analysis undertaken.

Discipline: Marketing/supply chain **Ends:** 30/04/2015
Project code: VG13048
Contact person: Bronwyn Warfield **Email:** Bronwyn.Warfield@tiq.qld.gov.au
Service provider: Trade and Investment Queensland
Extension materials: [Final Report and research summary booklet](#)

Optimum vegetable portion size to meet consumer needs

This project looked for potential to optimise portion sizes to drive increased purchase and consumption. The research focused on six vegetables including carrots, pumpkin, cabbage, cauliflower, celery and broccoli.

Overall, findings support four recommendations to industry, all of which can lead to increased purchases and consumption:

1. Retailers will benefit from offering more fairly basic portion options
2. Removing excess parts of the vegetable will enhance perceived value
3. Smaller versions of vegetables should be considered
4. Industry should provide greater inspiration about how to prepare and store vegetables.

Summary factsheets on each vegetable are available at the end of the final report.

Discipline: Marketing/supply chain **Ends:** 31/05/2014
Project code: VG12094
Contact person: Georgina Woodley **Email:** georginawoodley@bdrc.com.au
Service provider: BDRC Australia
Extension materials: [Final report](#)

Evaluating the success of VG12045/069/070 – Barriers & drivers of vegetable consumption and purchase

This project evaluated and summarised findings from three projects completed by different providers on the barriers and drivers of vegetable consumption and purchase. The final report provides a useful summary of barriers and drivers of vegetable consumption and purchase of capsicum, Asian leafy greens, pumpkin, beans, cauliflower and broccoli. The summary can be found as part of the executive summary.

Discipline: Marketing/supply chain **Ends:** 30/04/2014
Project code: VG12092
Contact person: Paul Costantoura **Email:** paulc@reviewpartners.com.au
Service provider: Review Partners
Extension materials: [Final report](#)

Conveying the positive social, economic, environmental and other benefits of Australian vegetables

This project provides a statistical overview of the Australian vegetable industry, value of vegetable trade, value of the vegetable industry by region, modelling the economic value of the vegetable industry, and summaries by vegetable (presented in factsheet style). Data from this project could be used as is, or incorporated into product or region-specific factsheets.

Discipline: Marketing/supply chain **Ends:** 31/10/2015
Project code: VG12090
Contact person: Paul Costantoura **Email:** paulc@reviewpartners.com.au
Service provider: Review Partners
Extension materials: [Final report](#)

Enhancing market Attitudes Towards IPM and Sustainable Vegetable Production Practices

This project had two objectives. The first was to examine the attitude of consumers to insect contamination in vegetables. The second was to determine whether there is likely to be a specific, value added market for vegetables grown using integrated pest management under a sustainability or “ecolabel”. The project involved a bench-top study of these issues and literature review, focus groups with consumers, a national survey and finally the production of a series of short, consumer focused videos which explain the use of beneficial insects in growing vegetable crops.

Discipline: Marketing/supply chain **Ends:** 5/05/2014
Project code: VG12084
Contact person: Jenny Ekman **Email:** jenny.ekman@ahr.com.au
Service provider: Applied Horticultural Research Pty Ltd
Extension materials: [Final report](#) [Consumer videos on AHR website](#)

Consumer and market program for the vegetable industry

This market research project tracks consumer attitudes and trends, as well as conducting customer market research on areas of interest to the industry. Colmar Brunton is the project service provider and copies of the monthly reports produced over a three-year period from June 2013-June 2016 are available on the links provided on the AUSVEG website (link below).

Discipline: Marketing/supply chain **Ends:** 23/06/2016
Project code: VG12078
Contact person: Jenny Witham **Email:**
Service provider: Colmar Brunton
Extension materials: [Monthly reports on AUSVEG website](#) [Final report](#)

Consumer attitudes and usage in the green leaf category

This project provides important insights into consumer behaviour when purchasing green leaf salads. The final report contains plenty of results – some of which will still be relevant for grower-marketers.

Discipline: Marketing/supply chain **Ends:** 31/08/2013
Project code: VG10094
Contact person: Treena Welch **Email:** treena.welch@oneharvest.com.au
Service provider: Harvest FreshCuts Pty Ltd
Extension materials: [Final report](#)

VegBIZ -Vegetable enterprise decision support systems

A simple computer program was developed to assist vegetable growers with making decisions about what to grow, based on an analysis of potential income and likely operating costs. A link to the tool is available on the AUSVEG website (follow link below). Factsheets are also available that explain how to use the tool. Check with Gerard Kelly if the tool has been updated since it was produced.

Discipline: Marketing/supply chain **Ends:** 1/06/2013
Project code: VG08021
Contact person: Gerard Kelly **Email:** gerard.kelly@dpi.nsw.gov.au
Service provider: NSW Dept of Primary Industries
Extension materials: [Final report and factsheets](#) [Summary and links on AUSVEG website](#)

Horticulture for tomorrow review and update

The Guidelines for Environmental Assurance in Australian Horticulture provide a mechanism for all horticultural producers to assess their level of environmental credentials and to develop a pathway for continuing to improve their on-farm environmental performance. The guidelines contain useful grower resources and links to other resources that could be used directly or modified for future extension material.

Discipline: Marketing/supply chain **Ends:**
Project code: AH13014
Contact person: **Email:**
Service provider: HAL
Extension materials: [Link to environmental assurance guidelines](#)

Vegetable snacking options market research - Stage 2

This project will build on the findings of VG14024, and will look at distribution channels, smaller vegetable product forms and overcoming issues and challenges related to using locally produced vegetables in processed snack form. The final report details a number of products available internationally, and may contain some good options for vegetable growers.

Discipline: Market **Ends:** 25/11/2016
Project code: VG15060
Contact person: Martin Kneebone **Email:** info@freshlogic.com.au
Service provider: Freshlogic Pty Ltd
Extension materials: [Final report](#)

Sensitivity Study - Impact of increasing exports on the domestic vegetable market

This report examined the impacts of increasing vegetable exports on the domestic vegetable market, so that the industry can prepare and plan for the forthcoming changes. The project involved desktop research, industry consultations and economic modelling, supplemented by detailed case study research into individual segments of the Australian vegetable market. Three scenarios of low, moderate or high vegetable export growth were modelled for short and long-term effects on the domestic industry.

Discipline: Market **Ends:** 21/12/2016
Project code: VG15061
Contact person: Dr Daniel Terrill **Email:**
Service provider: Deloitte Access Economics Pty Ltd
Extension materials: [Final report](#)

VG15077 - Financial Performance of Australian Vegetable Farms 2016-2017 to 2018-2019

This project will complete three further economic surveys of Australian vegetable growers, in the financial years 2016-17 to 2018-19. The proposed three surveys will be an extension of the nine surveys already conducted by ABARES for Horticulture Innovation Australia (Hort Innovation) and its predecessor Horticulture Australia Limited (HAL).

The surveys are designed to collect comprehensive production and financial performance data, production intentions and issues of particular interest to industry stakeholders.

The surveys will be conducted in March to June of each financial year and results will be presented to Hort. Innovation in September.

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| Discipline: | Market | Ends: | 30/10/2019 |
| Project code: | VG15077 | | |
| Contact person: | | Email: | |
| Service provider: | Aust Bureau of Agricultural & Resource Economics & Sciences | | |
| Extension materials: | Report from 2014-15 and 2015-16 | Website with reports | |

Understanding consumer triggers & barriers to consumption of Australian indigenous vegetables & Asian vegetables

This project has been tasked with identifying commercially viable Australian indigenous vegetables and Asian vegetables; assessing their consumer appeal through a range of consumer interactions, including sensory testing; and providing recommendations for industry to ensure the greatest likelihood of success in the market. Product sheets are being developed and will be available soon.

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| Discipline: | Market | Ends: | 19/05/2017 |
| Project code: | VG15071 | | |
| Contact person: | | Email: | |
| Service provider: | Colmar Brunton | | |
| Extension materials: | Booklets | | |

Addressing Vegetable Consumption Through Food Service Organisations (Chefs, TAFEs and other training institutions)

This project was established to drive domestic sales and consumption of Australian vegetables through engagement with the foodservice industry. It will develop a program to help recruit, educate and impact on chefs, cooks and hospitality students in particular, to be led by a celebrity chef.

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|-----------------------------|--------------------------------|---------------|--|
| Discipline: | Market | Ends: | 25/09/2017 |
| Project code: | VG16026 | | |
| Contact person: | Jamie Kwong | Email: | jamiek@wshop.com.au |
| Service provider: | WORKSHOP AUSTRALIA PTY LIMITED | | |
| Extension materials: | VegeNotes | | |

Boosting Vegetable Consumption through Diet

This ongoing investment has delivered an innovative tool to help consumers understand and increase their vegetable intake – an app called VegEze, which challenges people to eat more vegetables.

Released in mid-November, the VegEze app has a game-style approach, motivating participants to add extra vegetables to their daily diets and form long-term, healthier habits through a 21-day challenge to eat three different vegetables at each dinnertime. There are daily reminders and rewards throughout, and the app comes with educational resources such as a visual guide to serving sizes for specific vegetables, plus recipes and nutritional information.

The idea behind the app came from previous levy-funded research with the CSIRO, which demonstrated a positive relationship between the number of different types of vegetables Australian adults eat and their overall vegetable intake.

To help further understand vegetable consumption and how education initiatives can boost it, the project team will also be looking at how effective the VegEze app's game-like nature is at helping transform people's eating patterns.

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| Discipline: | Market | Ends: | 1/05/2018 |
| Project code: | VG16071 | | |
| Contact person: | Anna Crook | Email: | 0 |
| Service provider: | SP Health Co. Pty Ltd | | |
| Extension materials: | VegeNotes | | 0 |

Horticulture Trade Intelligence Reporting 2017-2019

This project provides easy-to-read and easy-to-act-upon trade performance information to Australia's horticulture industry. Quarterly reports will be made available for download through the Hort Innovation website.

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|-----------------------------|--|---------------|--|
| Discipline: | Market | Ends: | 1/03/2020 |
| Project code: | MT16011 | | |
| Contact person: | Tim Foulds | Email: | tim.foulds@euromonitor.com |
| Service provider: | EUROMONITOR INTERNATIONAL (AUSTRALIA) PTY LTD | | |
| Extension materials: | Vegetable trade intelligence report: Q1 2017 | | Q2 report |

Market Opportunity for Vegetable Juices

This project involves market research into the vegetable juice market of Australia and trends that might lead to increases in consumption. Opportunities to increase consumption will be investigated. There may be opportunities for the findings of the project to be presented to interested growers towards the end of the project.

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|-----------------------------|--------------------------------------|---------------|--|
| Discipline: | Market | Ends: | 18/09/2017 |
| Project code: | VG16016 | | |
| Contact person: | Michael Feely | Email: | mfeely@market-research.com |
| Service provider: | Horizon Research Corporation Pty Ltd | | |
| Extension materials: | VegeNotes | | |

Understanding the Nature, Origins, Volume and Values of Vegetable Imports

This project seeks to understand the nature, origin, volume and value of vegetable imports coming into Australia. It examines data from a range of sources and produces annual summaries.

Discipline: Marketing/supply chain **Ends:** 30/03/2018
Project code: VG12083
Contact person: Luke Rolley **Email:** luker@rmcg.com.au
Service provider: RM Consulting Group
Extension materials: [Import factsheets](#) [0](#)

Vegetable trend Forecasting and Analysis

The aim of this project is to provide insight on the topic of trends in diet, dining and health and forecasting future drivers, stakeholders and consumers based on these trends. In understanding this, we can provide both a competitive advantage for the Australian vegetable industry by extrapolating those trends as a basis for strategic growth initiatives. Using broccoli and eggplant, the project provides a practical example of how this may be actioned right now to benefit the growers/industry financially by leveraging proven health/nutritional benefits. Case studies are available.

Discipline: Market **Ends:** 17/03/2017
Project code: VG16027
Contact person: Susan Coles **Email:** susanc@wshop.com.au
Service provider: WORKSHOP AUSTRALIA PTY LIMITED
Extension materials: [Casestudies and final report](#)

Educational opportunities around perceptions of, and aversions to, vegetables through digital media (part 1 - market research, part 2 - development)

This project is the first of three related projects to be established by Hort Innovation. Combined, the new industry initiative will first seek to understand school-aged children's perception of vegetables, and will then develop digital food education resources to boost consumption of and attitudes towards veggies. These resources will feature the involvement of a celebrity chef. The projects will also develop other supporting materials to encourage positive behaviours, attitudes and outcomes around vegetables with kids aged six to 14.

Discipline: Market **Ends:** 12/06/2017
Project code: VG16018
Contact person: Alice Zaslavsky **Email:** squeak@aliceinframes.com
Service provider: EDIBLE ADVENTURES PRODUCTIONS PTY LTD

Vegetable Market Price Reporting pilot program - market data and reporting

This pilot program represents the trial of a new market price and insights reporting resource for Australian vegetable growers. It will deliver accurate and timely twice-weekly and monthly wholesale market price reports on 10 key vegetable categories from markets in Brisbane, Sydney, Melbourne and Adelaide.

The reports include summarised wholesale prices; price differentials between wholesale markets; analysis of pricing, including trends through the season and over time, as well as the impact of product form, grade, pack size and more. The project will focus on providing analysis and insights to support increased knowledge and use of market price reporting by growers to aid in business decision making.

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| Discipline: | Market | Ends: | 19/5/2019 |
| Project code: | VG16081/16084 | | |
| Contact person: | John Brewer & Martin Kneebone | Email: | ausinspect@outlook.com martin@freshlogic.com.au |
| Service provider: | AUSMARKET CONSULTANTS and Freshlogic | | |
| Extension materials: | Bi-weekly and monthly reports | | |

Vegetable Business Benchmarking

This project will develop a targeted and applied benchmarking tool for vegetable growers. It will establish key benchmark performance metrics for the vegetable industry and drivers of best practice performance through a grower-orientated participatory tool.

Benchmarking is a simple and effective way to take stock of a business and identify where improvements can be made — it also gives a clear idea of how a business is performing compared to the industry average.

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| Discipline: | Market | Ends: | 16/12/2019 |
| Project code: | VG17000 | | |
| Contact person: | Bryn Edwards & Donna Lucas | Email: | donnal@rmcg.com.au bryn.edwards@vegetableswa.com.au |
| Service provider: | VegWA and RMCG | | |
| Extension materials: | WA report | | |

Vegetable Cluster Consumer Insights Program (VG16069)

This new data initiative, which will be known as the 'Harvest to Home' program, is responsible for bringing together retail and consumer data for the benefit of the vegetable industry. Growers will be able to access the program's insights through an easy-to-use and simple-to-access 'data dashboard', with its own dedicated website called 'Harvest to Home' (see link below).

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|-----------------------------|-------------------------|---------------|--|
| Discipline: | Marketing | Ends: | 22/9/2020 |
| Project code: | VG16069 | | |
| Contact person: | Sarah McKee | Email: | sarah.mckee@nielsen.com |
| Service provider: | The Nielsen Company | | |
| Extension materials: | Website | | |

Building the business case to grow domestic demand for vegetables in Australia

This research will look at the potential to grow consumer demand for vegetables through marketing efforts, and to subsequently increase economic returns for growers. It will provide information on the likely return on investment to industry from funding generic vegetable marketing activity, with the information intended to help AUSVEG in assessing and discussing the future in this space with industry.

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| Discipline: | Market | Ends: | 31/08/2018 |
| Project code: | VG17013 | | |
| Contact person: | Adam Briggs | Email: | Adam.Briggs@horticulture.com.au |
| Service provider: | MCKINNA ET AL - Insight Outlook Consulting Pty Ltd as Trustee | | |
| Extension materials: | | | |

Food safety, health and nutrition

Fostering and enhancing food safety in the vegetable industry

This project sought to quantify the extent of food safety certification in the Australian vegetable industry as a primary measure of food safety commitment. It discusses food safety hazards and opportunities for effective food safety management to maintain the industry's good food-safety record. Data and recommendations from the project are available in the final report.

Discipline: Food safety, health and nutrition **Ends:** 1/12/2013
Project code: VG13020
Contact person: Doris Blaesing **Email:** dorisb@rmcg.com.au
Service provider: RMCG
Extension materials: [Final report](#)

Identifying and understanding the factors influencing bioactive levels in vegetables

This project collated information on the phytonutrients (bioactives) in levied vegetables. This project has developed a useful resource of information on phytonutrients in vegetables and as a result amendments were made and resources added to www.veggycation.com.au as text and downloads. Amendments include new information on postharvest factors that impact on phytonutrient levels, status of health claims of phytonutrients and typical amounts of phytonutrients present.

Discipline: Food safety, health and nutrition **Ends:** 31/01/2016
Project code: VG14027
Contact person: Carolyn Lister **Email:** Carolyn.Lister@plantandfood.co.nz
Service provider: The New Zealand Institute for Plant and Food Research Ltd
Extension materials: [Final report and vegenote](#) [veggycation website](#)

Developing a nutrient and/or health claim label for packaged babyleaf spinach and rocket

Many factors can affect the levels of bioactives including weather, variety and handling. The main aim of this project was to measure the impact of these factors on the levels of bioactives. It was found that while location, season and storage all affected the levels of vitamin C, vitamin A and folate in rocket and spinach, claims could be made on vitamin C, folate, and beta-carotene. Models were developed to determine the estimated levels of vitamin C and folate in blends of salad mixes.

Discipline: Food safety, health and nutrition **Ends:** 28/02/2012
Project code: VG08148
Contact person: Gordon Rogers **Email:** gordon@ahr.com.au
Service provider: Applied Horticultural Research Pty Ltd
Extension materials: [Final report and VA feature](#)

ProbiSafe - Development of biocontrol agents to inhibit pathogen growth

This project focuses on keeping vegetables healthy and safe. It will develop, verify and make available new biological control agents (new strains/blends of beneficial bacteria) to inhibit the growth of harmful bacteria on vegetables. The result will be an additional level of safety in both fresh and processed produce.

Initial work has included lab-based trials of ProbiSafe and commercial probiotics, with ProbiSafe shown to inhibit the growth of *Salmonella typhimurium* on cut iceberg lettuce by up to 1000-fold over seven days of storage at 8°C. The project team has also been reaching out to major vegetable growers and processors to present preliminary work and seek involvement with the project.

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| Discipline: | Health | Ends: | |
| Project code: | VG16005 | | |
| Contact person: | Cameron Turner | Email: | c.turner@uniquet.com.au |
| Service provider: | UniQuest Pty Limited | | |
| Extension materials: | | | |

Increase Consumption and Sales by Developing Community Awareness and Benefits of Vegetable (Scoping Study)

This is a preliminary study to increase understanding of a range of 'community interventions', such as the establishment of community gardens, and how these might increase vegetable consumption. By outlining the existing knowledge and impacts of such interventions, it is expected to help guide further research, evaluation and action.

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| Discipline: | Health | Ends: | 27/07/2017 |
| Project code: | VG16025 | | |
| Contact person: | Rebecca Patrick | Email: | rebecca.patrick@deakin.edu.au |
| Service provider: | Deakin University | | |

Improving safety of vegetable produce through on-farm sanitation, using Electrolysed Oxidising (EO) water

Electrolysed oxidising (EO) water is used during postharvest but has not been used to any extent for treating preharvest water. It has potential for minimising risk of contamination by food borne pathogens and the outcome from this project will be validation of its effectiveness and application relative to other sanitisers and protocols for its use on-farm.

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|-----------------------------|-------------------------------|---------------|--|
| Discipline: | Food safety | Ends: | 31/05/2020 |
| Project code: | VG15068 | | |
| Contact person: | Enzo Lombi | Email: | enzo.lombi@unisa.edu.au |
| Service provider: | University of South Australia | | |
| Extension materials: | Update | | |

Pathogen Persistence from Paddock to Plate

The project will examine whether current pre-harvest water and untreated animal manure withholding periods are sufficient to minimise or eliminate the risk of microbial contamination of high risk vegetable crops.

The work aims to support the use of materials that add valuable organic matter to soil, while still managing food safety risks.

Free testing of soil amendments and irrigation water for *E. coli*, *Salmonella* and *Listeria* is available to vegetable growers.

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|-----------------------------|-------------------------------------|--|--|
| Discipline: | Food safety | Ends: | 1/12/2019 |
| Project code: | VG16042 | | |
| Contact person: | Richard Bennett | Email: | r.bennett@pma-anz.com |
| Service provider: | Fresh Produce Safety Centre Limited | | |
| Extension materials: | Project details | Vegetables Australia article | |

Export focus

Improving the efficiency of the carrot export industry – A whole of chain approach scoping study

The objective of this project was to identify issues that affect the economic efficiency of the export carrot industry in Australia. These will be addressed by further research.

Discipline: Export focus **Ends:** 6/05/2016
Project code: VG12063
Contact person: Rachel Lancaster **Email:** rachel@eatswa.com.au
Service provider: Western Australian Agriculture Authority (WAAA)
Extension materials: [Vegenote](#) [0](#)

Malaysia and UAE market analysis and strategy: Carrots and sweet corn

The objective of this study was to complete an analysis of the fresh carrot and sweet corn markets in the United Arab Emirates (UAE) and Malaysia; identify and profile relevant supply chain participants that would assist growers to develop export trade networks; and prepare an R&D investment plan. Opportunity to grow the export market for carrots and sweet corn was identified in the UAE and additional commercial opportunity was also identified for carrots in Malaysia. A Three Year Market Development Investment Plan for Carrots UAE and Malaysia was developed.

Discipline: Export focus **Ends:** 30/05/2014
Project code: VG13047
Contact person: Michael Clarke **Email:** Clarke@AgEconPlus.com.au
Service provider: AgEconPlus Pty Ltd
Extension materials: [Final report](#)

Malaysia and UAE market analysis and strategy: babyleaf and beans

This feasibility study was carried out by Euromonitor International. Throughout the course of the research, a comprehensive inquiry has been conducted on local consumers' preferences via extensive consumer surveys and in-store interviews, followed by trade interviews and product placement studies. Trade networks and supply-chain participants between Australia's growers and offshore distributors in Malaysia and UAE were identified and profiled. Recommendations on the two markets by product are available in the report.

Discipline: Export focus **Ends:** 28/03/2014
Project code: VG13046
Contact person: Umesh Madhavan **Email:** umesh.madhavan@euromonitor.com.sg
Service provider: Euromonitor International Ltd
Extension materials: [Final report](#)

Japan export symposium

An export symposium was held in Cairns to deliver a forum specifically designed to explore the opportunities the Japanese market presents while increasing the understanding of what the consumer is seeking in this market. Presentations from the symposium are available in the final report.

Discipline: Export focus **Ends:** 30/09/2014
Project code: VG13034
Contact person: **Email:**
Service provider: AUSVEG Ltd
Extension materials: [Final report](#)

Identifying market opportunities for Australian vegetables in China

This project focused on exploring opportunities for Australian vegetables in China. Research was conducted among Chinese consumers, as well as local retailers, wholesalers, government and thought leaders. The target market for Australian vegetables in China is large and open to considering Australian produce. Modern channels such as hypermarkets and premium retail should be primary target channels.

Discipline: Export focus **Ends:** 30/04/2014
Project code: VG12095
Contact person: Bill Morgan **Email:**
Service provider: Cognition Research
Extension materials: [Final report and vegenote](#)

Exporting to China – A symposium for vegetable growers

The aim of the symposium was to deliver a forum designed to increase the understanding of the Chinese market and consumer, increase understanding of how to tap into the Chinese market and successfully conduct business. Presentations from the symposium are available in the final report and are summarised in the factsheet.

Discipline: Export focus **Ends:** 30/08/2013
Project code: VG12093
Contact person: **Email:**
Service provider: AUSVEG Ltd
Extension materials: [Final report and summary factsheet](#)

Domestic and export market access and trade viability issues – Strategy to address

This project details a strategy to assist the Australian vegetable industry to open new domestic and export markets and make existing markets more viable. To deliver the strategy it was necessary to focus on three key issues: domestic and export impediments; relevant leviable products; and existing and potential markets. The final report includes case studies of export success, market analysis summaries, and an export viability checklist for growers.

Discipline: Export focus **Ends:** 30/04/2013
Project code: VG12042
Contact person: Michael Clarke **Email:** clarke@ageconplus.com.au
Service provider: AgEconPlus Pty Ltd
Extension materials: [Final report - including export market summaries and success casestudies.](#)
[Vegenote](#)

Removing barriers of food safety certification for vegetable exporters though GLOBALG.A.P. co-certification

This project supports the benchmarking of the Freshcare Food Safety and Quality Standard (FSQ4) against the internationally recognized GlobalG.A.P. standard. Successful completion of this benchmarking, and recognition of the Freshcare Standard by GlobalG.A.P., will help streamline compliance processes for Australian growers accessing export markets. The process is expected to be completed by mid-2017.

Discipline: Export **Ends:** 30/10/2017
Project code: VG16019
Contact person: Clare Hamilton-Bate **Email:** info@freshcare.com.au
Service provider: Freshcare Ltd
Extension materials: [Project details](#)

Export Development of Australian Vegetables to Japan

This project is focused on developing vegetable exports to Japan. The project will involve consumer research, competitor analysis and development and implementation of a market development strategy for Australian vegetables in Japan. The Queensland Dept. of Agriculture and Fisheries is the project leader and is working in collaboration with Trade and Investment Queensland (Japan Office), and The Agri Business and Western Australia Department of Premier and Cabinet (Japan Office) to deliver this project.

Discipline: Export **Ends:** 30/06/2018
Project code: VG15074
Contact person: Bronwyn Warfield **Email:** bronwyn.warfield@daf.qld.gov.au
Service provider: The Department of Agriculture and Fisheries (DAF)
Extension materials:

Vegetable Industry Export Program

This project incorporates activities in the following areas: export readiness, training and education, market development, market access; and communications and industry engagement. A number of export readiness checklists are available from the AUSVEG website (link below).

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|-----------------------------|-----------------------------|---------------|--|
| Discipline: | Export | Ends: | 26/03/2021 |
| Project code: | VG16061 | | |
| Contact person: | Michael Coote | Email: | michael.coote@ausveg.com.au |
| Service provider: | AUSVEG Ltd | | |
| Extension materials: | See website | | AUSVEG website |

China Insights Data for the Australian Vegetable Industry

Contact the project leader for details about this project.

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|-----------------------------|-------------------|---------------|--|
| Discipline: | Export | Ends: | 17/07/2017 |
| Project code: | VG16079 | | |
| Contact person: | Marc Soccio | Email: | marc.soccio@optusnet.com.au |
| Service provider: | AgInfinity | | |
| Extension materials: | 0 | | 0 |

Export facilitators

This project aims to help support vegetable growers to take advantage of commercial export opportunities. The project is being run in three parts, in Tasmania, Queensland, and in Western Australia, with WA as the overall facilitators. A network will be established between the regions to help coordinate growers' capacity to support foreign buyers.

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| Discipline: | Export | Ends: | 31/12/2020 |
| Project code: | VG16085 | | |
| Contact person: | Manus Stockdale | Email: | manus.stockdale@vegetableswa.com.au |
| Service provider: | West Aust Vegetable Growers Assoc Inc T/As Vegetables WA | | |
| Extension materials: | Project summary | | |

Environment

Landscape diversity and field-margin management

This project reviewed Australian and international literature related to the role of field margins and landscapes surrounding crop fields in providing resources to beneficial organisms and reducing arthropod pest pressure in vegetable and other crops. This review was used to generate recommendations on how to manage off-production habitats at field margins and in surrounding landscapes for vegetable pest suppression, and what is needed for this to be implemented by farmers.

Discipline: Environment **Ends:** 16/06/2016
Project code: VG14047
Contact person: Vesna Gagic **Email:** vgagic@gwdg.de
Service provider: CSIRO Sustainable Agriculture Flagship
Extension materials: [Final report](#)

Innovative ways to address waste management on vegetable farms

Vegetable production can result in the creation of large amounts of unwanted materials or waste products. The aim of the project was to enable the Australian vegetable industry to consider alternatives to plastic use and recycling, contributing to continuous improvement in farm management practices, efficiency and sustainability. Recommendations were made for the future of plastic management on vegetable farms.

Discipline: Environment **Ends:** 31/05/2015
Project code: VG13109
Contact person: Anne-Maree Boland **Email:** anne-mareeb@rmcg.com.au
Service provider: RMCG
Extension materials: [Final report and VA feature](#)

Environmental assessment of the vegetable industry

An environmental assessment was undertaken to measure the performance of the vegetable industry with regard to good environmental practices and also the impact it is having on the environment around it. This performance report provides the first environmental assessment for the vegetable industry. The report highlights the important environmental issues that were identified by different stakeholder groups and important issues that they say are emerging.

Discipline: Environment **Ends:** 2/02/2015
Project code: VG13057
Contact person: Anne-Maree Boland **Email:** anne-mareeb@rmcg.com.au
Service provider: RMCG
Extension materials: [Final report](#)

Economic evaluation of farm energy audits and benchmarking of energy use on vegetable farms

Infotech Research conducted 22 energy audits of vegetable growers around Australia. These audits best assisted medium-sized growers with farms and packing sheds in improving their business profitability through energy saving measures. The best returns on investment are achieved through prevention of energy losses (waste losses) followed by energy efficiency improvements.

Infotech Research produced a benchmarking report and options analysis to assist growers to evaluate their own energy consumption.

Discipline: Environment **Ends:** 15/12/2014
Project code: VG13054
Contact person: John Cumming **Email:** john@infotechresearch.org
Service provider: Infotech Research
Extension materials: [Final report, vegenote, factsheet, casestudy, energy saving calculator](#)

On-farm power generation – Options for vegetable growers

Research into on farm power generation has produced details of the options, and explored feasibility of adoption of such systems. Growers can use this to help them make informed decisions about the economic, technical and operational costs and benefits of the various technologies, the challenges of installation and operation, and the suitability of systems to individual ventures.

A summary factsheet, as well as factsheets on gas, solar and wind power were produced.

Discipline: Environment **Ends:** 31/10/2014
Project code: VG13051
Contact person: Gordon Rogers **Email:** gordon@ahr.com.au
Service provider: Applied Horticultural Research Pty Ltd
Extension materials: [Final report \(including detailed casestudies\) and factsheets](#)

Biogas generation feasibility study

This study was commissioned to explore in more detail the feasibility of biogas on Australian vegetable farms. Extensive consultation with industry was undertaken, including a number of case studies.

Analysis highlighted the complexity of determining biogas feasibility for individual farms. The analysis also suggests that the biogas technology is likely to be feasible for a small segment of the industry (large farms which generation large waste volumes and have high energy needs). For this reason future activities should be focused specifically on this segment.

Discipline: Environment **Ends:** 30/05/2014
Project code: VG13049
Contact person: Anne-Maree Boland **Email:** anne-mareeb@rmcg.com.au
Service provider: RMCG
Extension materials: [Vegenote and final report](#)

Remediation of soil contaminated by Salmonella enterica to expedite plant or replant of vegetables

This project was the first research study undertaken on survival of *Salmonella enterica* in soil contaminated with chicken manure conducted under Australian conditions. The research indicated that *Salmonella enterica* counts decline over time under natural field conditions after a contamination event. Solarisation (black plastic covering the soil) may have potential to promote faster die-off of *Salmonella enterica*, providing soil temperatures under the plastic have several hours at 37°C or above.

Discipline: Environment **Ends:** 31/05/2016
Project code: VG13039
Contact person: Robyn McConchie **Email:** robyn.mcconchie@sydney.edu.au
Service provider: University of Sydney, Faculty of Agriculture & Environment
Extension materials: [Factsheet](#) -

Understanding and managing impacts of climate change in relation to government policy, regulation and energy efficiency

This review identifies the potential threats, as well as opportunities, that relate to the current Federal Government regulatory framework. Outcomes from the project have been summarised on the vegetableclimate.com website and in the factsheet.

Discipline: Environment **Ends:** 25/02/2016
Project code: VG12049
Contact person: Gordon Rogers **Email:** gordon@ahr.com.au
Service provider: Applied Horticultural Research Pty Ltd
Extension materials: [Final report and factsheet](#) [More info on vegetable climate website](#)

Understanding and managing impacts of climate change and variability on vegetable industry productivity and profits

This review was commissioned by the industry in 2013 to provide a comprehensive assessment of the threats and opportunities around climate variability and climate change, and to develop a plan for the future. The Australian vegetable industry is in a strong position to deal effectively with climate change and vegetable growers have a greater capacity to adapt to change more than most other rural industries. Project outputs and materials relevant to the vegetable industry is available on the vegetable climate website.

Discipline: Environment **Ends:** 21/04/2013
Project code: VG12041
Contact person: Gordon Rogers **Email:** gordon@ahr.com.au
Service provider: Applied Horticultural Research Pty Ltd
Extension materials: [Final report and vegenote](#) [Website](#)

EnviroVeg Program for promoting environmental best practice in the Australian vegetable industry

EnviroVeg provides growers with guidelines and information on how to manage their business in an environmentally responsible manner. It provides a visible way of demonstrating a responsible attitude towards the environment. It also assists growers by showing the community that they are responsible environmental managers.

Growers can volunteer for free independent assessment of their environmental practices. The EnviroVeg manual is available on the website.

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| Discipline: | Environment | Ends: | 20/12/2016 |
| Project code: | VG12008 | | |
| Contact person: | Andrew Shaw | Email: | andrew.shaw@ausveg.com.au |
| Service provider: | AUSVEG Ltd | | |
| Extension materials: | Final report | | Website - including manual and other resources |

Carbon and sustainability – A demonstration on vegetable properties across Australia

A two-year study was conducted to demonstrate reduced GHG emissions management techniques on vegetable farms in Australia. On-farm demonstration of activities leading to reduced GHG emissions were packaged into case studies and informational products to provide the industry with an understanding of the importance of carbon and GHG emissions in the vegetable supply chain. A vegetable carbon calculator and links to other resources is available on the website.

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| Discipline: | Environment | Ends: | 19/06/2012 |
| Project code: | VG09190 | | |
| Contact person: | Peter Melville | | |
| Service provider: | Horticulture Australia Ltd | | |
| Extension materials: | Final report | | Carbon tool website |

Environmental effects of vegetable production on sensitive waterways

This project aimed to develop processes that enable vegetable farmers to address environmental concerns with respect to sensitive waterways, at a farm and community level. This has been achieved by identifying nutrient [nitrogen (N)] losses, validating nutrient application practices and developing tools to better manage nutrient application in vegetables and processes to engage with communities on issues associated with waterways. The activities were focussed in several vegetable growing regions that impact on sensitive waterways including Watsons Creek (Victoria), Lockyer Valley (Queensland) and Bowen (Queensland). The project developed a good agricultural practice guide, vegetable nutrient removal calculator, fertiliser use efficiency factsheets.

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| Discipline: | Environment | Ends: | 21/03/2014 |
| Project code: | VG09041 | | |
| Contact person: | Stephen Harper | Email: | stephen.harper@daff.qld.gov.au |
| Service provider: | The Department of Agriculture and Fisheries (DAF) | | |
| Extension materials: | Final report, vegenote and growers guide | | |

Economic and carbon emissions model for controlled traffic farming in vegetables

This project developed farm economic and GHG models relevant to different enterprise types in the Tasmanian vegetable industry. The models allow variables to be altered to conduct sensitivity analyses, thereby identifying the factors that are most important in delivering the benefits of CTF. This helps identify areas of focus for the adoption of CTF, and for future research and development.

Modelling showed CTF could increase average gross margin across the rotation by 66%, while seasonal controlled traffic farming (SCTF) could lead to a 16% increase, compared to the conventional production system.

Discipline: Environment **Ends:** 30/12/2012
Project code: VG09019
Contact person: John McPhee **Email:** john.McPhee@utas.edu.au
Service provider: Tasmanian Institute of Agriculture (TIA) - University of Tas
Extension materials: [Final report](#)

Revegetation by design, Queensland: Natural resource management and IPM

Experiments were conducted throughout the Lockyer Valley, QLD. These included: 1. The impact of early predation on pest populations, and how pest suppression was affected by land use, e.g. crops, grassland, bushland; and the sources of natural enemies at multiple spatial scales, e.g. farm, neighbouring farms, and landscape. 2. The contribution of an on-farm refuge for beneficial insects in landscapes with few and many beneficial insect sources. 3. The potential of two commonly observed predators to eat pests. Recommendations included trials of on-farm beneficial-refuge options for vegetable production systems in different regions, developing a decision-support tool to assist growers with plant selection, and investigation how the condition of native remnant vegetation affects the pest load and habitat for beneficial insects.

Discipline: Environment **Ends:** 30/03/2012
Project code: VG07040
Contact person: Nancy Schellhorn **Email:** Nancy.Schellhorn@csiro.au
Service provider: CSIRO Ecosystem Sciences
Extension materials: [Final report](#)

Creating Value from Edible Vegetable Waste

Established at the end of 2016, this project aims to address the issue of vegetable wastage on-farm and post-farm-gate. The project will develop new knowledge and processes to improve recovery of edible material. Avenues of exploration will include the extraction of 'nutraceuticals' from vegetable waste; the processing of edible waste into new fibre-rich, healthy raw ingredients and food products; and the use of fermentation to develop next-generation fermented vegetables. The project will have a focus on brassica vegetables and carrots. The project team are keen to engage with broccoli and carrot growers for ideas and input.

Discipline: Environment **Ends:** 20/12/2018
Project code: VG15076
Contact person: Mary Ann Augustin **Email:** maryann.augustin@csiro.au
Service provider: CSIRO
Extension materials: [Workshop presentation](#) [VegeNotes](#)

The EnviroVeg Program 2017-2022

The EnviroVeg Program 2017 – 22 is jointly managed by AUSVEG, Growcom and Freshcare. This revamped EnviroVeg program will align components from EnviroVeg, Hort360 and Freshcare Environmental to deliver a clear pathway to environmental assurance for Australian vegetable growers.

The program is the vegetable industry's own environmental program and previous EnviroVeg projects have provided resources to growers to develop and quantify their environmental practices. This new version of the program will support and improve environmental management on-farm and develop recognition and a competitive advantage for growers. Contact EnviroVeg Coordinator Andrew Shaw for further information.

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| Discipline: | Environment | Ends: | 28/02/2022 |
| Project code: | VG16063 | | |
| Contact person: | Andrew Shaw | Email: | andrew.shaw@ausveg.com.au |
| Service providers: | Growcom Australia, AUSVEG Ltd, Freshcare Ltd | | |
| Extension materials: | <u>0</u> | | <u>EnviroVeg website</u> |

Communications

Growing Leaders 2015

This National Vegetable Industry Leadership Program, develops skills of new and emerging leaders with a mix of theory, practical industry-based visits, and discussion panels with industry experts.

The program focuses on developing skills at three levels: personal, business, and industry. Therefore, all employees from all sectors of the industry, which includes growing, harvesting, processing, extension, exporters, importers, and marketing, are encouraged to participate.

Discipline: Comms **Ends:** 31/12/2018
Project code: VG15030
Contact person: **Email:** admin@ruraltraininginitiatives.com.au
Service provider: Rural Training Initiatives
Extension materials: [Link to program info](#)

Nuffield Scholarships

Nuffield Australia Farming Scholarships is a unique program that awards primary producers with a life-changing scholarship to travel overseas and study an agricultural topic of choice. Owners or managers of vegetable businesses should be encouraged to apply for the scholarship.

Discipline: Comms **Ends:** 30/09/2017
Project code: VG14065
Contact person:
Service provider: Nuffield Australia Farming Scholars
Extension materials: [Link to website](#)

Develop vegetable industry occupational health and safety resources

This project developed a suite of tools for growers to use to help them improve WHS practice on farm and in the packing shed. Approximately 1200 files of information have been provided on an easy-to-use carrot-shaped USB to 944 vegetable growers across Australia, called VegWHS. These USB drives are available from Adam Goldwater adam.goldwater@ahr.com.au.

Discipline: Comms **Ends:** 30/09/2015
Project code: VG13053
Contact person: Luke Rolley **Email:** luker@rmcg.com.au
Service provider: RMCG
Extension materials: [Final report, vegenote and large suite of tools available for growers](#)

VegWHS Training Resources

This project will create 8 x short video clips that can be uploaded to YouTube or other social media applications. The video clips will show levy paying vegetable growers how to use the VegWHS (the carrot USB's) resource.

The video resources will enable growers to access training at their convenience in a simple format (video), provide a low cost training outcome to the industry and extract additional value from the funds previously spent on the VegWHS resource.

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| Discipline: | Comms | Ends: | 2/06/2017 |
| Project code: | VG16031 | | |
| Contact person: | Luke Rolley | Email: | luker@rmcg.com.au |
| Service provider: | RM CONSULTING GROUP PTY LTD | | |
| Extension materials: | Final report | | Videos |

PMA ANZ Produce Executive Program Scholarships

Established in March, this project will support three industry scholarships each year from 2017 to 2020, for levy-paying growers to take part in the PMA A-NZ Produce Executive Program. The Program is an intensive course for middle and high-level vegetable industry managers from across the supply chain to advance personal and professional development.

The 2018 scholarship opportunities will be advertised in Hort Innovation and AUSVEG newsletters, as well as on the PMA-ANZ website.

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|--------------------------|--|---------------|--|
| Discipline: | Communications | Ends: | 3/04/2021 |
| Project code: | VG16031 | | |
| Contact person: | Anita Pike | Email: | apike@streamwise.com.au |
| Service provider: | Streamwise Learning Pty Ltd (Formally EMFOR Corporation) | | PMA-ANZ website |

Biosecurity

Strengthened biosecurity for the vegetable industry – Phase 1 and 2

Biosecurity is an important issue for the vegetable industry, both in terms of protecting Australian farms from pests and diseases we yet do not have, and maintaining our pest-free status for international trade. It is also important for minimising the spread of pests and diseases internally in Australia.

AUSVEG have a range of resources that are useful in managing biosecurity on their website (link below).

Discipline: Biosecurity **Ends:** 1/10/2018
Project code: VG15020 and VG1103
Contact person: Jessica Lye **Email:** jessica.lye@ausveg.com.au
Service provider: AUSVEG Ltd
Extension materials: [Biosecurity AUSVEG website](#)

Managing biting fly, a.k.a stable fly, in vegetable crop residues

This project evaluated methods of preventing stable fly (*Stomoxys calcitrans*) development from vegetable crop residues. Recommendations were generated for industry and growers, which were incorporated into Vegetables WA's (VWA) Good Practice Guide and reflected in the Stable Fly Management Plan (2013) within the Biosecurity and Agricultural Management (BAM) Act regulations to minimise stable flies.

Discipline: Biosecurity **Ends:** 15/08/2015
Project code: VG12022
Contact person: Don Telfer **Email:** don.telfer@agric.wa.gov.au
Service provider: Western Australian Agriculture Authority (WAAA)
Extension materials: [Vegetable, VegWA guide and final report](#)

Advanced stable fly management for vegetable producers

This project is investigating strategies to reduce the development of stable flies in crop residues left after vegetable harvest. As well as assessing the ability of the flies to lay eggs on residues, it is looking at the use of new machinery for deep burial of crop residues; the use of biological agents including beneficial fungi and predatory insects; and non-chemical approaches to removing stable flies from carrier animals.

Discipline: Biosecurity **Ends:** 30/09/2018
Project code: VG15002
Contact person: 0 **Email:** 0
Service provider: Western Australian Agriculture Authority (WAAA)
Extension materials: 0

Investigating on farm HACCP programs for managing plant pests of biosecurity concern

This project will see an options paper developed for a Hazard Analysis and Critical Control Points based biosecurity system to manage plant pests in Australia that are of concern to industry, and government biosecurity agencies. Initially, the paper will concentrate on some key pests for the vegetable industry; however the ultimate intent is that such a system would have broader use for the horticulture sector, and perhaps all plant industries.

Discipline: Biosecurity **Ends:** 4/04/2017
Project code: VG15051
Contact person: Grant Telford **Email:**
Service provider: BIOSECURITY SOLUTIONS AUSTRALIA PTY LTD
Extension materials: [Website](#)

Review of the National Biosecurity Plan for the Vegetable Industry

This project is reviewing the industry's current biosecurity plan. The revised plan will identify the current highest-risk pests to the industry, the risk mitigation activities needed to reduce the biosecurity threat, and the surveillance and diagnostic activities and capabilities available.

Discipline: Biosecurity **Ends:** 1/06/2021
Project code: VG15065
Contact person: 0 **Email:** [0](#)
Service provider: Plant Health Australia Limited
Extension materials: [0](#)

Surveillance of tomato potato psyllid in the Eastern States and South Australia

Its surveillance activities are designed to bolster psyllid surveillance already conducted under other industry work, for the early detection of tomato potato psyllid (TPP) should it cross from Western Australia into South Australia and the eastern states, including Tasmania. Surveillance involves potato crops as well as other solonaceous vegetables (including capsicum, eggplant and chilli), especially those grown in greenhouses.

The project continues to offer growers access to sticky traps for participation in the national TPP surveillance program, as well as training workshops on surveillance and identification.

Discipline: Biosecurity **Ends:** 1/05/2018
Project code: MT16016
Contact person: Calum Wilson **Email:** calum.wilson@utas.edu.au
Service provider: University of Tasmania
Extension materials: [Recorded training session](#) [Final report](#)

Control, eradication and preparedness for Vegetable Leafminer

The VLM project will prepare for the potential spread of the pest by developing management and surveillance packages, modelling the spread, and developing response plans in the event of a regional eradication. Throughout the project AUSVEG will deliver an extension program to improve awareness of VLM, and educate growers about methods of control as developed by project partners.

Workshops will be held in late 2017 in QLD and can be extended to other growing regions around Australia as the project progresses. These awareness workshops will include a farm biosecurity planning component, as developed by the AUSVEG Vegetable and Potato Biosecurity program. Workshops in later years will include a VLM management component, which will be informed by project partner findings.

Discipline: Biosecurity **Ends:** 1/09/2020
Project code: MT16004
Contact person: Jessica Lye **Email:** jessica.lye@ausveg.com.au
Service provider: AUSVEG
Extension materials: [Flyer](#) [Website with video](#)

Training

National Innovation Coach/ Hort 360

This project is part of the EnviroVeg program, and provides training through the pilot program. Hort 360 also host the environmentally focused self-assessment platform for the EnviroVeg project.

Discipline: Training **Ends:** 30/09/2018
Project code: VG16063
Contact person: Scott Wallace **Email:** swallace@growcom.com.au
Service provider: Growcom Australia
Extension materials:

Veg Inductions

This project involves creating a digital induction resource for entry-level workers in the vegetable industry. The resource will be ready for use in April 2018.

Discipline: Training **Ends:** 31/1/2018
Project code: VG16031
Contact person: Shane Ridley **Email:** shane@otrain.com.au
Service provider: Pinkmonkey Pty Ltd
Extension materials:

Basic Irrigation Skills Workshops

The workshop will deliver hands on training to irrigation operators in the vegetable industry. The training will cover; water - soil –crop relationships, understanding and managing the irrigation system, determining an irrigation schedule that matches crop water needs, measuring and interpretation of soil moisture monitoring information, and strengths and weaknesses of soil, plant and weather based approaches for irrigation decisions. The primary focus of the training will be the delivery of practical irrigation management tools and information to allow irrigation operators to improve crop yields and/or quality and profitability.

Discipline: Training **Ends:** 25/10/2018
Project code: VG16031
Contact person: Gordon Rogers **Email:** gordon@ahr.com.au
Service provider: Applied Horticultural Research
Extension materials: [Training guide](#)

Horticulture Code of Conduct Workshops

This half-day session covers an overview of the code, types of trading arrangements covered and paperwork and records required.

Discipline: Training **Ends:** 23/06/2018
Project code: VG16031
Contact person: Jill Briggs **Email:** jill@ruraltraininginitiatives.com.au
Service provider: Rural Training Initiatives
Extension materials:

Negotiation and Influencing Workshop

This two-day workshop covers negotiation and influencing skills, including how to communicate, increase confidence and develop practical skills.

Discipline: Training **Ends:** 21/06/2018
Project code: VG16031
Contact person: Edwina Swan **Email:** eswan.ens@negotiate.org
Service provider: ENS International
Extension materials:

VegInnovations 2018 Regional Roadshow

This series of workshops follows on from VG14031 (New product development for the vegetable industry). The workshops aim to help equip Australian vegetable growers and producers with the tools required to innovate and develop new products to maximise the value of their crops. Extension materials include a 'How-To Guide' and 'New Product Development Checklist', as well as videos with key messages from the workshops. There is also a resource guide of Australian companies that specialise in new food product development.

Discipline: Training **Ends:** 31/08/2018
Project code: VG16031
Contact person: Hazel Mactavish-West **Email:** hazel@mactavishwest.com.au
Service provider: MacTavish West Pty Ltd
Extension materials: [How-to Guide](#) [Website with videos, and guides](#)

AusChem Chemical Accreditation Level 3

A 2 day workshop covering safe chemical handling, storage and transport as well as safe application of chemicals using correct personal protective equipment and understanding chemical labels. This course includes ACCHM303 and ACCHM304.

Discipline: Training **Ends:** 31/05/2018
Project code: VG16031
Contact person: James Gorrie **Email:** james.gorrie@trainsafe.net
Service provider: Train Safe NT
Extension materials:

Chemical Handling for Vegetable Crops

This project is facilitating nationally-recognised Chemical Accreditation courses that are specific to the vegetable crops grown in the region where the training is taking place. There have been 15 two-day courses scheduled around the country.

Discipline: Training **Ends:** 20/10/2018
Project code: VG16039
Contact person: Sophie Lapsley **Email:** sophiel@rmcg.com.au
Service provider: Duff Consulting
Extension materials:

VegPRO Pest and Disease Training

Workshops delivered practical, hands on training for Pest & Disease ID in the vegetable industry.

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|-----------------------------|---|---------------|--|
| Discipline: | Training | Ends: | 30/11/18 |
| Project code: | VG16031 | | |
| Contact person: | Stuart Grigg | Email: | stuart@sgahortconsulting.com.au |
| Service provider: | Stuart Grigg Ag-Hort Consulting Pty Ltd | | |
| Extension materials: | | | |