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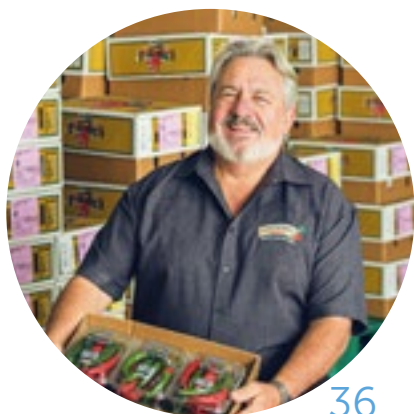
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Vegetables Australia is the most widely distributed magazine in Australian horticulture.



Editorial

As the 2010s draw to a close, it may be fun to sit back and think about how far we have come as an industry over the past decade. It is important to think about how we got to where we are today because knowing where we came from will help us forge our path to guide where, as an industry, we want to go.

Ten years may not seem like a long time, but in a world where technological advances are changing our habits and creating new norms, 10 years can seem a whole lot longer.

Ten years ago, no one took photos of their food for Instagram – it wasn't invented. Ten years ago, people couldn't opt for the convenience of food delivery services like Uber Eats – Uber wasn't available.

Ten years ago, digital technology was becoming more integrated in our businesses and our daily lives with the

advent and proliferation of smart phones, tablets and the 4G network.

What will the next decade bring? What technologies will our industry begin to adopt as we head into the 2020s? The next generation of farm robotics? Virtual and integrated realities?

What about the technologies that haven't been invented yet that change the way people farm, change the way people shop and change the way people eat?

The next 10 years will undoubtedly see a lot of change for the vegetable industry, but one thing that will not change is that people will need to eat; and they will need to eat vegetables.

To ensure we are capable of taking advantage of the newest technologies and social platforms, we need to attract the brightest minds to the industry and show them the tremendous opportunities that exist in horticulture.

To ensure we are capable of feeding a growing population fresh and convenient food, we need to supply fresher food to people all over the world in a form that they want to eat.

To ensure we are capable of helping the agriculture industry grow to a value of \$100 billion by the end of the next decade, we need to ensure we secure investment in research, innovation and product development. Growers have a big part to play in this by engaging with AUSVEG, Hort Innovation and the government to tailor the next generation of research investment so that it meets your current and future needs.

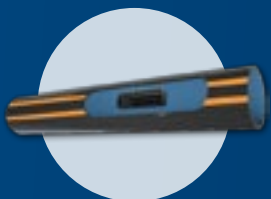
We do not know what the world will look like in 2030, but we cannot wait for it to arrive before we act. Let's celebrate how far we have come and strive to reach the potential that our industry can achieve.

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Message from the CEO

In a positive step forward for pest and disease detection, the first mobile pest surveillance unit, known as a 'sentinel', was unveiled at the Hart Field Day in South Australia recently. This forms part of a nationwide R&D initiative to provide Australia's plant industries with vital information about the presence of pests and diseases in different growing regions.

A total of eight sentinels will be constructed and deployed in different growing regions around Australia as part of a \$21 million program entitled *iMapPESTS: Sentinel Surveillance for Agriculture*. This project is led by Hort Innovation, through funding from the Australian Government Department of Agriculture as part of its Rural R&D for Profit program, as well with support from 17 partner organisations, including AUSVEG. More about iMapPESTS and its activities can be found on page 16.

Although projects such as iMapPESTS play a vital role in protecting Australia's agriculture and horticulture industries, we must do more to safeguard our borders from pests and disease. Therefore, AUSVEG is calling on the Federal Government to deliver the biosecurity imports levy, which is due to raise more than \$100 million per year to assist in this process.

The levy applies to all containerised (including empty containers) and non-containerised cargo imported into Australia by sea and will support a smarter and more efficient biosecurity system that protects our agricultural production, trade and environment.

Farmers already shoulder a large burden of cost for Australia's biosecurity system, and the flow-on effects of pests and disease incursions are significant, not only to producers, but to consumers and everyday people in big cities. Therefore, biosecurity is a shared responsibility between the federal and state governments as well as growers and citizens at large, so it is appropriate that our importers take a bigger role in funding our biosecurity systems given they are a significant pathway for pest and disease incursions.

A handwritten signature of James Whiteside in white ink, written in a cursive style.

James Whiteside
CEO
AUSVEG



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Commodity Profile:

Chilli



Chillies are grown across most states of Australia, with the majority of chillies being grown in Queensland. The major growing regions include Bowen and Bundaberg in Queensland; Carnarvon in Western Australia; and Mildura in Victoria.

Source: Australian Horticulture Statistics Handbook Vegetables 2017/18.

4,545 tonnes

of dried chillies were imported, while 129 tonnes were exported in the year ending June 2018 according to *The Australian Horticulture Statistics Handbook Vegetables 2017/18*.

48%

almost half of shoppers do not notice prices for chillies and close to one third of shoppers would pay any price to purchase chillies, according to Harvest to Home.

Project Harvest Wave 42 found that the main triggers for purchasing chillies are taste and to use as an ingredient in dishes. The key barriers to purchase are not wanting to waste any and consuming enough for their needs.



From 52 weeks to 10 August 2019, pre-pack chillies saw a decline in both dollar (-5.6%) and volume (-8.5%) sales compared to total vegetables which saw a dollar sales growth (4.7%) and a slight decline (-2.1%) in volume sales.

Source: Harvest to Home.

Three chilli spacing treatments were examined as part of a trial for project VG15010 – *A multi-faceted approach to soil-borne disease management* (VG15010): Current commercial spacing (6.1 plants/m of bed), 75 per cent of current spacing and 50 per cent. Compared to current spacing, the 75 per cent spacing treatment yielded 33 per cent more fresh market red chillies, while the 50 per cent spacing treatment yielded a 16 per cent increase.

Source: soilwealth.com.au.

According to Veggycation®, the most common organisms causing decay in chillies are botrytis, alternaria, and soft rots of fungal and bacterial origin. This can be minimised with good hygiene and temperature-controlled storage.

Published in 2019, a project reviewed low-cost protected cropping options, identifying shade structures, windbreaks and floating row covers as the most potentially effective options for vegetable growers. These options were subsequently trialled in a large number of growing sites around Australia. Crops grown during the trials included chilli. To find out more, search 'VG13075' on the InfoVeg database: ausveg.com.au/infoveg/infoveg-database.

Once harvested, chilli should be cooled as soon as possible to reduce water loss. Storage above 7.5°C causes water loss resulting in shrivel. Storage at 7.5°C is best for maximum shelf life (3-5 weeks); fruit can be stored at 5°C for 2 weeks and although this reduces water loss, chilling injury will begin to appear after that period.

Source: Veggycation®.



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Hort Innovation Vegetable Fund Annual Report 2018/19 now available

Pay a levy? Then you won't want to miss everything your levy dollars got up to during the most recent financial year, with the release of Hort Innovation's 2018/19 Fund Annual Reports.

Hort Innovation has developed an online portal that hosts each of its 37 Fund Annual Reports for 2018/19, which detail the research, development, extension and marketing investments that Hort Innovation administers to increase growers' productivity, competitiveness and profitability.

Each industry-specific report includes key investment and project information from the year, and is available to download from horticulture.com.au/annual-report-portal.

From this link you can also access a copy of the Hort Innovation 2018/19 Company Annual Report, which details activities and highlights across the entire portfolio of Hort Innovation's work.

If you prefer to read a hard copy of your Fund Annual report, you can request one for free by emailing communications@horticulture.com.au with the report you'd like to receive, and your mailing address (available while stocks last).

2018/19 snapshot of Vegetable Fund investment:

- \$18.2 million invested in research and development.
- 100 active research investments.
- Updated Hort Innovation website with dedicated Vegetable Fund section (horticulture.com.au/growers/vegetable-fund/).
- Hort Frontiers and cross-industry investments that will deliver value to vegetable industry.


Keeping track of Vegetable Fund investments

All investments in the Hort Innovation Vegetable Fund are detailed on the 'Your investments' page at horticulture.com.au/vegetable-fund. Hort Innovation also provides regular updates on news and alerts on its investments to its members. Anyone who would like to receive these updates can sign up for free at horticulture.com.au/sign-up.

AUSVEG will also provide regular updates on the wide range of industry projects and investments through its communications program, including the quarterly *Vegetables Australia* magazine.

Do you have a project idea?

Don't forget, ideas for research projects, or 'concepts', can be made by anyone in the industry, including growers. The process for submitting a concept is straightforward and quick. A concept for a research project can be made online via the Hort Innovation Concept Portal (visit edms.horticulture.com.au/Forms/ConceptFormV2).

Find out more 

To read the 2018/19 Vegetable Fund Annual Report please visit horticulture.com.au/annual-report-portal.

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AUSVEG National Public Affairs Manager Tyson Cattle.

Update on industry advocacy activities

AUSVEG has hit the ground running since the Federal Election result in May, working with the Federal Government and its new teams around a number of different issues. AUSVEG National Public Affairs Manager Tyson Cattle provides an update.

Labour continues to be the top issue for growers – from access to a reliable, efficient and competent workforce and improving compliance, to the introduction of Overtime for Casuals under the Horticulture Award and union representation as well as a National Labour Hire Licencing Scheme.

There is no doubt labour is a complex issue, and there is no ‘silver bullet’ that will address all of the above concerns in one simple and easy way.

AUSVEG is focused on all of the above labour aspects as it continues to push for a level-playing field in the industry. But, recognising the difficulty in getting action in this space through the Federal Government, AUSVEG has focused heavily on increasing the legal labour pool for horticulture growers.

Vegetable and potato growers particularly require a competent, reliable and efficient workforce for at least 12 months and beyond.

The current visa programs, particularly through the Working Holiday Maker program and Seasonal Worker Programme, which are the most popular among growers, do not provide adequate pathways for an employer to employ somebody for an extended period of time, of up to two years or beyond.

Industry Labour Agreement

AUSVEG has been working with its state members, horticulture industry bodies, federal and state governments and departments, as well as migration agents and skills assessment authorities, to work toward developing a Horticulture Industry Labour Agreement.

An Industry Labour Agreement is essentially an agreement entered into by industry with the Federal Government to help approved businesses access a skilled workforce.

This includes finding people for occupations such as irrigationists, production managers, forklift drivers, to production horticulturalists and quality assurance officers.

So far, this has been well supported by the Federal Government and industry bodies, as it would deliver a skilled workforce for the industry, and would also bring horticulture in line with other sectors such as pork, dairy and meat, which are already benefiting from their own industry labour agreements.

At the time of writing, the submission process is underway, and AUSVEG is hopeful an outcome won’t be too far away.

The agreement will be a significant step in the right direction to allow horticulture growers better access to a more reliable, competent, efficient and skilled workforce.

AUSVEG will continue to push for National Labour Hire Licencing Scheme to help growers deal with unscrupulous labour contractors, as well as working with and investing in programs such as Fair Farms to ensure growers understand their employer obligations.

Union representation is also a growing

concern among growers as the unions continue to look for ways to build their presence in horticulture. AUSVEG urges any growers who have concerns and examples of union activity to please get in touch.

Another issue that AUSVEG has been focusing on is the Federal Government plans to increase its Export Cost Recovery Arrangements, with some proposed increases as high as 277 per cent. This is unacceptable for industry, and while we support cost-recovery arrangements in general, cost increases that significant, with no transparency over costs and no improvement in service, will not be supported.

Improvements in Australia’s biosecurity is also high on the AUSVEG advocacy agenda, as the Federal Government looks to bring in a Biosecurity Imports Levy across all imports. This would lead to more than \$100 million per year to help strengthen Australia’s biosecurity and protect its clean, green and safe image.

AUSVEG also recently called for the repeal of the controversial Backpacker Tax following the Federal Court’s decision that the tax was a “form of discrimination based on nationality”, as it was in violation of tax treaties Australia had signed with eight countries.

AUSVEG has also been involved heavily in the review of the Research and Development Corporation (RDC) system, as well as consultation on the national Property Identification Code reform and increases in penalties for wage theft.

While there is still much to do in a variety of spaces for vegetable and potato industry, AUSVEG is well-placed to continue to build on its advocacy activities in 2020.

Find out more

Please contact Tyson Cattle on 03 9882 0277 or email tyson.cattle@ausveg.com.au.



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A new weapon for growers in the battle against soil-borne diseases

The Soil Wealth and Integrated Crop Protection (ICP) project works with growers nationally to put soil management and plant health research into practice. This column showcases the impressive new resource to assist growers to better manage soil-borne diseases – a practical guide that covers specific crops and addresses specific disease problems. *Soil Wealth ICP Phase 2 (VG16078)* and *A multi-faceted approach to soil-borne disease management (VG15050)* are strategic levy investments under the Hort Innovation Vegetable Fund.

Soil-borne diseases cause an estimated \$120 million in losses to the Australian vegetable industry annually, and are an ongoing challenge to all growers around the world. Knowing how best to manage them is key. A new practical guide to identification and control of soil-borne diseases will help Australian growers to incorporate these skills into their farming practice, regardless of whether they are currently battling disease or not.

Their ability to survive for long periods in the soil makes the control of soil-borne diseases particularly difficult. The diseases are caused by a range of fungi, bacteria, moulds, nematodes and viruses occurring in the soil. They also appear across a wide vegetable host range, making them incredibly difficult to avoid.

Modern intensive farming operations are under continued pressure from consumers for perfection. Growers are no longer able to rely on broad spectrum chemical treatments. Pests can be resistant to available chemical treatments, so growers are increasingly embracing Integrated Pest Management (IPM). This environmentally-sensitive approach uses a range of techniques to manage pests, rather than growers automatically reaching for a pesticide.

A helpful resource



Soil-borne diseases in vegetable crops - A practical guide to identification and control.

Soil-borne diseases in vegetable crops: A practical guide to identification and control fits seamlessly into this way of thinking, providing a valuable tool for the grower. Chapters are based around vegetable crop families, providing information on identification of the major soil-borne diseases for each crop. The guide outlines conditions that favour disease and methods available for control.

“Often, the most challenging thing for a grower is to correctly identify what soil-borne disease they may have. Without this it’s really difficult to effectively manage the problem,” the guide’s lead author, Dr Len Tesoriero from Applied Horticultural Research, said.

RM Consulting Group’s Carl Larsen is the manager of communications and resource development for the project.

“The soil-borne disease project team has incorporated the latest information, great photographs and innovative icons to produce a one-stop-shop ute guide. This makes it easy for growers and advisors to get the information they want to solve their problem, regardless of whether that’s identification or available controls,” Mr Larsen said.

Complementing the guide in supporting growers, the Soil Wealth and Integrated Crop Protection project operates across the country. Demonstration sites, master classes, field days, regional workshops and interest groups deliver best-practice management of soil-borne diseases. There are also a range of other great resources to assist in soil-borne disease management, including fact sheets, case studies, videos and past webinar recordings, which can be found on the project’s website: soilwealth.com.au.



Irrigation tips for summer

We all know good irrigation management gives you good plant and soil health outcomes. As crop growth and water use increases with the warmer weather, it is a good time to be thinking about getting on top of your irrigation. Below are some quick tips and tools to help get you ready for a potentially challenging summer growing season:

- Below average rainfall during 2019 may have reduced your water reliability. Check the seasonal rainfall outlook for vegetable growing regions (September - November 2019) to get some indication of potential in-season rainfall.
- Check your irrigation system is ready for the season.
- Check your subsoil moisture.
- Check your crop monitoring and soil moisture tools are working before it really warms up.
- Don't get caught out by rapid increases in crop water use in spring/early summer. Be aware of declining water quality as water becomes scarce.
- Understand irrigation decisions: from enterprise planning to the paddock.

Find out more R&D

You can access all the resources in this article, as well as news and events from around the country at soilwealth.com.au. For more information, please contact project leaders Dr Gordon Rogers on 02 8627 1040 or gordon@ahr.com.au and Dr Anne-Maree Boland on 03 9882 2670 or anne-mareeb@rmcg.com.au.

This project has been funded by Hort Innovation using the vegetable research and development levy and contributions from the Australian Government.

Project Number: VG16078

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The inaugural iMapPESTS sentinel showing the internal components and the solar panel array, situated at the Hart Field Day in South Australia's mid-north.

Introducing the latest tool in plant pest surveillance

The first mobile pest surveillance unit, known as a 'sentinel', was unveiled in September this year at the Hart Field Day in South Australia. The sentinel forms part of a nationwide R&D initiative to provide Australia's plant industries with vital information about the presence of pests and diseases in different growing regions. Shakira Johnson reports.

A collaboration between Australia's major plant industries aims to rapidly monitor and report the presence of airborne pests and diseases for multiple agricultural sectors, including viticulture, grains, cotton, sugar, horticulture and forestry.

The surveillance initiative aims to lay the foundation for a nationally coordinated, cross-industry approach to rapidly monitor and report the presence of airborne pests and diseases. Such information could be used by industry stakeholders to guide the direction or intensity of scouting efforts and pest control actions. The system could also facilitate a co-ordinated response to biosecurity efforts during exotic pest and disease incursions, including use in delimiting surveys and proof-of-freedom claims.

The iMapPESTS: Sentinel Surveillance for Agriculture is a five-year, \$21 million partnership program that is being led by Hort Innovation, with funding from

the Australian Government's Rural R&D for Profit Program, as well as 16 partner organisations.

Becoming mobile

A key feature of this project is the sentinel – a custom-designed mobile surveillance unit designed to offer optimal sampling of airborne fungal spores and insects. Its mobile nature enables the surveillance technology to provide localised information that impacts a specific region, which might not apply to growing regions in other parts of the country.

A prototype sentinel was launched at South Australia's premier agronomic cropping site, Hart, at the Hart Field Day in September. It is the first of several units to be developed by Primary Industries and Regions South Australia's research division, the South Australian Research and Development Institute (SARDI), as part of the iMapPESTS program.

SARDI lead scientist Dr Rohan Kimber is guiding technology partners in the development and construction of the sentinels. The sentinels will be deployed across the country, in various growing regions with the capacity to mobilise in response to industry and government surveillance needs. This mobility means the sentinel can provide localised information that impacts a specific region, which might not apply to growing regions in other parts of the country.

The sentinel is equipped with several airborne samplers, power supply,

a climate sensor, telemetry and an industrial computer to remotely control and monitor the unit, including automated robotics to change pots on the samplers according to the day or capture criteria.

Air samplers include:

- Two spore samplers, which are high-volume air samplers specifically designed to collect airborne spores.
- A two-metre insect suction trap to monitor localised insect dynamics.
- A six-metre insect suction trap, for monitoring of long-distance migratory insect flights.
- A BioScout system, a near real-time monitoring technology of fungal spores under collaboration.

A surveillance focus

The iMapPESTS team has been conducting surveillance activities at the Hart field site, which concluded in early November. During this time, the sentinel targeted pests and diseases present in the grains growing region. The data captured at Hart is now available to stakeholders via the iMapPESTS website.

A high-priority pest list for each major agricultural sector has been developed, with a focus on targets that affect multiple industries (e.g. green peach aphid and grey mould caused by *Botrytis*). After the sentinel captures airborne pests and diseases – including many long-distance dispersal insects such



Hart Field Day onlookers during a demonstration of the iMapPESTS sentinel. The roofline of the sentinel displays the individual air sampling devices, including (from L-R): pathogen sampler, BioScout system (pathogens), 6m pop-up insect sampler, 2m insect sampler, climate monitoring sensor and a second pathogen sampler.

as aphids and thrips – the samples will be dispatched to SARDI for inspection. The sentinels are being optimised for new and established advanced diagnostics techniques developed by SARDI to identify and measure abundance of high-priority pests and diseases under surveillance. This research will expand the capacity of current airborne surveillance technology and diagnostic tools.

SARDI is examining the airborne samples captured by the sentinel using highly specific and sensitive methods of analysis that have been designed for the targets of interest. The research and development of the application of these advanced techniques to pests will speed up identification and reporting; putting accurate, actionable information in the hands of growers to enhance pest management.

Meanwhile, some of the samples captured by the sentinel are also being sent to Agriculture Victoria to investigate the application of new pest diagnostic techniques for the broadscale detection of exotic pests and diseases using next generation sequencing (NGS) technologies, which will be particularly useful in mixed population samples captured by the sentinels. This sequencing means there will be high throughput capacity for pest and disease diagnostics.

Upcoming activities

Following the trial in the grains industry, the sentinel will make its way to the Barossa Valley where it will be trialed in a viticulture region. The trials provide learning opportunities, leading to engineering and operational optimisations and improvements. Beyond these early trial phases, the plan is to deploy the sentinel in the Adelaide Hills region of South Australia in early 2020.

A second sentinel is currently under construction and will be launched in northern Queensland in February 2020. This sentinel will focus optimisation of trapping and sampling in a tropical environment characterised by more adverse environmental conditions, before moving down through various growing regions of Queensland. By mid-2020, it is expected that several more sentinels will be launched across the country, reporting dynamic pest and disease information to all plant industries.

The iMapPESTS team will work with growers and industry representatives to understand the best way to communicate and visualise the dynamic pest information for end users, sharing which pests or diseases the sentinel is detecting in an area at a particular time. Growers and agronomists are encouraged to visit the iMapPESTS website for more information on surveillance outcomes.

iMapPESTS is supported by Hort Innovation, through funding from the Australian Government Department



The 6m pop-up insect sampler is at full sampling height during SARDI research scientist Rohan Kimber's presentation of the sentinel to the iMapPESTS team, comprising a multi-faceted research and industry network. Photography by Andrew Beveridge.

of Agriculture as part of its Rural R&D for Profit Program and AgriFutures Australia, AUSVEG, CSIRO, Cotton Research and Development Corporation, Forest & Wood Products Australia, Nursery & Garden Industry Australia, Plant & Food Research, Rothamsted Research, PIRSA-SARDI, Sugar Research Australia, DJPR, the Western Australian Department of Primary Industries and Regional Development, Wine Australia and Burkard Agri Limited.

Find out more R&D

Please contact AUSVEG Engagement and Adoption Coordinator for iMapPESTS Shakira Johnson on 0433 937 564 or shakira.johnson@ausveg.com.au, or visit imappests.com.au. You can follow the project on Twitter: @iMapPESTS.

For further information on the iMapPESTS program, see page 47 of *Vegetables Australia* March/April 2019 and page 36 of *Vegetables Australia* November/December 2018 at ausveg.com.au/news-media/publications.

Project Number: ST16010

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Carmel Ingram with Bonaccord Ingram employee Liezl Enever.



Yi-Ci Huang and Carmel Ingram.

Passion and commitment leading to horticulture success

For over 30 years, Carmel Ingram has worked alongside her husband Keith to manage the packhouse operation at Bonaccord Ingram, one of Victoria's largest vegetable growing operations. In 2019, Carmel was recognised for her contribution to the horticulture industry when she received the Boamaroo Nurseries Women in Horticulture award at Hort Connections. Michelle De'Lisle reports.

In her own words, Carmel Ingram prefers to work under the radar. As a member of one of Victoria's biggest vegetable growing operations, Bonaccord Ingram in East Gippsland, Carmel manages the packhouse and oversees a team that can fluctuate from around 65 to up to 160 employees, depending on the time of the season.

However, Carmel couldn't stay out of the limelight forever. Her hard work and dedication to the Victorian vegetable industry was recognised at the AUSVEG VIC Awards for Excellence in May this year when she took home the Boamaroo Nurseries Women in Horticulture award. This led to Carmel being nominated at the 2019 National Awards for Excellence at Hort Connections, and much to her surprise, she received that accolade too.

"To be one of 13 nominees, I found it a real privilege to be recognised," Carmel says.

"It was an absolute delight and a total surprise to win the regional award, but to win the national award as well – I'm still trying to get my head around it."

Farming journey

Carmel didn't always live and work on a farm. In 1980, she married a farmer, Keith Ingram – one of five boys, four of whom are still working at Bonaccord Ingram today – and knew very little about agriculture or horticulture.

"I've grown with the business and have learnt as we've gone along. I've had very good mentors in the family that I married into, and have gained my practical on-farm knowledge and advice from them. As the business has evolved, we've made mistakes but have learnt from them," Carmel says.

One of the biggest changes to the business occurred in 1985 when Bonaccord Ingram transitioned from a dairy farm into a vegetable growing operation. This was due to the falling returns on milk production, while there was strong growth in the vegetable sector, particularly in crops such as broccoli.

Fast forward to today, and Bonaccord Ingram has evolved into a 3,000-acre growing operation with crops including broccoli, carrots, cauliflowers, spinach, mescaline, cabbages (red and green), sweet corn and beans. There are also cattle and sheep on the property as well as barley

crops. In addition, the business has around 50 trucks to carry its produce up and down the east coast.

In her role as Packhouse Manager, Carmel oversees the grading and quality assessment of the produce along with the cutting, washing and packing that occurs.

Over the years, she has been a mentor for her employees as well as counsellor, and if that's not enough, Carmel sits on the business' health and safety committee.

Teamwork the key

The challenges that Carmel and Keith face stem from people management, especially in peak production season when staff numbers are at their highest. This is overcome by the pair taking the time to communicate with their staff and providing English lessons for those employees from the language other than English community.

"Ninety per cent of your problems stem from a lack of communication, and with a lot of foreign labour, you've really got to take the time to communicate and find different ways to communicate. Some of these people might not be able to understand English, but they can read and write English, so texting them on the

phone and things like that are important," Keith says.

Speaking to Keith and Carmel, there is a great sense that family and working as a team drive Bonaccord Ingram's success.

"We always emphasise that family is important. It keeps us grounded," Carmel says.

Family also underpins the operation's growth; it was part of the reason why the business exited the dairy industry. To financially sustain four families, the farm had to transition to vegetables. But it's not all about money, as Keith explains.

"We get a sense of pride to see the family business keep growing," he says.

"It's not all about the dollars. You're doing it because you love it. The business is the family and the family's grown – plus we all get along and it's successful."

Carmel and Keith are starting to slowly step away from the business and let the next generation take the reins. It is emerging, with the couple's daughter Anita returning to the farm earlier this year to take up a position in quality assurance.

"I can't imagine Keith will ever retire as such, but we're looking at just taking a little bit more time off each year," Carmel explains.

"To start handing the reins over, you've got to step back a little bit and not be about so much. That's my plan anyway!"

The final word

Carmel's advice to women looking for a career in the horticulture industry is to 'get your hands dirty'.

"Get down there and do your work experience to start with. Doing the manual work to start with, whatever it may be packing, sorting, tractor driving – if that's the line you want to go into, you've got to have that practical experience," she says.

And as a leader and mentor at Bonaccord Ingram, Carmel has wise words for others who have dreams of following in her footsteps.

"I think it's important to build a support network and have a mentor or advisers around you. Because as you mature, you'll hold yourself in good stead and it will pay off.


"If you have the passion, it becomes rewarding as opposed to being just a paid job. And it's two-fold: by having that mentorship, you yourself will grow into becoming a mentor."





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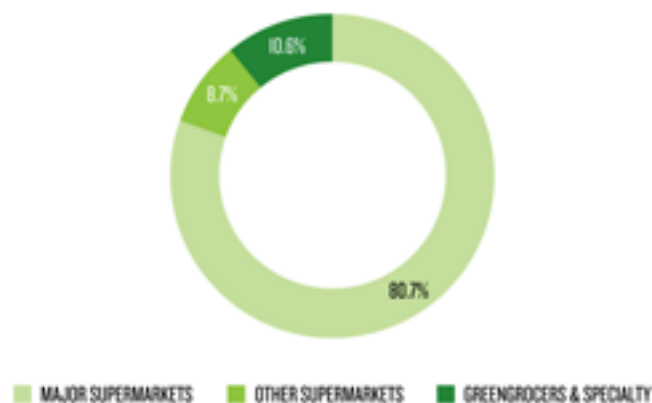


Latest Nielsen consumer data update: Lettuce

Hort Innovation has worked with global information and measurement company, Nielsen, to bring growers the largest series of insights into market performance and shopping behaviour yet. The latest update is on the Australian lettuce industry. Andrew Wang reports.

Figure 1

HEAD LETTUCE RETAILER DOLLAR SHARE OF TRADE

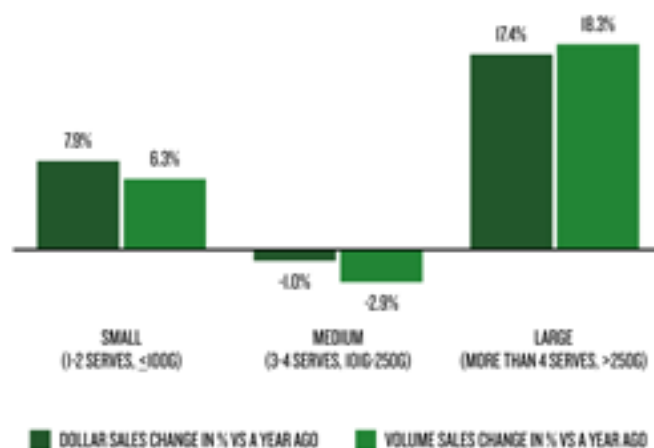


Source: Nielsen Homescan 52 weeks to 13/07/2019

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Figure 2

DOLLAR SALES CHANGE COMPARED TO YEAR AGO IN MAJOR SUPERMARKETS



Source: Nielsen Homescan 52 weeks ending 13/07/2019

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Lettuce purchasing statistics

In the 52 weeks to 13 July 2019, eight-in-ten Australian households have munched on head lettuce. However, as Australian households continue their quest to find convenient and healthy fresh food options, head lettuce recorded a growth in dollar sales (3.6 per cent), while volume sales declined (-2.8 per cent). Fresh and pre-prepared salads, on the other hand, increased annual sales in both dollar (5.4 per cent) and volume (3.2 per cent) terms. Priced, on average, 30 percent cheaper than pre-prepared salads, head lettuce is however still an attractive proposition for households trying to eat healthily on a budget.

Where do people currently buy lettuce?

The major supermarket chains continue to be the most important retail channel for head lettuce, accounting for over 80 per cent of total dollar and volume sales across the country. This channel was also the only one that generated growth for the category, with an increase of 5.3 per cent in dollar sales in the past year. In contrast, smaller supermarkets declined in both dollar and volume sales, while greengrocers saw relatively flat dollar sales and a decline in volume sales over the same period.

What are consumers buying?

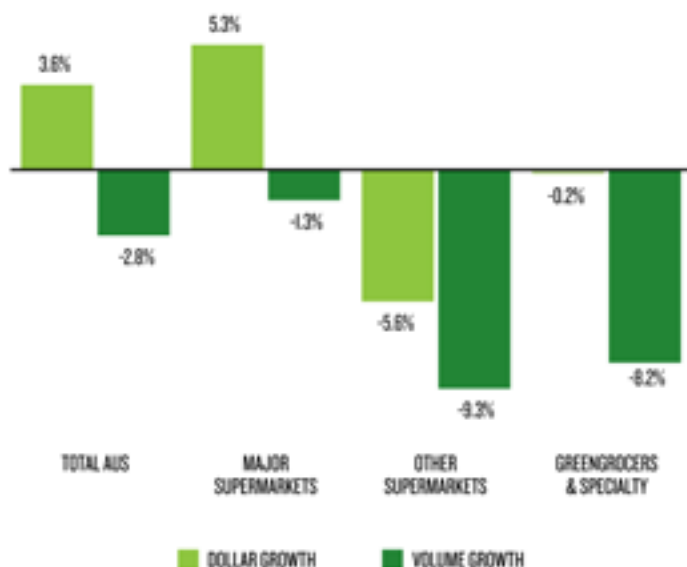
Much like fresh salad shoppers, lettuce shoppers saw a similar shift in purchasing preference, with these shoppers buying more convenient packages. In the past year, major retailers saw pre-pack head lettuce (e.g. cos, butter, oak) overtake loose head lettuce in dollar sales contribution, with pre-packs now accounting for 51 per cent of all head lettuce dollar sales.

Pre-pack head lettuce sold through major retailers continues to see growth, with households purchasing on average 5.6 per cent more frequently and spending 10.4 per cent more in the past year resulting in strong dollar (12 per cent) and volume (5.8 per cent) sales growth. In contrast, loose head lettuce recorded relatively flat dollar sales (-0.9 per cent) and declined in volume sales (-9.1 per cent).

In a recent survey prepared by Nielsen, lettuce shoppers claimed variety was the most important purchasing factor for lettuce, with almost three quarters of respondents claiming they always or mostly choose a specific variety over price and promotion. However, when respondents were asked in

Figure 3

HEAD LETTUCE RETAILER DOLLAR & VOLUME SALES GROWTH VS YEAR AGO



Source: Nielsen Homescan 52 weeks to 13/07/2019

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a prompted survey regarding varieties, just over a third of respondents were able to recall butter lettuce and less than three-in-ten respondents were aware of other varieties such as mignonette, oak and coral lettuce. Educating shoppers with in-store information and packaging that explains the lettuce varieties would be key to build awareness and help realise further growth opportunities for lettuce.

With head lettuce being a much cheaper option compared to fresh salad, it is no surprise that lettuce had a higher dollar sales distribution from low income households compared to fresh salad.

In addition to its lower price point, 85 per cent of respondents claimed they purchased lettuce to be eaten in a salad, making it the most favoured vegetable to be purchased for a salad.

Although head lettuce does not offer the same convenience as fresh salad products, it has the advantage of offering the same health benefits at a cheaper price point. Potential growth opportunities exist by increasing consumer awareness around lesser known types of head lettuce (e.g. butter, mignonette, oak) that fresh salad does not offer. Reinforcing the value that head lettuce provides, supported with simple and convenient recipes will be crucial to grow the overall consumption of lettuce.

Sources: Nielsen Homescan for the 52 weeks to 13/07/2019
Attitudinal reports prepared by Nielsen for Hort Innovation, survey sample minimum n=300, fieldwork from 24/04/2019 to 30/04/2019 for the Australian market. Copyright © 2019 Horticulture Innovation Australia.

Find out more

Please contact Chanel Day at chanel.day@nielsen.com.

The Harvest to Home dashboard is an initiative of the *Vegetable Cluster Consumer Insights* Program and is funded by Hort Innovation using the vegetable, sweetpotato and onion research and development levies and contributions from the Australian Government.

Project Number: MT17017

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Images by Roman International Photography.



Paul Glavocich with his wife Crystal and son Benjamin.

Vegetable growing: A risky business

Vegetable growing is more than throwing seeds into the soil and expecting them to grow. It is a livelihood for many, including Western Australian grower Paul Glavocich. In this edition, Paul speaks to Michelle De'Liste about his growing operation and its challenges, his role at vegetablesWA and how a benchmarking project has assisted him in recent business decisions.

Paul Glavocich understands that making tough decisions is vital to maintaining a profitable and sustainable vegetable growing operation.

The second-generation grower currently oversees a 10-acre property in Wattleup in Perth's southern suburbs, but until recently Paul owned another farm at Gingin in the city's north. However, after reflecting on the Gingin growing operation and its viability, Paul decided to concentrate on the Wattleup property that was started by his parents, Paul and Katy, over 30 years ago. Paul and Katy still work on the farm, along with a couple of permanent staff.

Currently, Paul grows parsnips, kale and silverbeet all year-round, with garlic and sweetpotatoes grown as seasonal crops.

Combating challenges

Like all growers, weather is a big issue for Paul, particularly with leaf lines. However, he has looked at ways to minimise the risk to those crops.

"I have cut back production a bit in the

times when the weather can be an issue, and then grow the other crops that can handle those conditions. I grow a bit more of my root crops during wintertime, when you have damaging winds and potential hail. You can't always predict the weather, but you try to, to the best of your knowledge," Paul says.

Water is another challenge and so are the rising costs of operating a farm.

"These are issues that people have got to learn to work with," Paul says.

Furthermore, there is the challenge of urbanisation in the inner-city suburbs where growers have been operating for generations. This is causing them to look further afield which Paul says is understandable, but there are roadblocks.

"People are buying land but are being told they can't clear it for horticulture. The Government's putting agriculture in the same category as developers. How are we meant to grow the industry if the land that the farmers used to have that was closer to Perth is getting taken away for residential areas? People are moving further out of Perth and then they're buying this land and the Government's saying no (you can't clear it), that's native vegetation," Paul says.

"How is the Government expecting industry to get ahead? I think there should be a bit of forgiveness for people who are feeding the country. We're using the land for productivity and these are only areas that we have, because people are being pushed further out from the CBD.

"It's really hard to find farms close to Perth. You've got to start moving up to Gingin or down to Myalup, which has been the case for years."

Advocacy activity

To ensure his voice is heard on issues affecting the Western Australian vegetable industry, Paul joined the vegetablesWA Committee of Management just over a

year ago. Meetings are held every three months, where these and other topics are discussed between growers and industry members.

Paul joined the Committee so he can have an input in order to benefit the vegetable industry, and he encourages other growers to do the same.

"If growers want to better the industry, then the best way is to get involved with the body that supports it. Instead of sitting on the fence, put your voice out there. That's what vegetablesWA is there for. Everyone's welcome to speak up."

Paul also encourages vegetable growers to attend networking events.

"I know being a grower can mean you are time-poor, but even if you just go to one of the networking events once every three months or six months, you can be involved," he says.

Getting down to business

Over the past two years, Paul has been involved in *Vegetable business benchmarking* (VG17000), a strategic levy investment under the Hort Innovation Vegetable Fund. Led by vegetablesWA, this project is engaging with Western Australian vegetable growers like Paul to identify production and financial benchmarks and to uncover the drivers of best practice performance.

Paul is an ardent supporter of the benchmarking project.

"I'd encourage Western Australian growers to get on-board with benchmarking because it's helping people figure out what it's really costing them to run their business and getting average costs for growers who produce the same lines as you," he says.

"Being involved has given me a view on where my costs are in my business and the crops I was growing, and the money I was really making. Look at the crops that

you're growing and why are you growing them. Are they profitable or are you over supplying, which is not making them profitable?

"Just because you need to make a hard decision on your business, it doesn't mean that it's actually *bad*. Selling my Gingin farm was a hard decision that I had to make, because it was going to better my business. The crops that I was doing weren't suitable. I think benchmarking can help people make the right decisions and know where their business is heading."

Additionally, to maintain disease resistance and ongoing sustainability of the farm, Paul engages in crop rotation practices and has implemented an irrigation and fertilising program that can be used remotely from his phone. He has installed biosecurity measures for anyone entering the farm, and is also a pilot member of the current EnviroVeg program, an industry-led initiative that promotes best management techniques by providing resources, support, engagement and a pathway to certification recognition for vegetable producers.

A growing passion

Despite the challenges and the tough decisions that have accompanied him over the years, Paul is still enjoying being on the farm. As the business owner, Paul runs the day-to-day operation and he still gets his hands dirty out in the field.

"I'm quite happy at the moment with the way my operation is running. It's only a small operation, but I'm happy with the customers who I deal with and the lines that I'm growing," he says.

"I like watching the plants grow and their progress. Every day you know you're doing something productive, and I lead a good lifestyle. You are your own boss. I can see that I've planted something, spent an amount of time growing it and then I've sold it. To me, that is rewarding."



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Developing emergency procedures

The Fair Farms team shines the spotlight on emergency procedures and what the requirements are for agricultural businesses when implementing an emergency plan, as well as how to maintain these procedures once they have been developed.

Agriculture is among the most dangerous Australian industries to work in, and with the fire and storm season upon us, there is no better time to review your emergency procedures.

Depending on your business, emergency situations you need to prepare for might include fire, explosions, power outages, medical situations, rescues, incidents with hazardous chemicals, and natural disasters such as cyclones or floods. Being adequately prepared for these events is crucial in keeping you, your employees, and your business safe.

The Fair Farms Standard requires that businesses have thorough emergency procedures that meet their environmental risks, and effectively train their employees in how to implement them.

What is an emergency procedure?

An emergency procedure is a written set of instructions that outlines what workers and any visitors should do in each type of emergency. To determine which emergencies you need to prepare for, undertake a basic risk assessment of your workplace. For example, if your employees often work near creeks, you need to have a clear procedure for flooding; if working with flammables, then a clear emergency procedure is vital. Procedures do not need to be lengthy or complex, but you do need an easy to understand plan for each emergency outlined in your risk assessment.

What do I need to include in an emergency procedure?

The person responsible in your business for Work Health and Safety (WHS) creates emergency procedures and may do so in consultation with workers. These procedures need to include:

- Chain of Command – make sure your team knows who is in charge in an emergency or disaster situation.
- The immediate response to the emergency e.g. removing people from a danger area.
- Evacuation procedures – assembly procedures and points, accounting for employees.
- How to notify emergency services and who does this.
- How to provide medical assistance.
- How emergency information will be communicated at the workplace.
- Testing of procedures.

The Fair Farms Standard also requires that businesses have a trained and appointed fire warden as part of their procedures. Fire wardens are responsible for preventing fires by being aware of and reducing potential fire hazards in the workplace, and for implementing the emergency procedures for a fire. Fire warden training can be undertaken in person or online through multiple Registered Training Organisations. You should also contact your local fire service, who can help with advice about controlled burns and managing risks.

Next steps

Once you have developed your emergency procedures, it is very important to train your staff in how to implement the plans. In emergency situations, staff need to know what to do very quickly to ensure everyone's safety, including their own.

Be aware that rules change. To ensure your procedures are up-to-date, make sure you review them annually against the Fair Farms Standard. If you do find that your procedures need updating, amend them and re-train your staff in those changes. You should also review your procedures when there are major changes to your business, such as re-location, refurbishments, staff number/composition or new business activities.

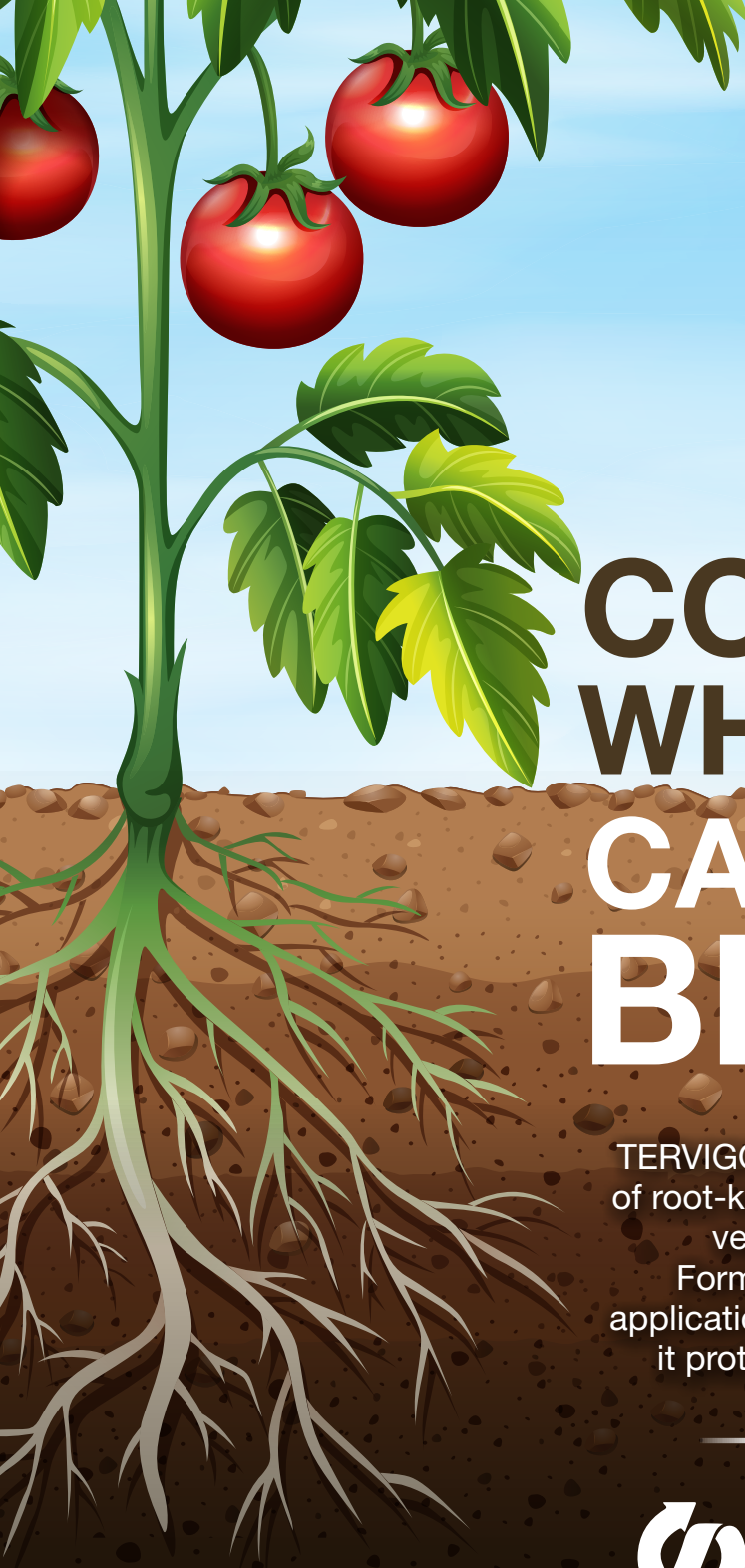
For Fair Farms training across any element of the Standard, or for more information about Fair Farms, visit: fairfarms.com.au or email us at fairfarms@growcom.com.au. A further resource is the SafeWork Australia – Emergency Plans, which can be found at safeworkaustralia.gov.au/topic/emergency-plans-and-procedures.

Find out more

Visit fairwork.gov.au and growcom.com.au for more information regarding your obligations as an employer.

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Positive relationships between kids and veg: A growing Phenomenom

'Phenomenom' is a digital toolkit for Australian teachers that aims to help engage children with vegetables and cultivate their curiosity around fresh food. It includes a suite of springboard webisodes, audio and PDF lesson plans, and has continued to expand its reach into classrooms and demonstrate impact over the past 12 months.

With only six per cent of Australian children reaching the Recommended Dietary Intake of vegetables, a project was commissioned by Hort Innovation in 2018 to develop and deliver digital food education resources that promote healthier attitudes to food, with a focus on changing children's perceptions of vegetables.

Since its launch in May 2018, 'Phenomenom' has produced 26 springboard webisodes as well as 59 lesson plans and resources for teachers, and eight episodes of its new podcast for families, *Nomcast*.

The project's success was recognised when it took home Best 'Healthy Eating' Campaign of 2018 at the Parents' Voice Fame and Shame Awards. These awards recognise campaigns that promote healthy food and activity to children in a fun and appealing way.

Educational opportunities around perceptions of, and aversions to, vegetables through digital media (VG16018) is a strategic levy investment under the Hort Innovation Vegetable Fund.

Veggies + maths = success!

Over the past 12 months, Phenomenom has received investment from the mushroom and onion industries that allowed the project to create a webisode featuring Australian secondary school teacher Eddie Woo. Eddie is globally known for his online mathematics lessons published on YouTube, with nearly 700,000 subscribers to his channel.

The latest Phenomenom video incorporated the vegetable commodities and combined them with maths in a fun, easy-to-learn way.

The mushroom and onion industry-funded project added to the existing vegetable levy-funded project with one springboard webisode, nine PDF lesson plans, podcast series, teacher guidebook and workshops with teachers.

Not only do the new materials expand the reach of the original materials, they also frequently reference vegetables.

"For example, with onions we thought the students might want to explore the notion of diameter and radius and concentric circles, so we created an episode around that. We also explored the magical world of the mushroom underground within that same episode with a fantastic animated sequence," Project Lead Alice Zaslavsky said.

This webisode is now online; however, it has had far greater reach beyond the internet with the episode screening on all Qantas flights as well as being played at Federation Square during the Little Food Festival, a children's food festival held in Melbourne.

"The Little Food Festival was held over the AFL Grand Final week in Melbourne, so there was a lot of foot traffic. People were getting to see the episode and experiencing what Phenomenom is all about," Alice said.

Further opportunities

Vegetable growers are steadily becoming more involved with Phenomenom. At the time of writing, the *Ag Heroes* video series was being created, which focuses on opening the world of agriculture up to secondary students in Years 9 and 10 to show them the opportunities that exist within the sector.

So far, Jessica Toth from Costa

Mushrooms has spoken about her passion for growing, while in the veggie space, siblings and growers Hope and Jake Shadbolt from Scotties Point Farms were set to be filmed in November 2019.

Academia is also taking notice of this project. Alice and her team have been approached by universities, which are interested in researching its implementation and approach to teaching.

"We're looking to partner with Monash University and the Australian Research Council to create an implementation study and a research study around how Phenomenom can be built upon, and how we can make it even bigger," Alice said.

Phenomenom is also working with the ABC to develop further education tools around native foods following a successful segment featuring Wardandi Bibbulmun woman Auntie Dale Tilbrook.

"I think there is so much more that we can explore in that area. Connecting kids back to country will pique their interest in other ways – not only about vegetables, but also about how they can be more sustainably-minded and more conscious consumers," Alice said.

A learning curve

In March this year, Alice became a mother for the first time with the arrival of her daughter Hazel. Since then, she sees the Phenomenom project differently as it is now closer to home.

"I think being a mother now has both enriched my understanding of Phenomenom and the project moving forward; but it's also gone another way – Phenomenom has enriched my own understanding of what it means to help to engage young people, including babies, with vegetables," Alice said.

"From our research, we have learnt that one of the most important things for children to see is positive role modelling from whoever is around them enjoying vegetables. From about two months old, Hazel was leaning in to see what we were eating, and so as soon as she hit six months old (because that's the recommended age for introducing vegetables), we've been popping a new vegetable on her plate every day."

Alice explained her involvement, and the reasons that this project is close to her heart.

"The reason why this is meaningful to me is because I believe that everybody benefits from learning to love vegetables – beyond feeling better, you're learning to explore new things and you get out of your comfort zone," she said.

Eddie Woo on set with Phenomenom stars Billy and Maddy.



"They're really important attributes for a person to have and I think that for a child to build up their resilience through something like food – they have the option to eat something at least three times a day, and for them to use it as an opportunity to not only nourish themselves, but also to push themselves, is really exciting."

Meanwhile, Alice recently attended a round-table discussion, hosted by the Victorian State Health Minister, which focused on childhood obesity.

"To be able to get to that point felt like an achievement within the project because it shows that even at a decision-maker level, it is seen as something worthwhile and worth listening to," Alice said.

"It was also good to hear about what's going on in this space. These days, it feels like the conversation is moving forward. Rather than talking about the doom and gloom, it's actually about cultivating more. We need to offer more beyond just saying, 'vegetables are good for you' – and I think that is what Phenomenom does."



Billy discovers that mushrooms can be eaten raw from grower Jess Toth.



Find out more R&D

For more information, please visit phenomenom.com.au.

Nomcast podcasts can be found at: omny.fm/shows/nomcast/playlists/podcast.

This project has been funded by Hort Innovation using the vegetable research and development levy and contributions from the Australian Government.

Project Number: VG16018

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EnviroVeg Program: What's next?

In 2019, the EnviroVeg Program underwent a pilot phase and feedback collated from participating vegetable growers was used to drive the next stage. Now incorporating improved features, the program is open to all levy-paying Australian vegetable growers. *The EnviroVeg Program 2017-22* is a strategic levy investment under the Hort Innovation Vegetable Fund.

The EnviroVeg program was established to improve the longevity of vegetable growing regions, benchmark industry data and develop industry recognition for environmentally responsible, sustainable production methods. EnviroVeg is industry-led and promotes best management techniques by providing resources, support, engagement and a pathway to environmental certification for those businesses looking to take that next step.

Program steps

1. Self-assessment

The EnviroVeg self-assessment is an online tool housed within the Hort360 platform operated by Growcom. There are 10 areas to complete in the self-assessment.

Once it's completed, an EnviroVeg report is generated for each business, including benchmarking information and identifying the areas where good practice is already occurring, and the priority areas for focus and possible change.

2. Training

EnviroVeg training delivers in-depth analysis of business management practices based on the needs identified through the self-assessment stage. The training will prepare a business for an audit if that is what a business is seeking.

3. Certification

The EnviroVeg program provides a pathway to Freshcare Environmental certification for those growers seeking this step. Once certified, EnviroVeg program members can utilise EnviroVeg branding for marketing and industry representation, knowing that this is underpinned by a quality, recognised, third-party environmental assurance program.

Program pilot

Throughout this year, the EnviroVeg program, including the linkages with Growcom and Freshcare, was piloted with vegetable growers from across key growing regions. Feedback from these vegetable growers has been collected and used to help improve the EnviroVeg self-assessment and the EnviroVeg training program.

There are a range of reasons why vegetable growers have participated in the EnviroVeg program:

- Recognition for environmentally sustainable practices.
- Benchmarking farm practices over time to track improvement.
- Benchmarking farm practices against similar businesses.
- A report that summarises farm management priorities.
- Access to up-to-date research and information on sustainable practices.
- Review the efficiency of inputs and outputs.
- Environmental certification for the potential benefits in the marketplace.
- Environmental certification for the benefits when communicating with local community, local government and natural resource organisations.

Getting involved

The EnviroVeg program has been reviewed and tested by the pilot growers and is now ready for vegetable growers to join.

During 2020, there will be no charge to access the EnviroVeg self-assessment as well as receiving the EnviroVeg farm management report and benchmarking information.

"EnviroVeg was the next step for our business.

"The self-assessment highlighted areas where we already had the practices in place and we just needed to formalise our paperwork. We now have the evidence we're doing the right thing."

– EnviroVeg pilot grower 1

"Waste management was an eye-opener. Our business has changed a lot of our ways in the recycling area. After the training, we placed a greater focus on our approach to waste, together with a few small changes, and now it just works."

– EnviroVeg pilot grower 2

Find out more

Please visit enviroveg.com.au.

For help with accessing the EnviroVeg self-assessment, please contact AUSVEG EnviroVeg Coordinator Danielle Park on 0432 324 822 or at danielle.park@ausveg.com.au.

This project has been funded by Hort Innovation using the vegetable research and development levy and contributions from the Australian Government.

Project Number: VG16063

**Hort
Innovation**
Strategic levy investment

**VEGETABLE
FUND**



Tomato-potato psyllid eggs and adult captured in 2019 winter in an abandoned chilli plot in Western Australia.

TPP pictured in a chilli plot.
Images courtesy of vegetablesWA Industry Development Officer Truyen Vo.

Farmgate hygiene: The importance of cleaning up after harvest

In this column, AUSVEG National Tomato-Potato Psyllid Coordinator Alan Nankivell discusses post-harvest practices that can be undertaken to reduce the lifecycle opportunities for TPP as well as other on-farm pests.

Tomato-potato psyllid (TPP) lives on green plant material from solanaceous crops, which includes tomato, capsicum, chilli, eggplant and potato. There are also other hosts that have no economic benefit, such as the night shades and bush tomatoes, which need to be managed around the borders of fields.

One of the key findings from the Western Australian incursion in 2017 is that the psyllid appears to have the ability to 'over winter' on host plants, and wait for the growing season to commence in earnest during spring. If the numbers are high at the beginning of the season, then they will rapidly multiply and present as a major management issue early. Additionally, if TPP numbers get out of control, they – like all other sucking insects – will impact on crop yield and produce quality as well as increase the risk of spreading pests. To control the impact of TPP, it is important to minimise the numbers that can over winter.

Minimising risk

As with many crops, on-farm hygiene is an important element to farming best-practice.

This is particularly so for the effective risk mitigation of TPP. Cleaning up and disposing of green plant material that is past its productive usefulness will reduce the opportunity for over wintering of TPP.

The general practices of farmgate hygiene, which apply to other pests and diseases, also apply to TPP. The integration of farmgate hygiene practices and routine standard operating procedures will mitigate against the impact of many pests, not just TPP.

Key points to note:

1. Understand the lifecycle and behaviour of TPP.
2. Routinely undertake monitoring of fields and their surrounds, either by observation or trapping, to know which insects are present (pest and beneficial).
3. Once the economic value of the crop is exhausted, remove the unwanted green plants and dispose of promptly using methods such as composting or burning that kill unwanted pests.

Finally, there is value in regularly reviewing the Farm Biosecurity website as it is continually updated with management strategies and information on the management of new pests. This information can be found at farmbiosecurity.com.au.

Find out more

For more information on this program, please contact AUSVEG National TPP Coordinator Alan Nankivell at alan.nankivell@ausveg.com.au.

Tomato potato psyllid (TPP) National Program Coordinator has been funded by Hort Innovation using the vegetable, fresh potato and potato processing research and development levies and contributions from the Australian Government.

Project Number: MT16018

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The Seasonal Worker Programme delivering benefits for Timor-Leste

The Seasonal Worker Programme is an important means of employment for workers in Timor-Leste that provides an important avenue of work for its citizens. The programme helps to develop skills and provides remittances for workers, which are vital for the economic development of the small nation, as Lucy Rodgers from the Embassy of the Democratic Republic of Timor-Leste explains.

Timor-Leste is located under 700km north of Darwin and is one of Australia's closest neighbours. The country has just celebrated the 20th anniversary of the Popular Consultation that delivered independence after centuries of Portuguese and Indonesian occupation. Timor-Leste continues to experience high levels of poverty, chronic food insecurity, high unemployment, and a high stunting rate among children due to lack of nutrition.

Timor-Leste's high levels of unemployment is especially relevant for the younger generation. Timor-Leste has one of the youngest populations in the world, with over 33 per cent of the population between 15-24 years old. However, youth make up only 14 per cent of the labour force, and more than two-thirds of unemployment.

Employment options

Two means of employment in Timor-Leste are through its two labour mobility programs with Australia: the Seasonal Worker Programme (SWP) and the Pacific Labour Scheme (PLS). Both programs provide an avenue for employment, skill development, and remittances, which are vital for the economic development of the small nation. The SWP allows workers from nine Pacific Island countries and Timor-Leste to work in Australia in the agriculture and accommodation sector for employers who can't find local labour to meet their labour needs. Timor-Leste has been in the SWP since 2011, and has sent just under 1,400 workers to Australia in 2018. As of 2019, Timor-Leste is the third largest provider of seasonal workers, with the highest percentage of women.

Timorese have placements in the SWP across Australia in a variety of sectors, crops and positions. Timorese work with strawberries, citrus, vegetables, pome fruits, avocados, mangoes, quinoa and grapes, among others crops. They carry

out a range of roles, including forklift drivers, packers, pickers, and pesticide efficacy. The program is designed so that workers can return to the same employer year after year, which minimises training and training costs for employers, and maximises efficiency.

Timor-Leste's Strategic Development Plan 2011-2030 outlines the key areas of focus for the country, which specifies agriculture, fisheries and tourism as key areas for development outside of natural resources. A vital aspect of Timor's labour mobility is developing skills in these areas. English, horticultural and hospitality knowledge, along with soft skills, are vital to Timor's economic growth. The effect of remittances, along with the skills and language development while overseas, mean that the SWP is a powerful tool for economic development and employment.

Remittances are a vital component to the success of labour mobility. Remittances were Timor-Leste's largest source of revenue after oil and aid in 2017. Remittances from Australia reached over US\$3 million in 2017, which averages out to US\$4,000 per seasonal worker. The remittances are predominantly spent on daily expenses, house renovations, and education – injecting money into the community. We have seen businesses opened, including cafes, convenience shops, chicken farms and transport companies.

The SWP has provided employment and hope for young Timorese while delivering Australian employers with access to much-needed labour. With labour mobility programs like the SWP and the more recent PLS, it is hoped that more Timorese will be able to earn money, gain skills and have the opportunity to invest back in Timor-Leste.

Find out more

Please visit employment.gov.au/seasonal-worker-programme or call 02 6240 5234.



A Timor-Leste seasonal worker picking strawberries at a farm in Tasmania.

"I have worked in the Seasonal Worker Programme for five years harvesting lettuce. The money I earn from the programme is used to help my family, as I am the only one in my family that is employed. My country has gone through many challenges, but through the SWP I am able to learn and grow my future. I want to say thank you very much to the Australian and Timor-Leste Governments for this great opportunity that helps young Timorese like myself."

- Jacinta, Timor-Leste
Seasonal Worker, 2019

Unveiling new products to Queensland veg growers

In October, Queensland vegetable growers joined agronomists and other industry members to gain an insight into the latest crop protection products and technologies that will enter the Australian market throughout the next 12 months. *Vegetables Australia* reports.

Agronomists and growers were among guests invited to join Syngenta at two GrowMore Experience Sites in Queensland during October.

Featured were two new products for cucurbits and fruiting vegetables, as well as a soon-to-be-released insecticide for silverleaf whitefly, thrips, mites and lepidoptera.

This follows recent news that Syngenta will grow its global R&D investment to \$2 billion over the next five years to help growers sustainably meet agricultural challenges while delivering two technological breakthroughs a year.

Syngenta Technical Services Lead Shaun Hood said the Bundaberg and Ayr sites had been great opportunities to share insights with those guests.

"We're very lucky – so too is the industry – that we have such a strong portfolio coming through. That's particularly the case in cucurbits and fruiting vegetables. There are a lot of new products coming to market," he said.

"GrowMore is all about demonstrating our new products – even those that are yet to hit the market – in a commercial spray program."

The October events were a follow-up to the inaugural program Experience at Gatton in November 2018, which launched the concept in Australia.

The Gatton field walk featured nine crops across one hectare. The subsequent Ayr and Bundaberg events were more focused, to satisfy the particular crop interest of guests in their own backyard.

"Even six and seven months on from Gatton, people were asking us when the next one was going to be, hoping it would be a little closer to them so they could see the products working in their environment," Shaun said.

"We had always planned on expanding the Experience, giving an ongoing opportunity for advisors and their growers, and we are glad we got to take it to some new areas for the 2019 events."

Targeting resistance

For this year's events, Syngenta created a commercial spray program that included ORONDIS® FLEXI Fungicide, just weeks after its launch. This new fungicide combines azoxystrobin (Group 11) and oxathiapiprolin (Group 49) to help the industry manage downy mildew resistance.

Also featured was PROCLAIM® OPTI Insecticide, the successor to PROCLAIM®, newly formulated with PEPITE®

technology for advanced ease-of-use and user safety while targeting a greater range of lepidopteran pests, and in even more crops.

Guests even benefited from a first glimpse of the new insecticide MINECTO® FORTE Insecticide, which is currently under evaluation by the Australian Pesticides and Veterinary Medicines Authority.

It contains a Group 12a insecticide – a first for chewing and sucking pests in cucurbits and fruiting vegetables – as well as a Group 28 for lepidopteran control, and will offer enhanced efficacy and resistance management.

"Syngenta Potato and Vegetable Product Lead Peter Werbenec said of all the questions people ask at field walks, one always cropped up more than the others: 'What's in your pipeline?'," Shaun said.

"Fortunately, we've been able to launch two important products this year with PROCLAIM OPTI and ORONDIS FLEXI. And there's more to come, with new products next year and every year after, for the next five years."

EE Muir & Sons Agronomist Damien Macdonald is based in the Burdekin, and he welcomed the local focus for 2019.

"I attended the Gatton site last year," Damien said.

"It's a terrific opportunity to just see what chemistry is coming with your own eyes and, more importantly, to understand what these products are about before they even hit the market.

"You're digesting what you're seeing for your customers, where you will see these products being used and how they will fit into their programs."

The Ayr site was established at the Queensland Department of Agriculture and Fisheries Research Facility, coordinated by independent research agronomist Chris Monsour.

"There have been other sites in Queensland, but this is great for local growers, advisors and consultants to be able to see the chemistry in their own backyard, under their conditions," Chris said.

Find out more

For more information, please contact your local Syngenta Territory Manager, the Syngenta Advice Line on 1800 067 108 or visit syngenta.com.au.



EE Muir & Sons Agronomist Damien Macdonald was among the attendees at the Ayr GrowMore Experience Site.



Images by Nichole Taylor Photography.

Kevin Hoang

Age: 30

Location: Marrakai, NT

Works: HP Fresh Produce Pty Ltd

Grows: Okra

How did you first become involved in the vegetable industry?

I first got a taste for horticulture in 2009. Originally from Melbourne and studying IT (Computer Science and Software Development), I came to Darwin on a holiday and was helping my Aunty pick bitter melon on her farm. After graduating, I could not find a desirable job so I decided to work on my Aunty's farm for a living. I entered the vegetable industry in 2016.

What does your role in the business involve, and what are your responsibilities?

As a small business, I pretty much have to handle most of farming duties including soil tillage, seeding, fertigation, spraying, managing day-to-day picking and packing, communicating with wholesalers, quality control and maintaining farm machinery. My responsibilities are to make sure the farm is running smoothly, the fruits are picked on-time, the quality meets our client standards, and that the crops are staying healthy and free of disease. And the most important thing is that the business is making a profit.

What do you enjoy most about working in the vegetable industry and how do you maintain your enthusiasm?

I love to see things growing from the dirt. Nature is amazing. As a vegetable grower, it is a proud moment when you're

doing your job well and are recognised by other growers around you. Strengthening your business reputation in the market, and having people in the industry who know your name, is the prize that every grower wants to achieve. To maintain that enthusiasm, I have to hold myself to a high standard. I keep studying from several sources to update the latest technology in the industry. And I always think about advancing my career.

What are the biggest challenges you face working in the industry, and how do you overcome them?

Challenges for vegetable growers are pretty much the same. Pests, diseases, yield, the ratio between input in the business and income to make the business profitable, the weather in the Northern Territory, and the market. Here's a few key issues:

Pests: Caterpillars are the most destructive insect of vegetables. They are hard to control because moths lay eggs every day. A day later, egg masses hatch and become larvae and start feeding on the leaves and then the pod. Two-spotted mites are another big problem up here. They are resistant to most of the chemicals available now, and their reproduction is fast enough that if we do not have proper managing plans, mites can wipe off the entire crop in a matter of four weeks.

For the first year, I had no experience of pest management and I sprayed hard



chemicals aggressively like other growers around. This method did not seem to work very well. Then in the second year, I started attending Integrated Pest Management (IPM) demonstrations, which were being hosted by NT Farmers. This is a way of pest control by reducing the spraying of hard chemicals; introducing biological-friendly insecticides, fungicides, fertilities; and releasing good insects to keep the population of bad insects acceptably low. Overall, after two years of practicing this approach, I have significantly improved yield. I have reduced the yield lost from pests, have less input by reduced spraying, and a better fertility program. Through this approach, I have turned over more profit to invest in better input products, and the farm now is moving towards an organic system. Hopefully we can be organic in five years' time.

Diseases: Due to the extreme dry season in the NT, powdery mildew and downy mildew can decrease the yield and shorten the life of plants. Root-knot nematodes are also big problems every grower in NT has to face. I did some research and started taking action to improve the soil condition and increase organic matter – micro- and macro-organisms in the soil would help to reduce those diseases above without using too many chemicals. So, the key learning for me is to be a successful grower, I need to maintain biodiversity in my growing area and keep the growing environment as similar as possible to the natural environment.

Less chemical spraying allows predatory insects to balance the pests themselves. I think going organic is the right way of long-term farming.

Yield: By monitoring fertigation input and engaging in regular soil testing, we can maximise soil fertility and achieve the best results. By carefully undertaking a soil fertility program, I have recorded a yield increase of 1.5 times compared to the first year, and I keep getting it higher over the years.

How does growing vegetables differ in the Northern Territory to the rest of Australia? Are there any challenges that you, as a grower up in the NT, face (that other growers may not)?

We have dry seasons and wet seasons that are too long, which poses a big challenge for veggie growers in the NT. During the Dry Season, we have extreme windy conditions which bring a lot of pests and disease to the crop. This includes mites, fruit damage and fungus, while low-temperatures and drought contribute to poor nitrogen levels and poor moisture in the soil. On the other hand, during the Wet Season we have more caterpillars, while heavy rain and thunderstorms could take the plants down and reduce crop quality. Also, by this time, we have higher competition from other states as growers start their season.

Where do you receive your on-farm practice advice and information from?

From NT Farmers: They provide courses, the IPM demo sites and the fact sheets; the Internet: I have done a lot of research and studying in horticulture; Other growers: Fence-to-fence conversations are very useful, so we know what others doing and exchanging experiences is a great way of learning; From agronomists: they are great at introducing good products and the latest innovations in horticulture.

What new innovations, research and/or practices has your business implemented recently? What are you doing differently to other grower operations?

My farm was one of the first to adopt IPM practices when it was first introduced in NT. We've found ourselves recording our second successful year in a row by adopting IPM. At first, people were doubtful about what we were doing, and it was supposed that we could fail. But the

result was terrific – we got less insects, less diseases and more crop than anyone else around growing okra. Now some people have started practising an IPM program like we did.

I invented a spraying boom which can spray four rows at the same time. Conventional spraying available in the market can only spray one row at a time. With this new implement, I have reduced spraying time to three times; it is 2.5 times less fuel to run tractor; two-times less chemical run-off as the new boom gets closer nozzles to the plants so less pump pressure is needed, therefore there is less chemical fall-off.

Where do you see yourself in five years?

I want to keep doing what I am doing now. But as I said, I would try to become an organic grower. I will also look to expand the business to grow more crops so they can be rotated around.

How do you think more young people could be encouraged to study and take up jobs in the vegetable industry?

The vegetable industry is highly labour-intensive. It requires a lot of work done outdoors. I see young people that could potentially handle these jobs. Vegetables are essential part of the food chain and are important for people's dietary intake. With more people involved in this industry, we can provide higher quality, safer veggies to consumers and consumers can have a cheaper, healthier diet. This industry also provides a lot of career opportunities for young people. It is challenging but if you succeed, the reward is generous.



Kevin Hoang and his wife Vy Le.
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L. trifolii damage to chrysanthemum.

American serpentine leafminer: A threat to horticulture

The American serpentine leafminer (*Liriomyza trifolii*) is a small fly belonging to the family Agromyzidae. It infects plant species from 29 plant families including many vegetable, ornamental and legume crops. Currently, Australia remains free of this leafminer species but it is now well-established in nearby countries, including Indonesia. However, if the pest does establish in Australia, it could threaten our horticulture industry. AUSVEG Biosecurity Officer Madeleine Quirk reports.

The Research, Development and Extension program for control, eradication and preparedness for vegetable leafminer (MT16004) was developed in recognition of the extensive impact that vegetable leafminer (VLM; *Liriomyza sativae*) could have on the vegetable, nursery and melon industries if it were to move into production areas with no management plan in place. Project partners include Cesar, Plant Health Australia, Northern Australia Quarantine Strategy (NAQS), the University of Melbourne and AUSVEG.

The project has recently expanded to investigate two closely related leafminers, *Liriomyza trifolii* and *Liriomyza huidobrensis*. These pests have been recognised as potential threats to Australia's vegetable, nursery, melon, and

potato industries, and neither species is present in Australia.

The following is an overview of *Liriomyza trifolii* (*L. trifolii*), commonly known as the American serpentine leafminer, focusing on the pest's biology, distribution, effect on horticultural industries worldwide, and chemical and biological control strategies.

Pest overview

Adult *L. trifolii* can grow between 1-1.7 millimetres. The thorax and abdomen are grey/black with patchy yellow regions, while the head is completely yellow. Females will use their ovipositor (a tubular organ which can rasp through the leaf surface) to insert eggs just below the leaf surface that hatch between 2-5 days after being laid. Eggs are too small to be seen by the naked eye, so a seemingly healthy plant may be harbouring the pest without us knowing.

Inside the leaf tissue, colourless larvae grow to 3 mm, and as they move through three instar phases, the larvae become yellow-orange and exit the leaf at the third instar phase. Larvae pupate externally to the leaf, usually in the soil below the plant, from which adults emerge 7-14 days later.

The duration of *L. trifolii*'s life cycle varies with temperature. At 28 degrees Celsius (°C), a single cycle can be achieved in 14-15 days. At lower temperatures, the cycle takes longer. Research has shown that adults will not feed or lay eggs at temperatures as low as 12°C.

L. trifolii larvae feeds internally on living plant tissue, particularly plant leaves, reducing photosynthetic activity and causing premature leaf drop. Unlike many other leafminers, the American serpentine leafminer is polyphagous (it has a broad host range from a number of families). It also has a high reproductive rate and has developed resistance to several classes of broad-spectrum insecticides.

Ornamental crops, legumes and vegetables are affected by the pest. Host families include Apiaceae (celery), Asteraceae (chrysanthemum, gerbera, lettuce), Brassicaceae (broccoli, cauliflower), Cucurbitaceae (cucumber, melon, pumpkin), Fabaceae (beans, lentils), and Solanaceae (potato, tomato, capsicum).

Damage from this pest reduces both marketability and crop yield, and has resulted in economic losses to growers globally. Examples include:

- Between US\$18 and \$21 million damage per year to Californian greenhouse ornamental growers in the early 1980s.
- \$93 million in damage to the Californian chrysanthemum industry between 1981 and 1985.
- 80 per cent losses to celery growers in Florida in 1980, estimated at US\$9 million.

Risk of spread and establishment in Australia

Major risk entry pathways for leafminers into Australia are by importation of infested ornamental host plants, cut



Adult American serpentine leafminer. Images courtesy of Central Science Laboratory, Harpenden, British Crown, Bugwood.org.

flowers, leafy vegetables and seedlings. Human-assisted entry can also occur, e.g. illegally on plant material.

Globally, *L. trifolii* dispersal and establishment has occurred rapidly, with populations found on most continents, including Europe, Asia, Africa, Central America, the Caribbean, North America, South America and Oceania (American Samoa, Guam, Fiji and Tonga). It has recently been identified in Indonesia. Movement of cut flowers and infested chrysanthemum cuttings have played a major role in the spread of *L. trifolii* from its original range in the Americas to other regions in the world.

While *L. trifolii* is not yet present in Australia, many horticultural production regions in Australia have climatic conditions similar to locations overseas where it has already established, and therefore could be at risk of establishment. It is a heat-tolerant species, meaning it will thrive in tropical locations, potentially tolerating temperatures near 35°C. It does not adapt as well to cool-climate regions as other leafminers, but it could maintain populations year-round in protected environments such as greenhouses.

Chemical and biological control

L. trifolii can rapidly develop resistance to various chemical groups, particularly organophosphates, carbamates, diamides and pyrethroids, which can make control difficult. Application of broad-spectrum insecticides often results in larger leafminer populations as these insecticides reduce the reservoir of natural enemies (parasitoid wasps as well as other generalist predators like spiders), which

keep leafminer populations in check. Overseas, several insecticides are used for the control of *L. trifolii*, including but not limited to abamectin, azadirachtin, chlorantraniliprole, cyromazine, indoxacarb, spinetoram and spinosad. Currently, Plant Health Australia (PHA) is seeking to obtain insecticide permits for control of *L. trifolii* and other *Liriomyza* leafminers in Australia as a preparedness measure for growers. PHA will be releasing a contingency plan in coming months, which includes further details on these applications.

Nevertheless, many species of parasitoid wasps have been recorded attacking the pest. MT16004 project partners from Cesar and the University of Melbourne are currently reviewing international literature to investigate the suite of parasitoids that attack *L. trifolii* worldwide, and they will cross-reference this list with those that already exist in Australia.

They have already identified possible parasitoid species for future control of *L. sativae* and have identified several wasp species attacking Torres Strait and Seisia populations. Some of these wasps are also found in other regions of Australia, which is promising for future management of vegetable leafminer. It is highly likely that the same, or similar, suite of parasitoids that might control *L. sativae* populations in Australia could also assist in potential control of *L. trifolii*.

Further Reading

- Capinera JL. 2017. American serpentine leafminer, *Liriomyza trifolii* (Burgess). University of Florida.



- Reitz SR, Gao Y & Lei Z. 2013. Insecticide use and the ecology of invasive *Liriomyza* leafminer management.



Find out more

Any unusual plant pest should be reported immediately to the relevant state or territory agriculture agency through the Exotic Plant Pest Hotline (1800 084 881).

For further information, please contact AUSVEG's Extension and Engagement Team on 03 9882 0277 or email science@ausveg.com.au.

This project has been funded by Hort Innovation using the vegetable, nursery, melon and potato research and development levies and contributions from the Australian Government.

Project Number: MT16004

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Think Global, act local: growing your exports

For the vegetable industry to boost its value of its fresh exports to AUD\$315 million by 2020, a strategic approach must be taken by businesses that want to explore new markets for their fresh and value-added products. This not only requires persistence and patience, but also knowing where you can go for help. Shaun Lindhe speaks with leading vegetable exporter Austchilli about its export journey and how the rest of the industry can learn from its experiences.



The strong performance and continued development of food and fibre exports will be a vital component for the future growth of the Australian agriculture industry as it strives to reach the ambitious target of \$100 billion in value by 2030.

While other agricultural industries have seen significant growth through exports, the untapped potential of horticultural exports is an important avenue to increase agriculture's value – and the vegetable industry will prove to be a key player for this increased growth.

In 2018/19, the vegetable industry produced a total of 253,000 tonnes of fresh vegetables for export, at a value of AUD\$287 million. The vegetable industry has prioritised investment in developing the export capabilities and market opportunities for Australian vegetable growers, with AUSVEG delivering VG16061 – *Vegetable Industry Export Program*, a strategic levy investment under the Hort Innovation Vegetable Fund.

The vegetable industry's export growth target is a 40 per cent increase in value to AUD\$315 million by 2020 – the industry is well on track to exceed this target.

A big part of this success can be linked to the program delivered by AUSVEG, with its most recent independent review indicating that growers attributed \$20.3 million in revenue benefits as a direct result of the program in 2018, producing a net benefit of \$18 million and a return on investment of 882 per cent.

The program works one-on-one with growers around Australia to build their understanding of the exporting process and provides them opportunities to build business relationships and develop markets for their products. One of the businesses that has been involved in the program is Austchilli.

Austchilli – think global, act local

Austchilli is a family-owned business founded by David De Paoli in Bundaberg, Queensland, over 20 years ago. Austchilli is a privately-owned, vertically-integrated business that provides sustainable fresh and value-added products for local and international markets using state-of-the-art business management systems.

The business is the largest chilli company in Australia and started its export journey over 20 years' ago with a single product in a single market. Now, the

business exports fresh chillies and value-added products, including its AvoFresh cold-pressed avocado range, to 12 countries across three continents.

According to Austchilli owner David De Paoli, the business had a strong export and value-added focus from the outset as part of its strategic plan and as a way to mitigate risk to grow the business.

"Back in the early days the retailers were a significant portion of our business – and they still are," David said.

"But a realisation for me has been that we've got to act locally, but think globally – whether it is fuel and gas prices, or a natural event going through a specific area, even though we are growing produce in Australia we are all intrinsically connected, whether we like it or not.

"You have to open your mind and really think about the supply chain in that way so that you move past the farm-gate approach, and worrying about your domestic market as a survival tactic, to thinking about a strategic risk-managed export strategy."

Remain flexible to remain relevant

A key aspect of thinking globally and acting locally is to concentrate on who is buying your product, what they want and being able to change to meet their expectations and demands.

"You need to do your consumer research for each country that you want to explore," David said.

"One size does not fit all – because what consumers want tends to be very specific. I've got AvoFresh flavours that sell really well here that do not sell very well in other countries, as the flavour profile of their customers is different.

"You really need to understand your customer and take a staged approach – get your product over there with a partner, sense check it and do your consumer research.

"For example, the chillies we export are unique varieties that are specific to the countries where we export. We don't just do the red cayenne chilli, which is your standard everyday chilli in Australia.

"These markets look for unique products and consistent supply, as their customers' tastes can change very quickly – this is why you need to remain flexible to remain relevant."



Images by Paul Beutel Photography.

The two Ps – Persistence and Patience

While Austchilli has been in the export space for over 20 years, it still abides by the same principles that has resulted in its successful export journey – develop relationships, remain competitive, deliver the best-quality service, innovate and stay ahead of the competition.

“You need to understand that export markets are slow to develop and take a lot of time – you’ve got to go back and revisit and revisit and revisit and build trust. Once you’re there and you have that trust, they want to do more business with you,” David said.

“If they want one box in one A.V. to start with, that’s where you start. It’s generally a small base and you build it slowly. Your growth curve may only incline slightly for a couple of years, and all of a sudden the trajectory goes north because you’ve built that trust and they want to do more with you.”

“Export is a marathon, not a sprint.”

According to David, it is important to remember that there are people out there who can help, including the Export Development team at AUSVEG that delivers the *Vegetable Industry Export Program*.

“What I like about the AUSVEG export program is that it is a soft entry,” David said.

“So, for example, in the markets we are active in there are two main benefits from this program. We look to AUSVEG around leveraging our existing demand chain so that we can find new potential buyers for our products.

“The other side is that when you do a soft entry you can go onto a platform where you can showcase your products, engage with lots of people and come back to your business with a taste of what the opportunities are.

“You do a trade show with AUSVEG and you get a feel for it, you get a taste for it and you engage with potential customers and see what they are looking for.”



Growing the vegetable pie

It is these same principles – persistence and patience – that has helped the broader industry work with many growers across the vegetable category to boost the value of the overall industry.

According to AUSVEG National Manager – Export Development Michael Coote, the strategic approach to building fresh vegetable exports will undoubtedly pay dividends.

“The vegetable export sector is in a unique position to experience sustained growth as a result of the work that AUSVEG, Hort Innovation, AusTrade and exporting growers have done in the last five years,” Michael said.

“Horticulture industries that have a high export value, for example citrus and table grapes, have achieved this growth in part because the industry has invested in a long-term, strategic approach to obtaining market access, and growing and supplying specific markets.

“As the vegetable industry includes a wide range of different crops, all with different dynamics affecting trade, it is important that we take a whole-of-industry approach to grow the entire vegetable category. There are many opportunities that exist for specific vegetable products and value-add opportunities, which is why the industry’s

efforts have focused on delivering a program that has multiple elements to benefit growers at different stages of export maturity.”

The benefit of the Aussie brand

The vegetable industry is poised to take advantage of increased demand for high quality Australian product that is supported by a well-coordinated, strategic industry approach to exports and the strong reputation of the Australian brand.

But while Australian product has a strong global image, at the end of the day growers need to be competitive in an increasingly global market to survive.

“The Australian brand has a great level of credibility, but it is not going to make you sell your product just for the sake of having the logo on it, we’ve got to be competitive on price,” David said.

“If our competitors are growing a good quality crop with a good price that you can’t get close to, don’t waste your time.

“So if you’re in a commodity where you can’t grow at a global price, look for a value-added option and chase that market, because the reward is going to be much better.”

Helping the world Taste Australia

Efforts by Hort Innovation to promote Australian fruits and vegetables in key export markets through the Taste Australia initiative are also proving to be beneficial in growing the value of horticultural exports.

"Australians are well-known throughout the world; there hasn't been one country that I have been to where I wasn't welcomed. Anyone of any ethnicity will come up to you at a trade show and want to talk to you because you're Australian – Taste Australia does a great job at marketing that and leveraging it to the benefit of our growers," David said.

"It welcomes discussion and welcomes opportunities, as the credibility of Taste

Australia allows for a lot more free-flowing conversation. This can lead to people seeing our product and wanting to know how they can get our products on their shelves."

But at the end of the day, it does not matter what people think of Australia as a brand, the most important selling point as an industry is to be able to supply enough quality product at a competitive price to satisfy international buyers.

"From an export serviceability perspective, you need to be there all the time and you've got to build trust. It is a slow build and it takes persistence and patience to secure these markets, but the effort is worth it," David said.

Where should I start if I want to export?

"You can also think of your export journey in stages. For example, stage one as an exporter can be to chase a developed market – it's mature, the infrastructure is there and the know-how is there," David said.

"But as you evolve, you can then look to chase the developing markets once you have more fiscal capability, as they are younger, growing and offer much higher rewards.

"There's a lot that you learn as you go, but there are a lot of people out there who can help you so that you make fewer mistakes.

"The AUSVEG Export Development team has a good grasp on what is available to growers and how they can provide advice, so I would recommend anyone looking for more information to get in touch."



Find out more R&D

For more information, please contact AUSVEG National Manager – Export Development Michael Coote on 03 9882 0277.

The *Vegetable Export Development Program* is funded by Hort Innovation using the vegetable research and development levy and contributions from the Australian Government.

Project Number: VG16061

**Hort
Innovation**
Strategic levy investment

**VEGETABLE
FUND**

Vegetable Industry Export Program

The vegetable industry's export development project, a strategic levy investment under the Hort Innovation Vegetable Fund, aims to improve the capabilities and capacity of the Australian vegetable industry so that it can increase vegetable exports.

The program is delivered by AUSVEG and involves a range of activities, including:

- Export readiness training for growers looking to commence exporting and those looking to improve exporting performance.
- Market development activities including a combination of inbound and outbound trade missions to build growers' understanding of export market supply chains and facilitate connections with international fresh produce buyers.
- Working with industry, Hort Innovation and government to prioritise market access for vegetable products.

Working with earthworms to boost soil productivity

Attention vegetable growers: Are earthworms working for you? All you need to check is a spade and a morning walk, as agricultural and environmental scientist and Blue Environment Director Bill Grant explains.



Earthworms are a silent workforce working day and night in the root zone, improving soil structure and fertility and promoting root and plant growth.

A healthy population of earthworms will improve soil drainage and aeration in the upper 30-40cm of soil. They can consume and excrete their bodyweight each day, and a healthy population of at least 100-200 earthworms per square metre (or 2-4 earthworms per spade full) will 'turn over' and fertilise tonnes of soil per hectare every day.

Earthworms mainly eat soil bacteria, fungi, dead organic matter and other microorganisms in the soil. Their droppings, or 'casts', contain concentrated plant-available nutrients and chemicals that stimulate plant root growth. A 'worm-worked' soil will show visible signs of burrows and round 'balls' (casts) indicating a less dense and better aerated soil. Organic matter in casts, as well as calcium carbonate excreted by earthworms as they move through soil, contribute to lasting improvements in soil down the soil profile. Studies have found that increased earthworm activity can increase above ground biomass growth by 10-70 per cent, and typically a response of 10-30 per cent could be expected on most vegetable farms.

On-farm investigation

Blue Environment and SESL Australia recently completed a three-year research and demonstration project entitled *Optimising the benefits of vermiculture in commercial-scale vegetable farms*

(VG15037), a strategic levy investment under the Hort Innovation Vegetable Fund. This investment investigated how commercial vegetable farms can benefit from building and maintaining earthworm activity. The project team undertook field research at over 18 vegetable farms across Australia, looking at how farm practices affected earthworm numbers and how greater earthworm activity improved soil health.

The main factors influencing earthworm activity are:

- **Intensity and depth of tillage:** Many of the farms studied did not have healthy earthworm numbers. The most likely reason for this is intensity of tillage. Repeated tillage and rotary hoeing in the upper 30-40cm kill earthworms and the fungal hyphae they feed on. Most farms with healthy earthworm numbers have less intensive and shallower tillage. Strip tillage and bed preparation cultivation to only 10cm allows earthworms to survive. Deep ripping can be used to break up sub-soil compaction, but a healthy earthworm population 'takes over' the cultivation in the upper 30-40cm of the soil. This reduces the need for cultivation, saving fuel, labour and equipment costs.
- **Levels of soil carbon, and particularly labile forms of carbon:** Our research saw the greatest boost in earthworm activity when cover crops and green manures were used, and following crops that generate a lot of biomass. Composts and vermicast products also had some positive effects. Anything that feeds soil biology will also feed earthworms.

Other factors include:

- **Soil moisture:** Earthworms are quite hardy and can 'hibernate' in dry soil for three months. However, maintaining year-round soil moisture helps to maintain a healthier earthworm population.
- **Sensitive chemical use:** Some farm chemicals can impact levels of earthworm activity. However, other than soil fumigants, nematicides and some insecticides, most will not kill earthworms if they are used according to label directions. Earthworms will migrate through the soil to move away from unfavourable conditions and to move to more favourable conditions, so can survive non-acute 'toxicity'. Repeated use of some chemicals that reduce soil bacteria and fungi will impact on earthworm activity. However, tillage and soil carbon are more significant factors and if these create good conditions for earthworms, then their populations will be resistant to most farm chemicals used according to label directions. Herbicides that reduce the need for tillage and feed the soil with labile carbon will generally help earthworm numbers. Some Certified Organic chemicals can have toxic effect on earthworms.

Interestingly, although there are over 700 species of native earthworms in Australia, only the same five to six species of introduced earthworms were found to be active on the farms surveyed. Previous research has found this to be the case under other farming systems, and it seems only introduced agronomic earthworms that have evolved with agriculture can survive and thrive under vegetable crops.

The bottom line

So, how can you tell if earthworms are working for you? Less than an hour in the paddock with a spade will give you the answer. Follow the steps shown in Figure 1. The best time to look for earthworms is in the morning when soil moisture is good down the soil profile.

We recommend you sample at least 5-10 points across the paddock to see how variable earthworm numbers are. It is best to sample areas that have not been disturbed for at least two to three months, and where the soil is still wet down the profile – areas at harvest stage or have just been harvested without any soil disturbance are ideal. It is also a good

idea to sample some uncompacted areas that do not get cultivated such as irrigation lines and grassed areas on farms. Earthworm numbers under these areas tell you what a healthy earthworm population would look like at the time you are sampling. If you find a lot of earthworms under these areas, but few under cropped areas, this tells you that there is potential for improvement by increasing soil carbon and reducing tillage intensity.

Finally, if digging to 30-40cm is hard due to soil compaction, that tells you increased earthworm activity could improve your soil and productivity.



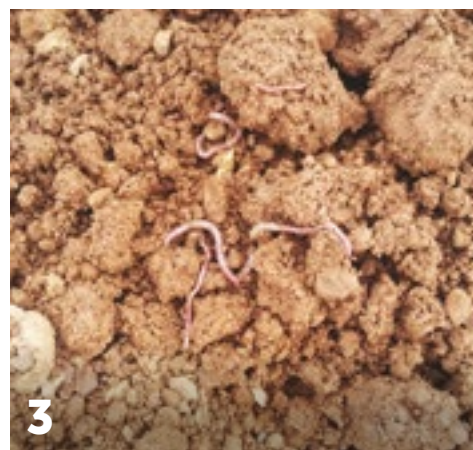
Figure 1: A three-step guide to checking earthworm numbers



1 Use a normal garden spade in areas that have not been cultivated for at least two to three months and have had good soil moisture down the profile during that period. In the warmer months, do this in the early to mid-morning before the temperature gets above 25 degrees Celsius.



2 Randomly pick a sample point. Use the spade to measure and cut out a spade-sized sod of approximately 15cm x 15cm wide x 30-40cm deep (i.e. the width and depth of most spade blades). Do this as quickly as possible – earthworms will retreat down the soil profile when they sense digging.



3 Place the sod on the ground or on a tarp and sort through it by hand. Extract and count adult and non-adult earthworms. Adult earthworms are typically larger and have a distinct collar or 'saddle'. If the earthworm population is healthy, there will be an average of at least two to four larger earthworms per spade-sized sod. You might not find this number in every sample, but you should find it in most. Repeat the sampling and worm counts at least 5-10 other sampling points to get a feel for the average number. Also, sample uncompacted areas that are not cropped such as irrigation lines and grasses areas neighbouring cropped areas.

Find out more

Please contact Bill Grant on 0407 882 070 or email bill.grant@blueenvironment.com.au.

This project has been funded by Hort Innovation using the vegetable research and development levy and contributions from the Australian Government.

Project Number: VG15037

Advancing robotics in the Australian vegetable industry

From 2016–2019, a team from the Australian Centre for Field Robotics at the University of Sydney undertook projects focusing on advancing the application of robotics, intelligent sensing systems, precision agriculture automation and more in Australia's vegetable industry. *Vegetables Australia* spoke to Project Lead Professor Salah Sukkarieh about the research, and the potential impact it has for the future of on-farm robotic automation.

Over the past three years, many vegetable industry members would have seen the LadyBird™ and RIPPA™ (Robot for Intelligent Perception and Precision Application) robots in both trial-farm and commercial-farm settings.

A strategic levy investment under the Hort Innovation Vegetable Fund, *Using autonomous systems to guide vegetable decision making on-farm* (VG15003) was undertaken to research and develop novel sensors, algorithms and robotic technologies that would help reduce production cost and increase on-farm productivity in the vegetable industry, in particular brassica, lettuce and baby leaf.

The project was awarded to the Australian Centre for Field Robotics at the University of Sydney and, led by Professor Salah Sukkarieh, started in January 2016. It was divided into four themes: Sensing, Automated Decision Support (ADS), Crop Interaction and Farm Automation Standards.

The project used the LadyBird robotic platform, designed and developed by the Australian Centre for Field Robotics under a previous investment entitled *An Intelligent Farm Robot for the Vegetable Industry* (VG12104). The robot was fitted with a number of different sensors including Thermal, Hyperspectral, Vision and Laser, and experiments were conducted on the University of Sydney farm.

Evaluating and testing autonomous systems developed in VG15003 in Australian vegetable production systems (VG15059) started in June 2016 and focused on Evaluation, Market Analyses, Economic Viability and Industry Engagement of the four themes in VG15003. The project used the RIPPA™ robotic platform, also designed and developed under project VG12104. It was customised for testing and evaluation of these technologies on commercial operational farms.

"The two projects worked together: VG15003 focused on the research and demonstration of novel sensing and

algorithms, and VG15059 operationalised that research and it demonstrated to growers on-farm," Professor Sukkarieh explained.

Both investments drew to a close in February 2019, having supported and progressed the development of new technologies for the vegetable industry.

Key findings

The experiments undertaken during project VG15003 collected large amounts of data and analysed for evaluation of plant health and estimation of water index.

"Initially experiments were done for lettuce and the scope was expanded to cauliflower and broccoli. Machine learning algorithms were developed that could observe plant structure, distinguish weeds from crops, detect water stress or damage, and map soil properties such as conductivity and moisture," Professor Sukkarieh said.

"The data collection exercise demonstrated the capacity to rapidly collect high spatial and spectral resolution data on a routine basis (weekly), as well as the software pipeline that could extract this data and make meaningful representations of the plants and environment in general.

"A number of important characteristics were determined from these results, including the ability to get close to 100 per cent confidence in the machine learning systems extracting plant information (shape and size), as well as greater than 90 per cent accuracy in detecting weeds green-on-green when in uncluttered environments (using spatial and shape differences), and greater than 75 per cent in cases where weeds were similar to early established plants."

During VG15059, Professor Sukkarieh and his team ventured on-farm to demonstrate RIPPA's capability for detecting weeds in real-time among crops and real-time weeding using mechanical prongs as well as directed spraying technologies that minimised chemicals.

"The software pipeline developed was also used to detect foreign objects and we retrofitted an industrial vacuum cleaner that could suck up those foreign objects. We demonstrated the capability of actively sampling water conductivity near plant roots. A user interface was developed that not only allowed growers to control the robot, but also to see results of plant statistics, history, weed pressure and water availability," Professor Sukkarieh said.

"Both projects went through continuous cycles of experimentation and design improvements; especially for operational envelope enhancements."

Most of prototype tests were conducted at the University of Sydney's Lansdowne farm, and operational trials were conducted in Gatton, Cowra, Griffith, Werribee, Gippsland and Launceston. More than 660 growers attended, and feedback was collected through end-to-end demonstrations.

Addressing issues

This was the first time extensive full production, autonomous data collection of individual plants in the field had been conducted – which posed challenges to Professor Sukkarieh and his team.

"There were a number of technical challenges that we overcame, including registration of changing plant data over multiple weeks and the effect of lighting and weather on autonomous data gathering," Professor Sukkarieh said.

"Plant biology means that the algorithms that were developed had to deal with changing plant architecture over time which hadn't been dealt with before in the research community."

This was also the first time that the robotics and automation work extended beyond just automating a platform for operation on-farm and moved into crop intelligence. Grower input also contributed to the program, as Professor Sukkarieh explained.

"We received very positive feedback in our trials as well as a number of



RPPA™ (Robot for Intelligent Perception and Precision Application) in action.

suggestions on operational improvements that were incorporated into the program. As the project moved through its various stages of development, the growers became very interested in the capability that the system could also provide in the future for pest/disease detection.”

According to Professor Sukkarieh, VG15003 and VG15059 both demonstrated that a continuous cycle of research and development through to operational demonstration with the growers was key.

“This is to ensure that the research aligned with the grower interests, and that continuous feedback was provided to the research. The next steps in robotics would include better crop intelligence algorithms for detecting pests/diseases and novel tools for precision action on plants and ultimately harvesting – and these should follow the same approach,” he said.

“There are technologies that are ready for commercialisation, including automated platforms for weeding and crop intelligence (plant size and

distribution). These should now transition into the hands of the growers for end-user feedback.”

The bottom line

Professor Sukkarieh said that the three projects – VG12104, VG15003, VG15059 – have placed the Australian vegetable industry at the leading edge of on-farm robotic automation.

“We are now in position to commercialise many of the technologies

developed in these programs. The industry now should look further forward to understand what future vegetable farm operations would look like with the belief that on-farm robotic solutions are coming,” he said.

“This will help provide a vision on how best to use these technologies (beyond weeding and crop intelligence), how intelligent on-farm systems should work with each other, and how these intelligent assets will support supply chain optimisation.”



The LadyBird™ robot. Images courtesy of the Australian Centre for Field Robotics at the University of Sydney.

Robotic technologies receive a boost

In April 2019, the Australian Centre for Field Robotics at the University of Sydney received one of the largest AgTech seed funds in Australia to commercialise the robotic technologies developed across its portfolio of projects in agriculture.

The company AGERRIS was formed and is now developing commercial products for Australian growers of all scale farming as well as currently looking for early adopters of the technology.

For more details, please visit agerris.com.

Find out more R&D

Please contact Professor Salah Sukkarieh at sukkariah@sydney.edu.au or visit sydney.edu.au.

These projects have been funded by Hort Innovation using the vegetable research and development levy and contributions from the Australian Government.

Project Numbers: VG12104, VG15003 and VG15059

**Hort
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Strategic levy investment

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Organic expansion key to business' sustainability

In mid-2018, two Victorian vegetable growing businesses banded together to complement their existing operations, focusing on organic vegetable production. *Vegetables Australia* reports on this partnership and how it will benefit the businesses into the future.

The ever-increasing demand of organic produce overseas, and now in Australia, is behind a new partnership between Butler Market Gardens and Murray Valley Organics, a 100-acre certified organic farm situated in Wood Wood, Victoria.

Rick Butler is a sixth-generation vegetable grower and sustainability is at the core of his business. Butler Market Gardens is committed to limiting the impact on the environment for generations to come and ensure viability for the horticulture industry.

The partnership between Butler Market Gardens and Murray Valley Organics was born out of a 20-year friendship between Rick Butler and his counterpart Adam Farley. The pair completed their Certificate III in Production Horticulture together.

The businesses joined forces in 2018 in winter and spring. Spring onions, herbs and Chinese broccoli were grown during the organic conversion period. After obtaining full organic certification, the hotter months saw a very successful period where organic zucchini was grown and sold to Melbourne, Sydney and Brisbane markets. In the cooler months, organic broccoli and herbs proved to be very popular.

Both businesses are now organically-certified to grow and pack over 20 different vegetable and herb varieties.

Key investment

Butler Market Gardens' Heatherton base, including some of its farms, offices and packing warehouse, was upgraded to allow for packing organic produce. This involved identifying and segregating a packing room to be used for organics only, and establishing a new ice machine for packing broccoli and new racking for separate packaging storage.

While the businesses have faced challenges in the early days of growing organic produce, they were able to address each issue through the partnership to ensure that production continued unhindered.

"Irrigation was an issue early on, but

Murray Valley Organics was able to overcome this with a recent investment into a travelling irrigator," Mr Butler said.

"Water is a challenge with its price in the region much higher than our initial forecasting expected, but we are working around it by minimising our summer production and maximising winter cropping. Summer irrigation will come from using drip tape, a more efficient way of watering in the warmer months."

Looking ahead

In the short-term, the business will be increasing production on the existing range of broccoli and zucchini, and working closely with its customers to identify any gaps in the organic market.

"Consumers are placing more emphasis on health, provenance and what is in the product they are consuming," Mr Butler said.

"With an ongoing commitment to broccoli and zucchini, there is potential to expand into products such as capsicum, eggplants and cucumbers in the near future.

"With this initial success in organic sales, Butler Market Gardens is taking the first steps in developing its own organic brand.

"We will be spending some time investigating the best options to ensure our offer meets and exceeds consumer expectations regarding the presentation and packaging of the product. This means ensuring minimal environmental impact from packaging, and product waste," Mr Butler said.

From a business perspective, Mr Butler explained the benefits that this partnership provides.

"It allows Butler Market Gardens to expand into organics, while keeping focus on its existing core business focus. It complements the current range and potentially opens the door for exports in the future," he said.

"It also allows both businesses to focus on their respective strengths and have complete control of the product from field to customer."

Find out more

Please visit butlermarketgardens.com.au.



Getting the most out of your pre-emergent herbicide investment

In this edition, Syngenta Senior Technical Services Lead Scott Mathew investigates pre-emergent herbicides and how growers can use these products to maximise their effectiveness in vegetable crops.

Pre-emergent herbicide performance is influenced by a number of factors. What is highly important to growers is how long the herbicide will remain active in the soil – it needs to be long enough to control germinating weeds, and yet breakdown quickly enough to not adversely impact on future decision-making. This is a fine balancing act.

Manufacturers such as Syngenta have conducted intense research programmes with herbicides such as BOXER GOLD® to find the right application rate and the best incorporation technique.

How effective the product will be starts with getting the spray application right. The effectiveness of any pre-emergent herbicide is reduced when it does not reach the target zone in the soil or is broken down before it can be taken up by weeds.

Spray can be intercepted by plant foliage or adhere to plant residues (e.g. stubble) on the soil surface. This can tie up the herbicide, making it unavailable for soil incorporation, or its interception can lead to uneven coverage of the soil surface, resulting in weed escapes. The key point here is that the amount of herbicide tied up by plant material or stubble is directly related to the amount of ground cover, so make sure the soil bed is well-prepared.

Some pre-emergent herbicides volatilise (transition to a gaseous phase after application) or undergo photochemical decomposition by breaking down with sunlight. They need to be incorporated into the soil within a short and defined timeframe. When this is important, it will be detailed on the product's label.

Other breakdown or loss pathways for soil applied herbicides include:

- Adsorption (where the active ingredient is tightly held onto organic matter or clay).
- Microbial decomposition (influenced largely by organic matter, temperature, moisture and air).
- Chemical breakdown (affected by soil chemistry such as pH).
- Leaching or deep percolation (impacted by rainfall and irrigation).

Going back to basics

For any pre-emergent herbicide to provide effective weed control, there is a need for good levels of soil moisture to ensure the active ingredient can be absorbed by germinating weeds. Without adequate soil moisture, through irrigation or rainfall after application, weed control is likely to be poor.

As the crop grows and further weeds germinate, there is an ongoing requirement for sufficient soil moisture to keep the product active for efficient uptake, but not too much to move it beyond the weed's uptake zone.

Two major contributing factors to a product's availability and performance when applied pre-emergent are its:

- Water solubility.
- Affinity to binding to soil and organic matter.

Herbicides with low solubility generally require very good levels of soil moisture or larger volumes of rain or irrigation post application to achieve good levels of incorporation and remain in soil water solution for uptake by germinating weeds.

Meanwhile, herbicides with higher levels of solubility require lesser amounts of irrigation or rainfall and are generally more plant available in conditions of lower soil moisture. Active ingredients that are more soluble and mobile can wash off plant residues and are more likely to move with soil water.

In addition to solubility, a herbicide's tendency to bind with the soil and organic matter will also affect its availability. Herbicides can be compared by Koc values (Soil Organic Carbon-Water Absorption Coefficient) which provides an indication of how tightly it will bind with the soil particles and organic matter including stubble.

There are many factors influencing how effective a pre-emergent herbicide can perform. All of these factors are taken into consideration when products are developed, and labels are written. It's just another reason to read, understand and follow the label recommendations for all products.

Find out more

For more information or to ask a question, please contact your local Syngenta Territory Manager, the Syngenta Advice Line on 1800 067 108, visit syngenta.com.au or email *Vegetables Australia*: info@ausveg.com.au. Please note that your questions may be published.

The R&D content for this article has been provided to *Vegetables Australia* to educate Australian vegetable growers about the most relevant and practical information on crop protection technologies and their on-farm applications.

A strategic investment: Vegetable Fund management

As one of the nation's 15 Rural Research and Development Corporations, Hort Innovation's job is to work with industry to invest the vegetable levy and Australian Government contributions into initiatives that help growers be as productive and profitable as possible. This is achieved through the Hort Innovation Vegetable Fund.

Hort Innovation encourages all growers and other industry participants to share their thoughts and suggestions for vegetable industry investment.

Ideas can be submitted any time via Hort Innovation's investment idea form, which can be found at edms.horticulture.com.au/Forms/ConceptFormV2.

Consultation process

To gain industry insights for strategic levy investments under the Hort Innovation Vegetable Fund, Hort Innovation consults with growers through the fund's Strategic Investment Advisory Panels (SIAPs).

The SIAPs have two main objectives: to give transparent and robust investment advice; and to ensure investments align to industry priorities by aligning them to the fund's Strategic Investment Plan.

Originally, the vegetable industry had three SIAPs aligned to the following investment areas: Farm Productivity, Resource Use and Management (FPRUM); Marketing and Value Chain Development (MVCD); and Consumer Alignment (CA).

In 2019, Hort Innovation amalgamated the MVCD and CA panels to streamline the advice process, and renamed the panels to better reflect the areas of investment they provide advice on.

As a result, the Vegetable Fund currently has both a 'Pre-farm gate' and 'Post-farm gate' SIAP.

The new SIAP members: Pre-farm gate

Name	Organisation	Location
Ed Fagan	Mulyan Farms	NSW
Andrew Craigie	Craigie Brothers	TAS
Rachel Lancaster	Environmental and Agricultural Testing Services	WA
Sharron Windolf	Windolf Farms	QLD
Michael Radcliff	Rhebanvale	TAS
Bill Bulmer	Bulmer Farms	VIC
Zarmeen Hassan	AUSVEG	VIC
Jo Tubb	Simplot	TAS
Ian Layden	Department of Agriculture and Fisheries (Queensland)	QLD
Mitchell East	Willara Gold	WA
Anthony De Ieso	Thorndon Park Produce	SA
Bob Granger	Chair	N/A

The new SIAP members: Post-farm gate

Name	Organisation	Location
Michael Coote	AUSVEG	VIC
Trent De Paoli	Austchilli Group	QLD
Jason McNeil	Premium Fresh	TAS
Greg Owens	NT Farmers	NT
Scott Samwell	Samwell and Sons	SA
Kees Versteeg	Qualipac	QLD
Andrew Moon	Moonrocks	QLD
Shane Quinn	Mulgowie Farming Company	QLD
Lynley Van Latham	Rugby Farming Group	QLD
Kingsley Songer	4 Ways Fresh	SA/WA
Nathan Free	Wattle Organic Farms	VIC
Bob Granger	Chair	N/A

Renewed focus for Australian horticulture

Horticulture is Australia's second-largest agricultural sector by value and, having grown in value by 40 per cent over the five years to 2017-18, is the fastest-growing sector in agriculture. To plan for and tackle issues facing horticulture, Hort Innovation has released its strategy for 2019-2023, with three strategic pillars at its core.

Launched on 1 July 2019, the Hort Innovation Strategy 2019-2023 lays out the organisation's focus, goals and key activities for the next four years, all of which are closely aligned to the industry's needs, now and into the future.

Purpose and role

Hort Innovation exists to drive a prosperous and healthy Australia by providing the best knowledge and solutions; connecting growers and

consumers to drive demand; and investing in solutions to improve productivity. Hort Innovation is committed to sustainable growth in horticulture, with the overarching aim of increasing the sector's value to \$20 billion by 2030.

Focus areas

The Hort Innovation Strategy 2019-2023 is defined by three strategic pillars:

- Drive knowledge and innovation into horticulture industries.
- Deliver the highest value R&D, marketing and trade investments across industries, now and into the future.
- Enable activities that drive all strategic imperatives.

Under each strategic pillar, the Hort Innovation Strategy 2019-2023 lays out key initiatives and activities.

Extension and adoption

There will be the development of a new Hort Innovation Extension & Adoption function and framework, focusing on communicating and extending practical investment outcomes, resources and knowledge directly to growers to drive adoption.


A sustainability framework

Hort Innovation will build a sustainability framework for Australian horticulture to help the sector proactively manage emerging issues now and in the future. This will include setting benchmarks to show progress over time.

This new strategy will see Hort Innovation sharpen its focus on consumer insights and understanding domestic and international markets. To help growers boost productivity and quality to act on these insights, the strategy will guide Hort Innovation to invest in innovations and the delivery of high-value trade and marketing investments to support them to change and adapt practices.

A change in approach

Under the new strategy, Hort Innovation will work to deliver more multi-industry collaboration in RD&E, marketing and trade – supporting more effective and efficient outcomes for growers and the wider horticulture sector.

Find out more 

Please visit horticulture.com.au.

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UNMATCHED ◀▶ COMPATIBILITY



Mulgowie Farming Company Sustainable Farming Practices Manager Andrew Johanson (right) with CEO Fabian Carniel (left) and National Sales Manager Shane Quinn. Photography by Rowena Dione.

Opening the doors to a sustainable farming future

Andrew Johanson has worked at Mulgowie Farming Company for over 20 years and during that time, he has reaped the rewards of being involved in vegetable levy-funded research and development projects. Michelle De'Lisle speaks to Andrew about the activities he has been involved in, and the positive impact that they have had on the growing operation.

Andrew Johanson enjoys a varied role at Mulgowie Farming Company. As the operation's Sustainable Farming Practices Manager, he focuses on a range of different aspects of the farms, from vegetable supply forecasting to building soil health.

Andrew also coaches the farm's agronomists and managers on innovative farming methods and strategies that align to building healthier soils and delivering healthy plants that can be more resilient, high in quality and yield and, ultimately, have increased shelf-life.

However, achieving these goals requires guidance and gaining knowledge from external sources. Andrew has been involved in vegetable levy-funded research and development projects that have proved valuable not only his own role, but for the wider growing operation. Beginning as a small family-owned business in Queensland's Lockyer Valley over 75 years ago, Mulgowie Farming Company now produces 5,000 hectares of fresh vegetables across Queensland, New South Wales and Victoria. Crops grown include yellow and baby sweet corn, green beans and broccoli.

On-farm focus

Andrew's sustainable farming journey began in the early 1980s, when he worked with his father on the family farm. He then progressed to an agronomy consultancy role in the Lockyer Valley in the early 90s before joining Mulgowie Farming Company in 1996. Since then, Andrew has been involved in Integrated Pest Management research and understanding beneficial insects and, most recently, projects in precision agriculture, soil wealth and cover cropping projects.

Over the past year, Andrew and Mulgowie Farming Company have been involved in a project entitled *Optimising cover cropping for the Australian vegetable industry* (VG16068), a strategic levy investment under the Hort Innovation Vegetable Fund that is led by Applied Horticultural Research scientist Dr Kelvin Montagu.

"Through my involvement, I've learnt a lot about soil biology and how microbes are helping to build a resilient plant," Andrew says.

"With controlled traffic farming, cover cropping and minimum tillage, we have seen our soil's water infiltration and holding capacity increase, the soil become less compacted and more friable, and

yields increase, with plants showing more resilience to weather extremes."

Andrew has used the information gained from his involvement in the project on Mulgowie Farming Company's five properties. For example, Kelvin has been supportive in helping the operation choose its cover crop based on crop rotation.

"It's totally different down in Victoria as to which cover crops are going to work compared to north Queensland, so Kelvin's advice has been very helpful," Andrew says.

Additionally, Kelvin has been conducting strip till trials at Mulgowie Farming Company's property in Maffra, Victoria, which produced positive results.

"Moving to zero tillage and minimum strip tillage from the result of trials – I didn't expect to see the increase in yields as quickly as we did. There has been an improvement right from the first season," Andrew says.

Touring benefits

Andrew doesn't just stay on the farm to learn about different growing practices as well as the latest in R&D.

In September, he attended a grower study tour of South Australia, Victoria

and Tasmania that gave participants the opportunity to visit case study farms and share experiences in getting the most out of precision ag technologies for their vegetable growing business. This tour was part of *Adoption of Precision Systems Technology in Vegetable Production* (VG16009). It also involved seeing the iMapPESTS: Sentinel Surveillance for Agriculture, which Andrew found most interesting. The iMapPESTS project is a collaboration of government, industry and science to develop a mobile cross-industry plant pest surveillance network, which will provide actionable information to primary producers and government on endemic, established, trade sensitive or exotic pests (see page 16).

"I wondered if there were opportunities in the future for a mobile unit to be established up around Home Hill in Bowen. It was very good," he says.

When on tour in these other regions Andrew also observed other strip till planters in action. He said that going on a tour such as this was very valuable, and he has been able to share the knowledge gained with his teams at Mulgowie Farming Company.

"I run our Operational Excellence Forum once a month, and that's where

we discuss innovation and new farming strategies. I've brought back what I've learnt from the soil wealth and precision ag tours and implemented it on our farms, which is making a big impact."

In 2015, Andrew went further afield when he jetted off to California, Delaware and Arizona, for the USA Industry Leadership and Development Mission. On the mission, he gained an in-depth understanding of the processes, procedures and issues facing vegetable growers in the United States. Plus, the networking was invaluable.

"Getting to know the other participants, and have those open networking friendships with people is important – now we meet up at Hort Connections to discuss where horticulture is at in Australia."

Export success

In 2018, Mulgowie Farming Company hosted a group of 40 delegates from Indonesia, Thailand, Taiwan, South Korea, the Philippines, Japan and Saudi Arabia. This was part of the AUSVEG-facilitated Reverse Trade Mission, which is delivered under the *Vegetable Industry Export Program* (VG16061).

The team discussed conventional and organic broccoli farming practices and provided the delegates with a tour of the farm and packing shed, with another positive outcome.

"We were able to show them the quality of our produce, the fresh quality aspect of Australian product and our standards. We then had a lunch where chef Alastair McLeod used our products in the culinary menu, and we got to network with the delegates," Andrew says.

"From that, we did get some export connections – we've followed through with sales (exporting to some of the people who attended)."

The final word

Andrew recommends that other vegetable growers get involved in levy-funded R&D, as it is a great networking and learning tool.

"The bottom line is to be on the cutting edge of the potential that is out there for better quality crops" he says.

"I have received a broader understanding of farming innovation, helping me to develop sustainable farming practices strategies for Mulgowie to ensure we are producing quality fresh vegetables, while looking after our environment."



Andrew Johanson and Shane Quinn.

Find out more R&D

Please contact Andrew Johanson on 07 5465 9222 or andrewj@mulgowie.com.au.

Communication of research and development projects has been funded by Hort Innovation using the vegetable research and development levy and contributions from the Australian Government.

Hort Innovation
Strategic levy investment

VEGETABLE FUND



Protecting the future of Australian horticulture

The Hort Frontiers – Fruit Fly Fund aims to control fruit fly populations that may impact the productivity of the Australian horticulture industry. At its core is the Sterile Insect Technique Plus (SITPlus) Program and since its launch in 2014, the focus has been on research and development. *Vegetables Australia* spoke to Hort Innovation SITPlus Director Dan Ryan about the program's activities and what has been achieved.

In 2016, the Australia's Plant Biosecurity Cooperative Research Centre estimated that fruit flies cost the horticulture industry more than \$300 million in lost international or domestic markets annually (not taking into consideration potential industry growth).

As a result, the Hort Frontiers – Fruit Fly Fund was established. This Fund is one of seven funds developed by Hort Innovation to facilitate collaborative cross-industry investments focused on longer-term, complex and traditionally underinvested themes identified as critical for Australian horticulture in 2025.

Research under the Fruit Fly Fund is focusing on enhancing existing in-field control measures, looking for new post disinfestation technologies, and developing and implementing sterile insect technology, known as SIT (including area wide management in preparation for SIT implementation).

The Fund centres around the multi-million-dollar Sterile Insect Technique Plus (SITPlus) Program. This pilot program is a national, long-term strategic research and development partnership that aims to deliver an integrated pest management solution to the major horticultural pest Queensland fruit fly (Qfly).

The program intensified its efforts to protect horticultural crops from Qfly in

September this year, when millions of sterile Qflies were released over trial sites in Hillston located in western New South Wales, and Cobram in northern Victoria. This follows the opening of the sterile Qfly production facility in Port Augusta which is now in full swing, producing 20 million flies per week. This was achieved as a result of the project *Establishment of the Qfly SITplus facility in southern Australia* (HG14035) while activities continue under *SITplus: Port Augusta Qfly SIT factory pilot operation* (FF15000).

Meanwhile, satellite rear-out centres, which receive sterile flies from pupae stage and grow them for release, are also now open in Yanco, New South Wales and Tatura, Victoria.

Protecting crops

Hort Innovation SITPlus Director Dan Ryan said the program aims to protect existing pest-free areas, which are important for Australia's trade.

"In Australia, we've got this unofficial protocol – the east-west protocol, which a lot of our trade partners work on, where we have Mediterranean fruit fly on the west coast and Qfly on the east coast and a gap in the middle where we have neither. If that breaks down, then that creates a whole plethora of issues for growers in

terms of market access internationally and interstate," Mr Ryan said.

He added that this also gives growers a tool to manage the widely destructive pest.

"The program allows them to have access to a significant new tool – new to Australia. The technology itself is not new, but it is new to Qfly technology as it can provide an environmentally- and market-friendly control and suppression mechanisms," Mr Ryan said.

The SITPlus Program is being delivered in two phases. According to Mr Ryan, phase one was discovery and underpinning science.

"We looked at all the things that we'd need to run a SIT program to try to develop that knowledge and those resources in phase one. That ran from late 2014 through to 2018," Mr Ryan said.

"Now we've rolled into the second phase, where we're piloting what we've learnt in the use of SIT; that is, running the pilot factory, piloting the releases and understanding their impact, as well as how best to do those releases."

Macquarie University led the pilot release effort, which included 1,000 hectares of citrus, cherry and summerfruit trees surrounding Hillston township. Between Hillston and Cobram, about two million sterile flies are being released from a customised aircraft. This is occurring each week until April 2020.

While it is mainly targeting fruit growing regions, Mr Ryan said these release efforts are both applicable to the vegetable industry.

"The knowledge you get from these area wide programs can be directly transferred to vegetables, and the knowledge you get from the urban program can be directly transferred to an area where there's vegetable farms bordering towns. That's a likely scenario, because we know that vegetable production is often close to urban areas," he said.



Loading of sterile Queensland fruit flies reared at Yanco Agricultural Institute into a Cessna plane at Narrandera airport for release over orchards and Hillston township, NSW.



NSW DPI researcher Dr Solomon Balagawi checking a fruit fly trap in Hillston, NSW.

Encouraging results

Mr Ryan said there have been a number of discoveries that are important for growers to know. One is that releasing sterile females as well as sterile males doesn't inflict damage to horticultural crops.

"We certainly believed that was the case but now we've got scientific evidence that we're developing," he said.

"We've also reached the stage where we've built a factory that can produce flies reliably, and in good health, and that we know are going to survive. We've developed technologies to reduce their cost of production. A good example is the gel diet that we've developed, which is a world-first, and is making fly production cheaper – that will be passed on to the growers into the future."

Larval Diets for High-productivity Mass-rearing (HG13045) developed a prototype gel larval diet and the fit-out of the Port Augusta facility incorporated physical design based on this diet. Future research will optimise the chosen diet for increased productivity as well as for reduced component cost, and will examine the potential value of probiotic bacteria as supplements in larval diets.

Additionally, research within the rear-out centres has also discovered the optimal age to release the flies. Originally thought to be as soon as they emerged, Macquarie University researchers discovered that there is a 90 per cent better survival rate if five-day old flies are released, rather than two-day old flies.

"Now if we were to run a program, we'd release five-day old flies and we'd have far more flies out there doing the job which is a significant increase in efficacy," Mr Ryan said.

Long-term outlook

Looking ahead, Mr Ryan said that the project team hopes to develop a tool that large-scale farms can use, while



Field fruit fly population monitoring trap established on a citrus orchard in Hillston, NSW.

groups of growers in low-pressure areas can collaborate by joining an Area Wide Management (AWM) program. AWM is a proven management approach for mobile pests around the world, employing a united strategy to target all pest habitats within a well-defined area or region to reduce the total pest population. *The Adaptive Area-Wide Management (AWM) of Queensland fruit fly (Qfly) using Sterile Insect Technique (SIT)* (ST15014) saw Hort Innovation team up with CSIRO and the Department of Agriculture and Water Resources to produce an online tool to help anyone undertake an AWM program.

"Longer term, it would be really good to see this technology in use to try and push back against that expansion of Qfly, and perhaps even roll it back like they have with fruit flies in other parts of the world," he said.

"It would be fabulous to recover the fruit bowl along the Murray River. That would be worth a lot of money to Australia and really open up opportunities for growers to produce crops more economically and for different markets.

"For vegetable growers, SITplus is worth watching. We're happy to engage with vegetable growers, but I'll say to them: Watch what happens with this pilot; see how successful we are, and then if it's of interest to you, come and talk to us."

Find out more



Please visit hortfrontiers.com.au/fruit-fly-fund.

These projects have been funded by the Hort Frontiers Fruit Fly Fund, part of the Hort Frontiers strategic partnership initiative developed by Hort Innovation, with co-investment from various partners and contributions from the Australian Government.



Managing a crisis in the vegetable industry

A Crisis Management Team, facilitated by AUSVEG, has been funded and trained to effectively respond to any crisis that may negatively impact growers, consumers, industry assets or the reputation of the vegetable industry.

A crisis management plan has been developed by the industry to respond to a crisis. The AUSVEG Crisis Management Team works with relevant stakeholders, authorities and the supply chain to manage and minimise the impact of industry crises.

A crisis can occur at anytime and can include:

- Accidental or deliberate contamination
- Threats/blackmail/extortion
- Theft of dangerous chemicals
- Significant workforce issues or unrest
- Felonious activity (e.g. market fraud or manipulation)
- Biosecurity incidents (or failure to report)

If you are aware of a potential/emerging crisis:

- Call the **Crisis Hotline on 1300 855 170** or call the **AUSVEG Crisis Management Team on 03 9882 0277**
- Refer enquires, including media, to **AUSVEG on 03 9882 0277**



Controlling thrips in tomatoes and capsicums is key to producing high quality yields in tomatoes and capsicums for Jason Neave from Carabooda in Western Australia.

Controlling thrips the key to quality vegetable crops

Pests such as western flower thrips and aphids can be highly damaging to vegetable crops in spring. Western Australian grower Jason Neave shares his experiences with these destructive pests, and how his operation is overcoming the challenges that they pose.

The ability to control thrips as winter turns into spring has a major bearing on the yield and quality of tomatoes and capsicums grown on the JE and MC Neave and Sons enterprise.

Jason Neave said the operation, which is located at Carabooda, north of Perth in Western Australia, was hit by a wide range of insects in the spring which included western flower thrips and aphids.

Western flower thrips is a vector for tomato spotted wilt virus, which can cause major crop loss in tomatoes, capsicums and other vegetables.

"Spring is the hardest time for tomatoes and capsicum. This is because of the amount of tomato spotted wilt virus that is around the place," he said.

Western flower thrips is a pest that develops resistance to pesticides easily and there is a limited number of options available.

Mr Neave said the bugs arrive in spring when the crops are young and the weather improves.

"We tend to get a lot of thrips that blow in from the east. You get bombarded daily – thrips fly in and you have no control over it," Mr Neave said.

"Some of those thrips might not transmit the virus at all. You have high numbers of thrips that blow in as well as aphids, but you just don't know which ones have got the virus and which haven't. So, you're trying to eliminate as many as you can and not let the virus start in the crops.

"It's hard to manage. Having a virus spread in one plant snowballs and then you've got it throughout your whole crop, so we really try and make sure we get no virus in at all."

Offering a solution

To ensure yield and quality are maintained, the enterprise relies on a multi-product insecticide program through the season.

"Our past experience has shown us that we have got to target the adult and nymph stages," Mr Neave said.

One of the key products used in recent years has been Benevia® insecticide, which

has activity on the adult, larvae and nymph stages of western flower thrips.

Mr Neave said it was important to understand any chemistry's mode of action, what stage of life they kill, and the insects that they control.

"We've been using this insecticide for a couple of years now, and we use it in those early stages when the pressure's high," he said.

Benevia® is also used as a double-knock option with two sequential applications providing excellent control.

Mr Neave said his operation would normally apply the product twice and then change chemistry groups.

"You've got about six weeks there that you need to go hard and change the groups that you're using on thrips and aphids," he said.

"We swap to another group just to make sure that if there are any resistant ones out there, it is three or four weeks before you apply the same chemical again."

While thrips and aphids are the main target of the Benevia® application, other pests such as silverleaf whitefly, heliothis and tomato leaf miner, are also controlled by the insecticide.

Mr Neave said the main aim of the insecticide program was to produce high volumes of top-quality produce.

"When you are producing a high volume and quality, and you see the trucks driving out full of this good quality produce, it gives you a feeling of achievement," he said.

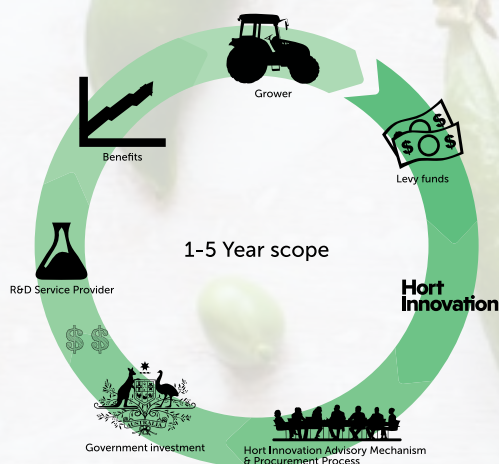
"Last season, we were quite happy. With tomatoes, we netted ten kilos per plant, which is a fantastic result."

Find out more

Please visit fmccrop.com.au.

THE VEGETABLE R&D LEVY AT WORK

STRATEGIC LEVY INVESTMENT



WHO PAYS THE VEGETABLE R&D LEVY?

The levy is paid by growers who produce and sell vegetables in Australia. The charge is set at 0.51 per cent at the first point of sale. The Federal Government also provides funding in addition to grower levy payments. Once paid, the research and development levy funds are managed by Hort Innovation.

HOW IS LEVY MONEY INVESTED?

Hort Innovation has two funding models for investment in research and development. The industry's levy is invested with Australian Government contributions through the Hort Innovation Vegetable Fund, which is part of the organisation's strategic levy investment activities.

All investments through the Vegetable Fund are made with advice from the industry's Strategic Investment Advisory Panels (SIAPs) – skills-based panels made of panellists from across the vegetable industry, the majority of whom are levy-paying growers.

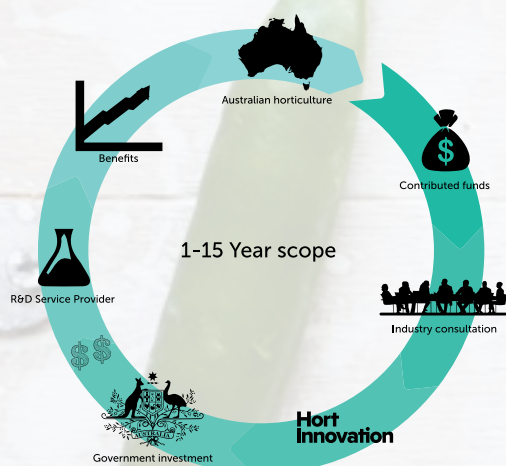
Strategic levy investments have a one- to five-year scope and the R&D is designed to directly benefit growers in the vegetable industry. Project topics range from pest and disease management to biosecurity matters, with findings communicated through a variety of channels, including *Vegetables Australia*.

You can find information on all current strategic levy investments, and details of the SIAP, on Hort Innovation's Vegetable Fund page at horticulture.com.au/growers/vegetable-fund/.

The second Hort Innovation funding model is the strategic partnership initiative known as Hort Frontiers. Hort Frontiers projects do not involve levy dollars, unless an industry chooses to become a co-investor in them, through advice of the SIAP. Instead, Hort Frontiers facilitates collaborative across-horticulture projects involving funding from a range of co-investors. These projects have a long-term focus and are designed to solve major and often complex challenges to secure the future of Australian horticulture.

You can read more about Hort Frontiers and the seven funds within it at hortfrontiers.com.au.

HORT FRONTIERS



HOW CAN GROWERS GET INVOLVED?

All vegetable growers are encouraged to share their thoughts and ideas for the research they want to see, both within the levy-specific Vegetable Fund, and within the wider Hort Frontiers strategic partnership initiative.

Ideas can be submitted directly to Hort Innovation through the online Concept Proposal Form at horticulture.com.au/about/investing-is-our-business/concept-proposal-form/. Growers are also encouraged to reach out to the SIAP panellists for the industry (available from the Vegetable Fund page).

Hort Innovation
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

Remote support aids large-scale vegetable grower

There is innovation in cloud-based management of vegetable cropping that has the potential to deliver cost-efficiencies and productivity gains for growing operations. *Vegetables Australia* reports on the latest user-friendly technology to reach Australian farms.

Tasmanian farming contractor and manager Joe Cook grows broccoli and cauliflower for leading Australian food manufacturer Simplot. As one of the company's farming partners in the vegetable growing heartland of the state's north-west, his operations produce seven thousand tonnes of vegetables, grown on multiple sites spread over a two-hundred-kilometre radius, with land leased from local owners.

For the past two years, Joe has used Ag Leader's AgFiniti to gather a layer of detailed data and manage his vegetable cropping operations. This is a full-farm connectivity platform, where growers can access maps and reports from any mobile device without having to learn a dedicated farm management software. There's no more hopping into a ute and driving down to the paddock to troubleshoot – AgFiniti gives growers immediate and real-time access to their entire operation.

Tapping at his iPad, Joe drills down into the detail. The layers of data add a level of precision planning to his operations that he wouldn't otherwise have. It allows him to quickly analyse the ground, using the elevation data and checking out which areas aren't going to grow particularly well.

"We're often presented with ground we don't know, for growing high value crops. Once we've done a pass with the Ag Leader system and pushed the data to the AgFiniti cloud, we can have a look at the terrain and elevation to scope it out," Joe says.

The data helps Joe to identify wetness potential and he can ask the system to generate drainage options. If necessary, he can bring in electromagnetic soil analysis generated by other technologies and integrate that into the data too.

"With high value crops like broccoli, you've got to do pretty fast analysis of that soil," Joe says.

With data on fertiliser rates available, Joe can also survey crops for growth patterns and undertake grower-based trials.

"Based on data we've collected, we might trial a different rate of fertiliser on a partial crop and save \$50,000 on

operations without losing any yield," he says.

The advantages that are passed on to Joe's manufacturing client are also welcome. Forecast harvest dates and tonnage are confidently sent to the processing plant, and calculating changes daily that allow for growing conditions overnight.

"We've always had tools to measure where we've harvested, but it's been very rough. This brings a level of precision to it. We've got our harvest laneways integrated into the data, and we can tell precisely down to the row what the planted area is," Joe says.

Gaining control

AgFiniti gives Joe an in-depth knowledge of the ground in an instant – the type of information that normally comes from farming the same land for generations. A further example of precision planning in vegetable crops is extending the boundaries of pivot irrigation.

Returning to the screen, Joe brings up a paddock with the signature circle overlaying it. Planting and spraying can be controlled with complete accuracy to the 'last nozzle' of the pivot, so high value broccoli is not planted and grown beyond reach of the irrigation.

"There's a lot of cost-saving associated with where we put our expensive investment. With over 30 pivots, that's a lot of extra hectares of expensive crop grown for no return at the end if you get it wrong," he says.

Joe's pleased to have eliminated that prospect from his operations, and this integrated planning system ensures that his entire operation is run smoothly with accurate results.



Find out more

Please visit agleader.com.

Minor use permits

Permit Number	Crop	Pesticide Group	Active	Pest/Plant disease/ Target weed	Date Issued	Expiry Date	Permit Holder	States
PER13147 Version 4	Cauliflower	Herbicide	Clopyralid	Capeweed and clover	21-Nov-11	30-Sep-24	Hort Innovation	WA only
PER14964 Version 3	Lettuce – head and leafy varieties (plant nursery phase)	Fungicide	Chlorothalonil	Anthracnose or shot hole	21-Dec-14	30-Nov-22	Hort Innovation	All states except VIC
PER88032	Eggplant (field & protected cropping)	Biofungicide	<i>Bacillus amyloliquefaciens</i>	Early blight, botrytis grey mould, powdery mildew and suppression of bacterial spot (<i>Xanthomonas</i> spp.) (suppression only)	14-Oct-19	31-Oct-22	Hort Innovation	All states except VIC
PER11764 Version 4	Snow peas and sugar snap peas	Fungicide	Spiroxamine	Powdery mildew	01-Jul-15	31-Dec-21	Hort Innovation	All states except VIC
PER11441 Version 3	Radish, Swede and turnip	Herbicide	Propachlor	Grass and broadleaf weeds	27-May-09	31-Oct-24	Hort Innovation	All states except VIC
PER14583* Version 4	Swede, turnip, brassica leafy vegetables, silverbeet, spinach, celery, beans, snow peas, sugar snap peas, parsley and sweetpotato	Insecticide	Chlorpyrifos	African black beetle, false wireworm, wireworms, sweetpotato weevil and vegetable weevil	01-Apr-14	31-Oct-21	Hort Innovation	All states except VIC
PER11440 Version 7	Peppers (capsicums, chillies, paprika)	Fungicide	Procymidone	Sclerotinia rot	01-Jun-09	30-Nov-24	Hort Innovation	All states except VIC
PER14907 Version 3	Brassica leafy vegetables, leafy beets, silverbeet and spinach (protected cropping)	Insecticide	Emamectin	Diamondback moth (<i>Plutella xylostella</i>), Heliothis (<i>Helicoverpa</i> spp.), cabbage white butterfly (<i>Pieris rapae</i>) and vegetable looper (<i>Chrysodeixis</i> spp.)	09-Dec-14	30-Nov-24	Hort Innovation	All states except VIC
PER8930 Version 6	Eggplant, peppers (chillies, capsicums and paprika), shallots and spring onions	Insecticide	Phorate	Aphids, jassids, mites, thrips and onion maggot	14-Aug-11	30-Nov-24	Hort Innovation	All states

Please note:

*Continued issuance of this permit is subject to the outcomes of the current APVMA review of chlorpyrifos.

Sweetpotato: If subsequent renewal of this permit is required for sweetpotato, please provide the following information as to why this permit is required in addition to the registered control options for control of wireworm and sweet potato weevil in sweetpotato. Registered products include 'Astral 250 EC Insecticide/Miticide' containing 250 g/L Bifenthrin (APVMA No. 68017) and 'Kendon Carbaryl Wettable Granule Insecticide' containing 800 g/kg Carbaryl (APVMA No. 68322).

All efforts have been made to provide the most current, complete and accurate information on these permits, however we recommend that you confirm the details of these permits at: portal.apvma.gov.au/permits.

This communication has been funded by Hort Innovation using the vegetable research and development levy and contributions from the Australian Government.

Agribusiness in focus: Positive outlook for Australian horticulture

A recent survey into Australian horticulture has revealed that it is among the best performing agribusiness industries despite facing major issues such as drought and labour. *Vegetables Australia* provides a snapshot of agribusiness conditions for four major horticulture industries, including fruit, vegetables, table grapes and nuts.

Over the past 12 to 24 months, dry seasonal conditions have been the most challenging issue for many horticulturalists in key production regions, with water availability low and prices high.

While these dry conditions will likely impact the production capacity of some growers into summer, NAB analysis shows generally positive conditions within the horticulture sector.

On a quarterly basis, the organisation conducts an Agribusiness Banker Survey, where it asks its specialist agribusiness bankers around the country how their customers are performing. It then aligns these observations with the industry in which the customer operates, to derive a unique insight into the current performance of agribusiness industries.

The most recent survey, released in September, shows horticulture, including fruit, vegetables, table grapes and nuts, to be among the best performing

agribusiness industries in Australia, despite conditions having come back slightly since late last year.

The value of Australian vegetable production has continued to grow, reaching over \$4 billion in 2017-18. While growth hasn't been constant, the trend is generally positive.

The value of vegetable imports has also grown, and now totals around \$1 billion per year. These imports largely comprise frozen and processed food.

Wholesale market prices for vegetables have demonstrated typical seasonal volatility, but have generally remained flat over the past decade. With higher input costs becoming the new normal, the sustainability of these prices remains an open question.

NAB's Agribusiness Banker Survey also looks at confidence in key sectors, as measured by bankers' perceptions of conditions facing their customers.

Facing challenges

On the whole, confidence fell in Australian agribusiness and across all states except Victoria and South Australia. NAB's bankers reported seasonal-related issues as the leading cause, while availability of suitable labour is reported as the fifth biggest issue impacting customer confidence.

Labour has long been a challenge for horticulture in Australia, and conflicting reports around the severity of the labour problem make it difficult for producers and policy makers to address the issue.

For instance, the most recent labour survey released by ABARES reported most vegetable and fruit growers have little trouble recruiting workers. At the same time, results of a National Farmers' Federation survey showed 43 percent of growers experienced labour shortages during peak season, and that 30 percent saw labour supply as the chief concern over the coming 12 months.

Wherever the reality lies, input costs such as labour and water are likely to continue to be key challenges for the sector. NAB's analysis shows temporary water prices in the Murray-Darling Basin continue to surge, reflecting low inflows and low allocations.

Despite this, conditions in the Australian horticulture sector are positive and strongly outperforming agriculture overall.

AGRIBUSINESS CONDITIONS - OVERALL



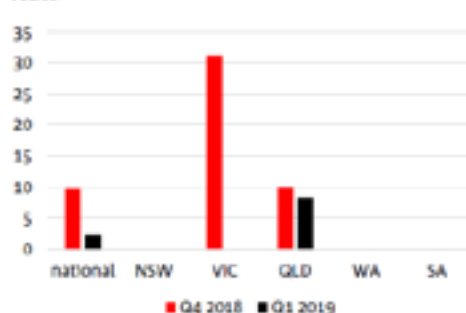
AGRIBUSINESS CONDITIONS

Fruit, vegetables and table grapes



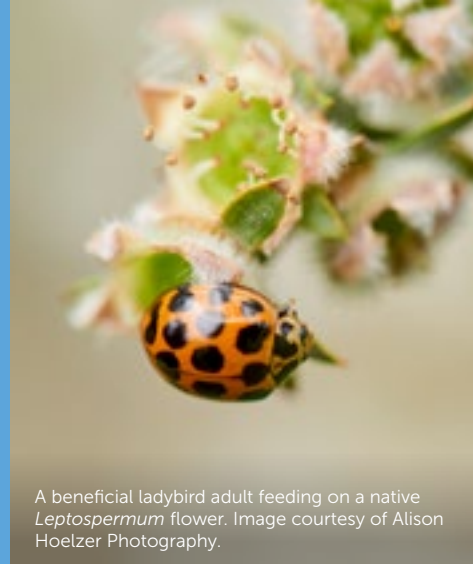
AGRIBUSINESS CONDITIONS

Nuts





Example of a containerised insectary that can be moved within a production system. Image courtesy of the Port Phillip and Westernport Catchment Management Authority.



A beneficial ladybird adult feeding on a native *Leptospermum* flower. Image courtesy of Alison Hoelzer Photography.

Creating a permanent habitat for beneficials through insectaries

Are you a vegetable grower looking for an easy way to improve your Integrated Pest Management program? Native vegetation insectaries might be the answer. The VegNET Victoria (South-East, West and Northern) team investigates.

What is a native vegetation insectary?

On-farm insectaries are vegetated areas of flowering plants that can provide habitat and a nectar food source for beneficial insects. By repurposing areas on your farm not suitable for cropping, insectaries can be a simple, low-cost way to support an existing Integrated Pest Management (IPM) program.

Boost your IPM program

The goal of on-farm insectaries is to enhance diversity and abundance of beneficial insects by planting flowering native species. Insectaries build resilience in an IPM program, particularly against seasonal variations and new pest incursions, by attracting beneficial insects and allowing them to persist in the area for longer.

There are some cost-saving elements as well, particularly if you buy and release beneficial insects, as many of these species need pollen and/or nectar to survive and reproduce as adults. This includes common beneficials such as ladybirds, lacewings, hoverflies and wasps. Subsequently, insectaries can maximise the benefits gained from these tiny pest-busting champions.

Depending on the crop type and timing, beneficials may also lay their eggs in an insectary or even shelter there from certain crop activities such as harvest.

How do I create an insectary?

Step 1 – Find suitable locations on your farm, such as:

- Land unsuitable for cropping but (ideally) within 50 metres of crop areas.
- Inter-row or end-of-row plantings.
- Headlands, buffers or shelterbelts (new plantings or create an understorey).
- Garden beds (e.g. along fence lines).
- Container plantings at various locations around each block.
- Surrounding a dam, embankment or area prone to erosion.
- Grassy drainage lines – native grasses provide excellent low maintenance groundcover and habitat for beneficial insects, as well as reducing erosion risks.

Step 2 – Choose appropriate native or indigenous plant species to best achieve your goals. For example, brown lacewings like to lay their eggs in native grasses. When selecting plant species, aim for as close to year-round flowering as possible and include diverse plant types, such as groundcover, grasses and shrubs.

Step 3 – Plant and maintain your insectary. Control weeds, which are more likely than native plants to harbour pests. Monitor your insectary and adjacent crop areas to make sure you are attracting the beneficials you need and not pests.

Insectaries in action

VegNET Victoria (South-East, West and Northern), delivered by RMCG, facilitated an R&D roadshow forum in mid-October with a focus on native vegetation insectaries at the CSIRO Food Innovation Centre in Werribee, Victoria.

The focus was to build on interest shown by several growers to learn more about insectaries. It included presentations from the Port Phillip and Westernport Catchment Management Authority and a project team from Charles Sturt University researching *Field and landscape management to support beneficial arthropods for IPM on vegetable farms* (VG16062), a strategic levy investment under the Hort Innovation Vegetable Fund. A key outcome from this workshop is the active exploration of external funding support to trial native vegetation insectaries in the Werribee region.

For more information on how to create an insectary on your own farm, including a suggested species planting list, a practical fact sheet is available on the AUSVEG VIC website: ausvegvic.com.au.

Find out more R&D

Please contact Clinton Muller at RMCG on 0498 192 596 or clintonm@rmcg.com.au.

Regional capacity building to grow vegetable businesses – Victoria (South-East, West and Northern) is a strategic levy investment under the Hort Innovation Vegetable Fund.

This project has been funded by Hort Innovation using the vegetable research and development levy and contributions from the Australian Government.

Project Number: VG18003

**Hort
Innovation**
Strategic levy investment

**VEGETABLE
FUND**

Tassie potato growers rewarded for industry innovation

Tasmanian potato growers Susie and Gerard Daly have been recognised for their innovation and dedication to the agriculture industry by winning the Kondinin Group and ABC Rural 2019 Australian Farmer of the Year Award.

The award was presented as part of the 2019 Kondinin Group and ABC Rural Australian Farmer of the Year Awards, which were held at Parliament House in Canberra on 16 October. The ceremony recognised the agriculture industry's leading farmers and industry members.

The Dalys received the top honour for their ingenuity and innovation in creating value-added products, which have increased their sales and productivity, and reduced waste. After years of global research, they transformed their business from farming fresh potatoes to launching a potato distillery producing quality vodka and opening a commercial kitchen producing ready-made potato salads, mash and bakes.

Susie and Gerard Daly have grown potatoes on the south-east coast of Tasmania for over 30 years; however, in recent years they have expanded into creating value-added products such as vodka, ready-made salads and mash. Their innovation and forward-thinking led to the couple being honoured at the 2019 Kondinin Group and ABC Rural Australian Farmer of the Year Awards.

They have also worked closely with the industry to explore new export markets for their products, taking part in industry initiatives such as the Hort Innovation-funded Reverse Trade Mission to showcase their potatoes and value-added products to international buyers, as well as other state- and industry-run export development programs to highlight the products that Australian growers can offer international markets.

Susie and Gerard were also awarded the Award for Excellence in Innovation, sponsored by Telstra.

Valuable investment

AUSVEG CEO James Whiteside commended Susie and Gerard on their decision to invest in product transformation to create high value products for local and international consumers, acknowledging the couple's hard work to increase potato's popularity,

improve its image and develop products that excite consumers. He also outlined the on-farm benefits gained from this investment.

"The innovations they have employed on-farm have the added bonus of reducing food waste in an environmentally sustainable way, thereby allowing the business to be more profitable and support their employees and local community," Mr Whiteside said.

"By working with state and industry export development initiatives to explore new markets and get more people around the world interested in Australian potatoes, Susie and Gerard's products will hopefully result in more people wanting to buy and eat Australian potatoes, which are tremendously healthy and a crucial component of a well-balanced diet."

Find out more

Please visit: abc.net.au/news/2019-10-16/farmer-of-the-year-award-2019-winners/11605076.



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Fall armyworm: On the march

Fall armyworm (FAW; *Spodoptera frugiperda*) is a pest native to tropical and sub-tropical regions of the Americas. Since 2016, FAW has rapidly distributed itself throughout areas of Africa and Asia. If FAW enters and establishes in Australia, it would pose a significant threat to Australia's vegetable industry as it causes damage to a wide range of crops. Lauren Turner reports.

Pest identification

Many species of armyworm are established throughout Australia, but the fall armyworm (FAW) is not. FAW adult moths are brown to grey in colour and have white hind wings. The wingspan width from wing tip to wing tip measures 3.2cm to 4cm. Older caterpillars are the easiest to distinguish, as they have developed a white longitudinal strip, numerous black dorsal spots and an inverted yellow Y-shape on the head. At the end of development, caterpillars may grow up to 4.5cm.

The feeding damage caused by the caterpillars may also assist in identifying the pest. It is characterised by ragged-edged feeding holes, bores in fruiting structures and sawdust-like droppings. FAW egg masses covered in a protective, felt-like layer may also be detected on infested plants. The egg masses can contain up to 200 cream to light brown eggs and are commonly found on the underside of leaves.

Host crops and damage

FAW feeds on more than 350 host plant species across 76 families. While maize, sorghum and other field crops (including cotton, sugarcane, rice and wheat) are the preferred hosts for FAW, multiple fruit and vegetable crops are significantly affected, including sweet corn, beetroot, tomato, potato, apples and oranges.

The damage caused to crops varies depending on the stage of FAW development. Young caterpillars feed on vegetative tissue surrounding the site of egg hatching. This causes plant defoliation, particularly on heavily infested plants. As the caterpillars develop, they tend to attack the plant's reproductive structures and terminal points. This causes significant crop damage and yield reduction. In heavily infested areas, crop yield reductions associated with FAW feeding damage has been estimated up to 100 percent in regions in Chad, Africa and up to 72 percent in Argentina, South America.

Worldwide distribution

In recent years, FAW has made rapid movement outside of its native range. In 2016, FAW was confirmed in Western and Central Africa. In a matter of years, FAW spread throughout the African continent, resulting in 44 African countries confirming the presence of the pest. Subsequently, FAW has been introduced to multiple countries throughout Asia, including Thailand, China, Bangladesh, Sri Lanka and Indonesia. While FAW has not yet been identified in Australia, it poses a risk of entry into the country.

Economic impact

Yield losses caused by FAW have been linked to severe economic consequences, particularly throughout Africa. In Ghana, economic losses due to FAW damage in maize crops are estimated at US\$284 million. Similarly, maize yield losses in Zambia are estimated at US\$198 million. Extrapolated from these estimations, the predicted crop loss across 12 maize producing countries in Africa is between US\$2.4-6.2 billion per annum.

Costs associated with controlling FAW also pose a major economic burden. It has invaded Africa, and governments from affected countries have allocated millions of dollars towards FAW management. For example, in Ghana, US\$4 million has been provided to FAW-affected areas to combat infestations and US\$2.3 million in Ethiopia to purchase pesticides to control FAW.

Pathways of entry and risk to Australia

FAW is a high alert pest for Australia, which has multiple trade and transportation routes connected with FAW-endemic countries and several pathways that could allow the pest to enter. Previous introductions of FAW overseas, such as the African incursion, were thought to have been introduced via a stowaway on a passenger flight. Passengers travelling from FAW-endemic countries are urged to keep watch for FAW hitchhikers.

Global forecasting studies conclude that Australia's tropical and sub-tropical climate conditions are suitable for FAW to successfully invade. In the chance of a FAW incursion, it is likely that the pest will have a quick rate of dispersal as FAW is highly mobile. During migration, one generation of FAW may travel distances up to 500 kilometres. When wind conditions are favourable, migratory flights can exceed this distance. For this reason, it is important to prevent FAW from bypassing Australia's borders.

Find out more

Any unusual plant pest should be reported immediately to the relevant state or territory agriculture agency through the Exotic Plant Pest Hotline (1800 084 881).

For further information, contact AUSVEG Biosecurity Officer Madeleine Quirk on 03 9882 0277 or madeleine.quirk@ausveg.com.au. The Farm Biosecurity Program is funded by the Plant Health Levy.



Fall armyworm eggs pictured hatching. Image courtesy of William Lambert, University of Georgia, Bugwood.org.



Fall armyworm larva. Image courtesy of Phil Sloderbeck, Kansas State University, Bugwood.org.



Fall armyworm soybean field damage. Image courtesy of John French, Auburn University, University of Georgia, Clemson University & University of Missouri, Bugwood.org

Useful resources

- *Spodoptera frugiperda* (fall armyworm) datasheet: cabi.org/isc.
- Fall armyworm: dpi.nsw.gov.au.
- 'Fall Armyworm: Impacts and Implications for Africa': CABI 2017.
- 'Host Plants of *Spodoptera frugiperda* (Lepidoptera: Noctuidae) in the Americas': African Entomology 2018.
- 'Forecasting the global extent of invasion of the cereal pest *Spodoptera frugiperda*, the fall armyworm': NeoBiota 2018.



Narrowing down the choice for Aussie growers

A new tractor series has been released to the horticulture industry that can assist in field work, can tow heavy loads including produce, and comes equipped with a comfortable, easy-to-use operator cabin.

Choosing an affordable tractor for orchard, nursery or viticulture operations can be a challenge. However, there is another option for growers on the market that can ease the burden of choice, with John Deere releasing its 5EN Series Tractors. Engineered and built to withstand tough working conditions, the 5076EN and 5090EN tractors are powered by PowerTech™ diesel engines ranging from 56 kW to 68.6 kW (75 – 92 hp) and have a working width of just 1.32* metres.

Downtime can be costly to growing operations, especially during harvest. But there is reassurance for growers who purchase a tractor, as they have support from a John Deere dealer network throughout Australia. The local distribution centre stocks over 75,000 lines, so there is minimal wait on parts, which ultimately keeps businesses moving.

Featuring John Deere PowerTech turbocharged diesel engines, the 5076EN and 5090EN tractors offer durability, dependable performance and have the ability to tow heavy loads and operating implements. They can be used for carting produce, spraying, fertilising or slashing, and are a seamless fit in narrow applications.

The PowrReverser™ transmission featuring 12 forward and 12 reverse speeds (12F/12R) offers additional operating ranges for field work and other applications. Equipped with a shiftable 540/540 economy power take-off, this transmission is ideal for operating in varying and demanding conditions.

Optional deluxe triple-rear selective control valves (SCVs) offer greater versatility by expanding the array of implements that can be utilised on the tractors, while presenting more operator control over hydraulic functions.

Operation features

Built for comfort and manoeuvrability in tight spaces, growers can select from an open operator station with foldable ROPS or a GreenStar™ ready, air-conditioned cab for guidance and protection when spraying. Seat suspension allows operators to make fore-aft and ride adjustments to suit the operator's preference.

Colour-coded control levers are intuitive and positioned for comfortable, convenient operation. An electrohydraulic fingertip directional control lever allows for change between forward, reverse

and neutral positions using a small finger motion. Plus, operators can speed up or slow down easily using the high-low buttons located on the gear-shift lever without using the clutch. Hydraulic wet clutches found in the 5EN narrow tractors are durable and offer extended life over traditional dry-type clutches, reducing maintenance costs associated with replacement.

An electrohydraulic hitch remote raise/lower switch is located on the left-hand rear fender to assist with attaching implements. Once implements are attached, top-link draft sensing allows the hitch to quickly raise or lower, as needed, to control load on the engine and provide more consistent results. It also reduces the requirement to downshift into a lower gear when working in rough conditions. This feature is particularly useful when operating lighter, short-coupled implements.

Find out more

Please visit johndeere.com.au or speak to your local John Deere dealer.

*minimum width with 8.0-16 6PR and 12.24 8PR tyres

Tackling hort industry challenges through start-up innovation

Founded in early 2018, Beanstalk AgTech aims to connect emerging start-up companies with agribusinesses seeking solutions to the challenges that are being faced throughout the world's supply chain. Beanstalk AgTech Director Cal Foulner spoke to *Vegetables Australia* about the organisation and its 'challenge-led innovation' approach.

Finding and then matching the ideal solution to an on-farm problem can seem daunting. Add in outside factors such as the weather, labour costs and consumer preferences, and it can seem almost impossible to a grower.

However, there is technological help at hand. Beanstalk AgTech was established 18 months ago after recognising the huge gap between large agribusinesses/growing operations and commercial start-up companies. With offices in Melbourne and Singapore, it aims to bridge this gap by finding new and emerging technologies that can aid growers and agribusinesses. It can also help growers and those businesses to avoid disruption or leveraging technology as a huge growth opportunity.

Understanding challenges

Beanstalk AgTech works on the premise of 'challenge-led innovation'. This is a lower risk, outcomes-driven approach, focusing on the agricultural producer's key issues. These are prioritised through workshops, and the biggest challenge is defined. Next, the producer's requirements are broadcast with industry to see who may be able to help with a solution that meets the operation's needs. Once the potential solutions are identified and narrowed down to three or four start-up businesses, trials are put in place.

"Once we've done that initial validation, then we look to do a more in-depth trial. If we've rolled out a piece of technology, for example across one processing facility or one farming operation, and it's successful, then we'll look to start to roll it out across the business," Beanstalk AgTech Director Cal Foulner explained.



Beanstalk team members (L-R) Will Taing, Rob Hulme, Kylie Kong and Cal Foulner. Images courtesy of Beanstalk AgTech.

Waste in focus

While it has wide-ranging interests across the Australian agriculture sector, there are a couple of challenges that Beanstalk AgTech commonly address that are relevant to the vegetable industry.

One of these is crop waste, which was highlighted at a forum hosted by the organisation in conjunction with the University of Melbourne in April this year.

"We're really passionate about crop waste and using that as an opportunity for environmental gains as well as profitability increases for companies," Mr Foulner said.

Beanstalk AgTech had been working with a juicing carrot grower in Australia who was exporting its concentrate, leaving it with highly fibrous carrot pomace. Through challenge-led innovation, the growing operation has now opportunities to provide its pomace to the wellness sector. This includes running trials with a leading Scottish research company that is looking to solve similar challenges in the turnip industry in Scotland.

"We identified an incredibly innovative company that is extracting fibre from carrots and other root vegetables and turning it into high performance materials such as additives for paint that make it harder wearing as well as a product that is similar to carbon fibre – but twice as strong," Mr Foulner said.

Another issue that can be addressed is supply chain traceability, and the global consumer trend of wanting to know where food comes from.

"That's another style of challenge that would fit into the challenge-led innovation process. We'll go out and scout the best technology that's applicable to that particular company, and how they want to use it, and help them to trial and scale those technologies," Mr Foulner said.

Finding a solution

As a result of the carrot pomace experience, Mr Foulner and his team gained an insight into the crop waste dilemma facing producers.

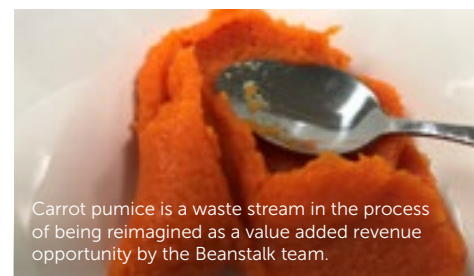
"We recognised that the market and the customer side is as important as the technology side. Specifically, in the case of crop waste, what you can turn something into is limitless. You can do so many things with by-product," he said.

"But the challenge is: what can you market? And often that comes back to what price you can produce the value-added product for."


Mr Foulner added that it is possible for growing operations to find the right business model and commercialise start-up ideas.

"In regard to crop waste, we have seen a big opportunity for partnerships with other non-competing producers so those producers get together to co-invest in a facility that can process different waste streams into different products, allowing the facility to operate at scale and to combine a number of different types of crop waste," he said.

"Individual companies are struggling to produce products commercially at scale on their own – it's an industry-wide challenge."



Carrot pomace is a waste stream in the process of being reimaged as a value added revenue opportunity by the Beanstalk team.

Find out more 

Please contact Cal Foulner on 0439 847 390 or at cal@beanstalkagtech.com, or visit beanstalkagtech.com.



Hamburg Süd's global services.



Hamburg Süd National Export Sales and Marketing Manager and Asia Pacific Refrigerated Cargo Manager, Simon Gardiner.

Protecting the reputation of Australian produce

Recent data from Global Trade Atlas has revealed that the value of fresh Australian vegetable exports increased by 14 per cent in 2018/19, continuing the recent trend of its rising value. To keep Australia's fresh produce moving in a safe and timely manner, Hamburg Süd, which has over five decades of reliable shipping experience with Australian produce, is leading the way.

Australia's fresh produce is known around the world for being clean, green and fresh, and fruit and vegetable exports to countries, including those in the Middle East and Asia, are growing.

However, to export premium produce around the world in a safe and timely manner, there needs to be reliable cargo specialists that provide port-to-port coverage around our country's main produce markets.

One service assisting to strengthen that clean, fresh produce perception is Hamburg Süd. The company is aiming to provide maximum support to every individual grower and shipper, as well as protecting shipments en route to their destinations around the world. This is to ensure safe, punctual delivery of the produce to destination markets.

Simon Gardiner is Hamburg Süd National Export Sales and Marketing Manager and Asia Pacific Refrigerated Cargo Manager, and he outlined what the business strives to achieve.

"Quality consistency and no-surprises delivery – we achieve this by providing a level of refrigerated cargo care expertise that has taken over a century to attain, and over 50 years' of service in Australia's most important produce trades," Mr Gardiner said.

Caring for cargo

With his twin-roles perspective, Mr Gardiner is perfectly placed to explain how Hamburg Süd helps produce shippers meet their export reefer challenges.

"Heading into the export season, we're catering for vegetable and fruit shippers with optimised capacity in the key Asia, Middle East and Europe trades – and this season's onions and carrots are key commodity sectors for us," he said.

"We welcome old and new friends with open arms. Specialised, sensitive cargo delivery is our core strength, and with our targeted port-to-port, relay services and intermodal links, these are the markets we most like to work in – where we can bring all our skills and experience to bear."

Hamburg Süd operates state-of-the-art containerships and a huge fleet of high-tech, fit-for-purpose equipment, plus it deploys highly-trained landside cargo care technicians to help maintain its second-to-none reliable scheduling and provide customer support.

Those who would like more information, please call the Hamburg Süd export team (toll-free) on 1300 134 096.

Watch this space!

Launching soon, Hamburg Süd's Remote Container Management (RCM) tech is designed to deliver total data transparency and supply chain visibility throughout the journey. With its RCM Application dashboard providing access via a full range of devices, the new RCM cold chain monitoring platform will be a useful tool for produce shippers.

Find out more

Please visit hamburgsud-line.com.

Hort Innovation vegetable fund investments (levy projects)

Project code	Delivery partner	Project title	Project lead contact details	Project description
VG15067	CSIRO	Development of a vegetable education resource - stage 2	Astrid Poelman: astrid.poelman@csiro.au, 02 9490 8356	This project is readying a vegetable education resource, developed for use by teachers in Australian primary schools through previous project VG13089, prior to its national roll-out. Ultimately, the resource is expected to positively influence vegetable consumption and therefore increase demand. The project is referred to as 'VERTICAL' – the Vegetable Education Resource to Increase Children's Acceptance and Liking.
VG16018	Edible Adventures	Educational opportunities around perceptions of, and aversions to, vegetables through digital media (part 3 - implementation)	Alice Zaslavsky: a-z@aliceinframes.com, 0423 435 211	With a focus on Australian children, this initiative is about increasing education around and attitudes towards vegetables. There was an earlier component that laid the groundwork – looking at school-aged children's perception of vegetables, and how to create positive behaviour change amongst educators, parents, caregivers and kids. Now this investment is tasked with developing and delivering digital food education resources based on this. Featuring the involvement of a children's television host and chef, and with advice from a curriculum expert who has previously been involved with the Stephanie Alexander Kitchen Garden Foundation, this will take the form of 'webisodes' – short videos primarily intended to be used by schoolteachers in their lessons. Other supporting materials will also be developed to encourage positive behaviours, attitudes and outcomes around vegetables with kids aged six to 14.
VG14065	Nuffield Australia Farming Scholars	Nuffield scholarships	Jodie Dean: jodie.dean@nuffield.com.au, 0431 438 684	This investment provides funding to support Nuffield Scholars in the vegetable industry, with one Hort Innovation scholarship being awarded each year of the project's life from 2016 to 2019. Nuffield Scholarships are a chance for Australians in agriculture to grow their practical knowledge and a broad variety of skills, while heading overseas to study a topic related to their industry.
VG18002	AUSVEG	Vegetable industry leadership and development missions 2019	Shaun Lindhe: shaun.lindhe@ausveg.com.au, 03 9882 0277	This investment will provide opportunities for levy payers in the Australian vegetable industry to take part in overseas leadership and development missions. Exposing participants to international industries and markets, these missions are about building awareness and knowledge of research, technologies and practices in the global horticulture industry, and building relationships and networks for the participants and the broader industry.
HA18002	Freshlogic	Australian Horticulture Statistics Handbook 2018-19 to 2020-21	Adam Briggs: adam.briggs@horticulture.com.au or Martin Kneebone: martin@freshlogic.com.au	This investment will continue the yearly production of the Horticulture Statistics Handbook – the annual statistics resource that delivers accurate data on market size, structure and consumption of horticulture crops in Australia.
LP15001	University of Tasmania	Global Masterclass in Horticultural Business	Alistair Gracie: alistair.gracie@utas.edu.au, 03 6226 7468	This project is part of the Hort Frontiers Leadership Fund, with the vegetable levy supporting scholarships for industry levy-payers to take part in the Masterclass in Horticultural Business course. The Masterclass is a unique offering designed to grow participants' business and leadership skills.
LP15006	Rimfire Resources	Attracting new entrants into Australian horticulture	Gemma Burger: gburger@rimfireresources.com.au, 1300 380 701	This Hort Frontiers Leadership Fund project includes contribution from the vegetable levy. It is responsible for engaging graduate students with the horticulture industry. It has a two-phase approach designed to attract the right people, retain them and support their ongoing leadership development. The first phase involves students undertaking internships within horticulture business, for which funding support is offered for both the student and the business. The second phase involves employment of students following graduation, with Hort Innovation co-investing to support the first-year salary and participation in a five-day leadership program. ➔

Project code	Delivery partner	Project title	Project lead contact details	Project description
VG17000	RMCG	Vegetable business benchmarking (RMCG)	Donna Lucas: donnal@rmcg.com.au, 0459 047 478.	This pilot project will develop a comprehensive benchmarking tool for Victorian vegetable growers – establishing key benchmark performance metrics and drivers of best practice performance, with the aim to enable a culture of continuous improvement. It will ultimately allow vegetable growers to compare their business processes and performance to industry bests and best practices from like businesses. Following the conclusion of this regional pilot, opportunities will be sought to scale the delivery to additional states.
VG17000	vegetablesWA	Vegetable business benchmarking (WA Vegetable Growers)	Bryn Edwards: bryn.edwards@vegetableswa.com.au, 0417 409 821.	Linked to the above benchmarking project, this component is specific to Western Australia.
VG15076	CSIRO	Creating value from edible vegetable waste	Mary Ann Augustin: maryann.augustin@csiro.au, 03 9731 3486	Addressing the issue of vegetable wastage on-farm and post-farm-gate, this project is developing new knowledge and processes to improve recovery of edible material. Avenues of exploration 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 has a focus on brassica vegetables and carrots.
VG16037	The University of Queensland	Novel topical vegetable and cotton virus protection	Professor Neena Mitter: n.mitter@uq.edu.au	This project aims to minimise the economic impact of pest infestation in both vegetable and cotton businesses*, through the development of an innovative topical protection medium, BioClay. The high-tech BioClay spray acts like a vaccine, to naturally attack specific crop pests and pathogens using non-toxic, biodegradable clay nano-particles that activate the plant's own immune system. *The project involves co-funding from the Cotton Research & Development Corporation (CRDC), and other parties.
VG16068	Applied Horticultural Research	Optimising cover cropping for the Australian vegetable industry	Kelvin Montagu: kelvin.montagu@gmail.com; 0421 138 019, 02 4754 3856	This project was contracted to support Australian vegetable growers in effectively using cover crops to boost soil health and reap productivity benefits. Bringing together a consortium of research partners, it is building on existing cover crop trial sites and establishing new ones to explore the how, why and when to best use cover crops across Australia's main vegetable growing regions. It is exploring cover crop species, cropping sequences, sowing windows and transition practices under a range of soil types, climates and crops, and ultimately deliver clear grower guidelines for using cover cropping that are specific to growing regions.
MT16004	Cesar	RD&E program for control, eradication and preparedness for vegetable leafminer	Paul Umina: pumina@cesaraustralia.com	This multi-industry investment is for and funded by the vegetable and nursery industries. It is set to bolster preparedness for and protection against the potential spread of vegetable leafminer (<i>Liriomyza sativae</i>) through Australian growing regions. The pest is capable of infesting a broad range of crops, and was first detected on the country's mainland in 2015, in a backyard garden in the Cape York Peninsula community of Seisia.
VG15037	Blue Environment Pty Ltd	Optimising the benefits of vermiculture in commercial-scale vegetable farms	Bill Grant: bill.grant@blueenvironment.com.au	This investment is investigating the use of commercial-scale vermiculture in the Australian vegetable industry to improve productivity (with vermiculture the cultivation of earthworms to convert organic waste into compost and/or for direct soil integration and management). Its end-goal is to develop guidelines for the use of vermiculture as part of soil and nutrient management, and provide a cost/benefit analysis to help growers decide whether to adopt the approach.

Project code	Delivery partner	Project title	Project lead contact details	Project description
VG15003	The University of Sydney	Using autonomous systems to guide vegetable decision making on-farm	Claire Burnett: claire.burnett@sydney.edu.au, 02 9114 0892	Using the well-known Ladybird and RIPPA robots in both trial-farm and commercial-farm settings, this project is advancing the application of robotics, intelligent sensing systems, precision agriculture automation and more in Australia's vegetable industry. It is developing, evaluating and supporting the commercialisation and adoption of such technologies, with the end goal of increasing industry productivity, particularly in relation to brassica, lettuce and baby leaf growing. Applications will help improve crop performance and resource use – including through the precision application of inputs – and assist in decision making by providing timely and accurate information such as predictions of optimum harvest time and the estimation of yield and product quality.
VG15059	The University of Sydney	Evaluating and testing autonomous systems developed in VG15003 in Australian vegetable production systems	Salah Sukkarieh: salah.sukkarieh@sydney.edu.au	Linked to VG15003, this investment is responsible for expanding evaluation of technologies across a range of growing regions and crops.
VG16031	Streamwise Learning	(NB: under VegPro) PMA-ANZ Produce Executive Program scholarships	Anita Pike: apike@streamwise.com.au, 03 8640 0947	This investment supports industry scholarships 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.
VG15070	University of New England	A strategic approach to weed management for the Australian vegetable industry	Paul Kristiansen: pkristi2@une.edu.au	Established in late 2016, this project is delivering weed management tools and approaches. It is tasked with identifying and improving integrated management strategies for high-priority weeds and developing guidelines and a host of resources for growers. It will ultimately help reduce the dependence on herbicides and tillage for weed control, which can become ineffective when used repeatedly.
VG16067	IPM Technologies	Impact of pesticides on beneficial arthropods of importance in Australian vegetable production	Jessica Page: jessica@ipmtechnologies.com.au, 0408 308 809	This project is 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.
VG15021	The University of Queensland	Sowing success through transformational technologies	Jitka Kochanek: j.kochanek@uq.edu.au	This investment is bringing together and further evaluating transformational precision technologies that have been developed through previous levy-funded work. These include new natural compounds to enhance crop establishment, growth and resilience; precision delivery technologies to deliver compounds and nutrients to seeds or crops exactly when and where they're needed, at the right dose; and new technologies such as membranes and micro-encapsulation to surround seeds or plant roots to enhance water and compound uptake.



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AUSVEG SA

AUSVEG SA has recently had some changes at Board level with Renee Pye from Zerella Fresh joining us. Zerella Fresh is a leading potato, onion and carrot producer in the state and Renee has been heavily involved in the management of the business, overseeing the launch of new products and value-added lines. AUSVEG SA is excited to have Renee on-board as an emerging leader in the industry, and for the perspective and knowledge she brings.

In advocacy news, AUSVEG SA continues to advocate for infrastructure investment to flood-proof the \$500 million Northern Adelaide Plains production region and is working with the South Australian Government to determine a response. We have also been involved heavily in discussions to reform and address concerns with proposed labour hire legislation in South Australia, which hasn't addressed issues with the liability for growers. In addition to this work, we have been working with the SA Government to roll out a number of new proposed programs for industry in the future.

In the program space, we have renewed our LEAN Manufacturing efficiency program,

which has been run with consultant Jon Ferguson of Viscon. In its first year, the project worked with 10 growers throughout the state and identified \$10 million in new investments yielding a total efficiency return of \$8 million per annum. This is part of AUSVEG SA's strategy to work with the SA Government and commercial service providers to identify ways to identify efficiencies for growers and save money in their businesses.

In addition to our LEAN project, we have just finalised support for another year of our Export Development program, funded by Hort Innovation, which will continue to provide on-the-ground support for growers looking to export their produce. The project has identified over \$20 million in new opportunities for South Australian growers over its period of operation and we look forward to this continuing for the coming year.

AUSVEG SA would like to remind members who have any R&D issues to contact the AUSVEG SA office anytime, as we would like this feedback to scope new programs and initiatives in the future.



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NT Farmers Association

As dry and relatively cool conditions persist in the Northern Territory, it seems there's no rain in sight.

At the time writing, the Bureau of Meteorology is predicting the possibility of a shower or storms at the end of this month, which is about a month later than normal. An exceptionally strong positive Indian Ocean Dipole is affecting weather right across Australia and has prevented the start of the normal north-western monsoonal flow that brings in the moisture to northern Australia and beyond.

The promise of rain at the end of the month is keeping livestock producer's hopeful, who are in desperate need of an early start to the wet for restocking and food store requirements. But with the humidity sitting around 60 per cent, the chance of rain before Christmas seems slim.

For our vegetable growers, this is a positive because it extends the growing season and enables them to continue to harvesting crops of high value such as snake bean,

which is still fetching a good price, in turn increasing yearly income streams.

On the other hand, okra prices have dropped slightly due to the cooler weather. Growth is slowing with a lot more okra hitting the market affected by pest and diseases issues, impacting quality and size. This is reflected in the price drop compared to previous years around this time, where prices have been higher.

Some growers are experiencing soil diseases such as fusarium, which shortens the life cycle of the crop and harvesting life of the plant. Some of the pests we're seeing this year include mealybugs in okra with less pressure from caterpillars, and mites and caterpillars in snake bean. The uptake of Integrated Pest Management (IPM) practices by our vegetable growers could be responsible for the changes in pest pressures as our farms settle into a new balance that has fewer chemical applications. This is the next challenge: supporting an IPM program for vegetable production in the Top End.



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Tasmanian Farmers and Graziers Association

The release of the Tasmanian Agri-Food ScoreCard 2017-2018 provided an interesting insight into Tasmanian agriculture. The report released by the Department of Primary Industries, Parks, Water and Environment (DPIPWE) highlighted the value of Tasmanian vegetable production, with a reported a total farm gate value of \$250.7 million and processed value of \$692 million. The markets for Tasmanian vegetable produce were discussed in the report, with interstate markets the primary destination. The top exports for 2017-18 were onions, valued at \$9 million and carrots, valued at \$8 million.

Potatoes in particular reported significant increases in value and volume with a 26 per cent increase in farm gate value total to \$123 million and a 26 per cent increase in volume. This demonstrates the importance of this industry and success of Tasmanian growers, and shows the value of the recently-successful potato negotiations between potato producers and processors, Simplot and McCain.

The TFGA was recently awarded a project to work with the Tasmanian State Government on developing an Industry Code of Practice for the Tasmanian agricultural and horticultural sectors for registration under the Heavy Vehicle National Law (HVNL). The purpose of this project will be to identify areas where agriculture differs under the HVNL and will sit under the Master Registered Industry Code of Practice. This is a significant project for Tasmanian agriculture to help ensure producers and those in the supply chain are covered by a Code that is appropriate for agriculture. The project will run for 12 to 18 months, and will involve consultation with producers and industry to develop the Code.

As Tasmanian producers continue to work hard, the weather remains relatively dry with below average rainfall across the state. The east coast did receive some much-needed heavy rainfall in September, but conditions remain dry overall. The days have also been warm with temperatures above average state-wide.



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AUSVEG VIC

Victorian growers need to be making sure they are working within new labour hire licensing laws that came into effect on 29 October. Growers must ensure that their labour hire providers are a registered labour hire contractor on the Victorian labour hire licensing website.

The Victorian Labour Hire Authority has told AUSVEG VIC that, for a labour hire provider to continue to provide a labour hire service, it must have applied for a licence prior to 29 October.

From 30 October, a host must not engage a provider that has not applied for, or been granted, a labour hire licence by the Authority.

In other news, the AUSVEG VIC annual general meeting (AGM) was held on Friday 25 October at Cricket Victoria's headquarters in St Kilda. Over 30 attendees received a report on the previous year and the outlook for the future. Paul Gazzola from Gazzola Farms was re-elected as President while Rick Butler from Butler Market Gardens has taken on the Vice President position.

The AUSVEG VIC Executive Committee and State Manager look forward to working with members across the state to build on the good work that has been undertaken in recent years.

There are several issues that Victorian growers are facing at the moment. AUSVEG VIC is acting on these, and keeping members up-to-date. Items on the agenda include labour hire licensing practices, Queensland fruit fly in northern Victoria as well as union interactions on farms, and we are continuing to ensure growers are supported in all aspects of their business.

There are various government grants on offer to Victorian growers to help with energy consumption, and making your operations more energy efficient. These grants are being run through Agriculture Victoria and are available to eligible primary producers until March 2020.

AUSVEG VIC is here for growers who are looking to apply for grants and can assist growers with their applications. Please contact AUSVEG VIC State Manager Tom Cohen to find out more.



VGA trading as AUSVEG VIC



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NSW Farmers Association

The NSW Farmers Horticulture Committee met on 14 October in Sydney to discuss their priorities for the upcoming year.

The committee's first priority related to competition and markets – an issue that has been front-of-mind for the association for many years. Through peak industry bodies, NSW Farmers will lobby the Federal Government for a review of the Horticulture Code of Conduct and participate in the review of the Grocery Code to highlight instances of market failure and improve compliance. We will also investigate alternative selling methods for produce, and see where there are opportunities for our members to maximise their returns.

On-farm profitability is at front of mind for all our members, including horticulture. We're looking to be smarter about our costs by investigating options to reduce the cost of energy on-farm, continue lobbying for assistance for netting schemes, and pursue sustainable and effective mechanisms to fill labour gaps, including an agriculture visa. The right policy settings around farming will help increase this profitability; we will lobby

the NSW Government for the development of a peri-urban agriculture strategy, and influence association and government discussions on land use planning and right to farm.

The committee agreed that industry good programs would be a focus for the upcoming year. We will look to ensure levy payments made by smaller horticultural industries are used for research and development in those industries. We plan to make sure that the Federal Government retains market access capacity in the Department of Agriculture and Water Resources. We will also work with the wider agricultural industry to highlight the environmental benefits of horticulture – this ties into the Telling Our Story initiative of the National Farmers' Federation.

Finally, NSW Farmers has established a new Water Taskforce to tackle this ongoing issue for our members. The Horticulture Committee developed some water-related priorities for our sector, including water security, reviewing water sharing plans, and protecting the ongoing viability of permanent plantings.



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In October, we celebrated our annual Grower Tour, HortConnectWA Brunch and Industry Summit.

Growers from across Western Australia made the trip to Perth on 17-18 October for two days of networking, eating and education and while I can't speak for everyone, the feedback we've had has been exceptional.

We kicked off with a tour of Brookrise farm in Gingin. A few dozen growers and industry representatives arrived at the farm mid-morning and had the rare opportunity to take a look around another farm and speak with its successful operator, Tony Colotti.

A commercial drone demonstration gave us all a peek into what the future holds for targeted spraying. It was great to get out in the paddock and see first-hand the kind of accuracy that can be obtained with this emerging technology.

The following day, we headed off to Crown Perth for the HortConnect Brunch and Industry Summit.

Guest speakers at the brunch included West Coast Eagles AFL Women's Assistant Coach Michelle Cowan, Woolworths Ethical Sourcing Manager Laura McManus and Buy

West Eat Best Manager Melissa Worthington, who talked us through their roles and goals.

The Summit, which was held in the afternoon, was emceed by ABC Rural radio presenter Di Darmody, who kept the event lively and the speakers on their toes.

Our first speaker of the event was banana grower, Krista Watkins, who blew the entire crowd away when discussing the origins of her business, Natural Evolution Foods.

Frustrated with dumping tonnes of bananas because they were the wrong shape or size, Krista and husband Rob repurposed the waste by developing gluten free "banana flour" and now produce approximately eight tonnes each week.

Their operations have extended to sweetpotato, broccoli, cauliflower and pumpkin, ginger, turmeric, beetroot and mushroom powders – as well as a new range of distilled products which includes sweet potato vodka and green banana rum.

Krista was followed by topics on Freshcare, area wide management, benchmarking and strip tillage. Each speech was followed by a panel discussion, which provided a terrific opportunity for the audience to ask questions.



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In September, the Queensland Parliament passed the Palaszczuk Government's Environmental Protection (Great Barrier Reef Protection Measures) and Other Legislation Amendment Bill.

Better known as the Reef Bill, among other things, it establishes the power for government to increasingly intervene in the everyday operations of agricultural businesses.

The loss of freedoms and liberties by individuals and businesses must always be justified by gains for the common good. In this case, the Government has argued the health of the Great Barrier Reef demands regulatory action.

But not for horticulture, at least initially.

Growcom welcomes the commitment from Minister Enoch that horticulture will remain unregulated, provided our industry demonstrates that most of our growers are moving towards best practice.

While we have three years to keep the Minister to her word, we don't intend on wasting a day.

Growcom will have plans in front of state and federal governments for further developing Hort360, our industry-led best management practice program, into the leading tool for growers to improve both their sustainability and profitability.

Growcom is already well on the way to developing a voluntary certification through Hort360 to give growers confidence their practices are resulting in improved Reef water quality.

Farmers are among the very best amateur scientists. Their lives and livelihoods depend on being observant, conducting experiments and drawing conclusions.

But there can still be tension in the

agricultural sector around science. For example, some are simultaneously standing behind the science supporting the use of glyphosate while also questioning the science on climate change and impacts on the Great Barrier Reef.

So to be clear, Growcom agrees with the scientific community and state and federal governments that water quality and the health of the Reef is impacted in part by runoff from farms.

Where Growcom does depart from the Queensland Government is how to best address it. We do not believe regulation is an effective and cost-efficient mechanism to improve runoff water quality in the horticulture industry.

Less than one per cent of the total Great Barrier Reef catchment area is used for horticultural production. For the risk we present, establishing regulations and minimum standards for each of the 120 horticultural commodities is overkill.

Our view is taxpayers' money should not be spent on regulating horticulture, but instead be invested in Hort360.

In horticulture, the best management practice train has left the station. Already almost 60 per cent of our growers in Great Barrier Reef catchments are participating in Hort360. And while we give credit to government for getting the train going, now is not the time to be letting up.

We call on all stakeholders, including our growers, to get on board, and to have confidence in continuing to evolve their businesses in the knowledge their governments and industry bodies are working hard to put in place the best management practice program they need to succeed.

Calendar

18-19 February 2020
evoke^{AG} 2020

Where: Royal Exhibition Building, Melbourne

Off the back of an immensely successful inaugural event, evoke^{AG} will be returning in 2020. evoke^{AG} is Australia's largest agrifood tech event, designed by industry to encourage domestic and international delegates to connect and collaborate across three important arenas – food, farm, future.

Further information: evokeag.com

15-17 June 2020
Hort Connections 2020

Where: Brisbane Convention and Exhibition Centre

Save the date for Hort Connections 2020, where AUSVEG and the Produce Marketing Association Australia-New Zealand (PMA A-NZ) will once again join forces to present the biggest event in Australian horticulture, which is set to deliver another world-class program and trade show to growers and whole-of-supply-chain companies alike.

Further information: hortconnections.com.au



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