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



Editorial

The start to 2020 has been sobering for many Australians, including those in our agriculture and horticulture industries.

A lot of our farmers and growers, many of whom have been battling years of severe drought, faced what has been labelled the worst bushfires that this country has ever experienced. At the time of writing, a number of these fires were set to continue in the months ahead.

While there has been widespread devastation and heartbreak, many examples of goodwill and kindness among Australians have emerged during these tough times.

Led by Australian comedian Celeste Barber and her Facebook fundraising campaign, we have seen many high-profile people dig deep and give to fire-relief charities, while everyday Australians have been doing their bit by joining social media campaigns. These include 'Spend with Them', which is encouraging Aussies

to buy online or in-store from fire-affected communities and support local businesses, and Empty Esky – an initiative urging us to visit these communities with an empty esky and fill it when we reach our destination.

Another example of the public's overwhelming generosity was witnessed at Foodbank Victoria, where, in just one day, more than 1,300 carloads of people visited the organisation's warehouse in suburban Melbourne to drop off various foodstuffs. AUSVEG witnessed this outpouring of kindness first-hand, with two teams of staff volunteering at Foodbank Victoria in January. The teams sorted a large amount of food orders, which were distributed in hampers to numerous charities throughout Victoria, including to those first responders who continue to play a crucial role in the unprecedented bushfire crisis.

There have also been examples of

farmers assisting their state and interstate counterparts, with fodder donations being sent into fire- and drought-affected regions where it is needed most. State organisations such as NSW Farmers and the Tasmanian Farmers and Graziers Association are continuing to facilitate fodder donations, so please visit your state farming body's website to find out how you can help or if you need assistance during this time.

Finally, it is imperative that we look after ourselves and each other. There are resources available to those who are seeking mental health and counselling support after witnessing a distressing event such as a bushfire. State health services are providing additional staff and resources in rural and regional areas affected by the fires. A full list of state and territory government resources, and mental health resources, can be found at farmhub.org.au/mental-health.



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Message from the Chair

It has been a tough start to the year for many Australians, and weather events around the country continue to have a significant impact on Australian agriculture, including Australian vegetable and potato growers.

At the time of writing, various bushfires are still active in many areas and as the recovery efforts get underway, the nation has banded together in support of those affected through various donations and support.

In mid-January, AUSVEG travelled to Gippsland to talk to growers about the impact of the ongoing fires on their businesses and their communities. I joined CEO James Whiteside, National Public Affairs Manager Tyson Cattle and AUSVEG VIC State Manager Tom Cohen in Bairnsdale and surrounding towns to listen to those who had been impacted by the fires and to see what we can do to help them.

The smoke haze was still prevalent during our trip and its impact on produce and cold storages was still being felt. Many growers said their growing season had already been affected due to the smoke haze and lack of sunlight infiltration, which has affected production for some producers for over three weeks.

Our thoughts go out to those who lost property, infrastructure and access to services during this difficult time.

While there have been vegetable farms in other regions (including Kangaroo Island) that have been affected by fires, other sectors have lost critical fencing and infrastructure, countless livestock have been lost, apple orchards have been significantly damaged and our beekeepers and their critically important pollinators have suffered major losses.

The Department of Agriculture is working with various industry bodies (including AUSVEG) to gather data and information to assess what damage has been done.

In the meantime, we are working with our State Members and other industry bodies to provide support where we can. Anyone looking for information or wanting to show support can head to farmhub.org.au, which lists all the latest information from the bushfires as well as support information.

I hope you and your families are safe, and that we can come together as an industry to become stronger and more resilient in the face of this hardship.

Bill Bulmer
Chair
AUSVEG



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Tasmanian agribusiness consultant Belinda Hazell, visiting GROWx in central Amsterdam. The first vertical farm in the world to run completely off renewable energy, the business grows microgreens, herbs and vegetables under LED lights.

Cultivating innovation in Australian horticulture

Members of Australia's horticulture industry are being offered a life-changing opportunity to travel overseas and investigate a topic they are passionate about. Three Hort Innovation Churchill Fellowships are available in 2020, and applications are now open.

Churchill Fellowships are unique awards that support people from all walks of life to explore best-practice anywhere in the world for up to eight weeks.

As well as general Fellowships, up to three specific Fellowships will be available this year as part of an ongoing partnership between Hort Innovation and the Winston Churchill Memorial Trust, to encourage innovation in Australian horticulture.

"We are particularly keen to hear from anyone with even just the seed of an idea that might help drive innovation and create new opportunities for the industry," Churchill Trust CEO Adam Davey said.

"Unlike some other travel scholarships, Churchill Fellowships allow people to travel at a time that suits them, and they are not given for tertiary study. In fact, no academic or formal qualifications are required to apply, and there are no age limits. Everyone has the potential to become a Churchill Fellow – the only

prerequisites are passion and curiosity, and a willingness to step outside your comfort zone."

Opening doors

Applicants design their own projects so they can access expertise that cannot be found in Australia. The award covers travel costs and living expenses for four to eight weeks, with Fellowships worth an average of \$29,000 each.

"Aside from their monetary value, the Fellowships open doors to expertise and experiences often unavailable to independent travellers, because the award is so widely recognised internationally," Mr Davey said.

"When they return home, Churchill Fellows are encouraged and supported to inspire change at a local level, by applying, adapting and sharing what they have learnt. As a result, they make a difference every day in all aspects of Australian life, across an incredibly broad range of sectors, including horticulture, which is an important contributor to our nation's economy."

More than 4,400 Fellowships have been awarded in Australia since the award was established 55 years ago to perpetuate and honour the memory of famous world leader, Sir Winston Churchill.

Over the years, many recipients have come from the horticulture sector,

beginning with Riverland citrus expert Ian Tolley, who received one of the very first Fellowships in 1965 when he was a grower. He has gone on to develop an international reputation as a citrus expert.

More recently, Tasmanian consultant Belinda Hazell received a 2018 Hort Innovation Churchill Fellowship to investigate the use of quality assurance standards to stay ahead of social licence demands. She travelled overseas last year, visiting New Zealand, the United Kingdom, Ireland and the Netherlands.

"I encourage anyone who has the desire to gain the utmost possible knowledge to benefit their professional development and industry sector to apply for a Churchill Fellowship. You never know what may happen," she said.

Hort Innovation CEO Matt Brand said investment in the sought-after Fellowships formed part of the biggest industry leadership drive in the organisation's history.

"In the face of an ageing horticultural industry and a fast-moving technological landscape, Hort Innovation is rolling out a host of tailored development opportunities for growers, and this is one not to be missed," he said.

Hitting the road

A national roadshow of information sessions is currently being run for people interested in applying for a Churchill Fellowship. These sessions are visiting every capital city and 20 regional centres. They started in Adelaide on 11 February, and are set to continue around Australia until mid-March.

The free sessions will provide advice on how to put together a successful application, with the opportunity to hear individual Churchill Fellows talk about their inspiring experiences.

Find out more

Please visit churchillfellowships.com.au.

Applications can be made online until 30 April 2020 for travel between 1 February 2021 and 31 January 2022.

Churchill Fellowships is a strategic partnership under the Hort Frontiers Leadership Fund.

This project is funded by the Hort Frontiers Leadership Fund, part of the Hort Frontiers strategic partnership initiative developed by Hort Innovation, with co-investment from the Winston Churchill Memorial Trust and contributions from the Australian Government.

Project Number: LP16002





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Romaine lettuce production at Mellon Farms.

US State of mind: Aussie growers gain American insight

Late last year, a group of Australian vegetable growers and industry members attended a two-week industry leadership and development mission to the United States, where they visited a number of growing operations, agribusinesses and key industry stakeholders. AUSVEG Tour leader Elyse Rosewall reports on the tour's highlights.

It was an action-packed two weeks for a group of growers and vegetable industry members who travelled to the United States to take part in the 2019 U.S.A. Industry Leadership and Development Mission.

The tour was a strategic levy investment under the Hort Innovation Vegetable Fund and was part-funded with contributions from tour participants.

Between 12-21 October, the group travelled from San Francisco to Anaheim to visit two major Californian vegetable growing regions, Salinas Valley and Bakersfield. Participants also ventured out to Arizona to tour the Yuma and Imperial Valley Districts, which supply 90 per cent of fresh produce to the U.S.A. between October and April each year. The mission also featured a visit to the Produce Marketing Association (PMA) Fresh Summit in Anaheim, California.

The salad bowl of the U.S.A.

In California, the group examined the similarities and differences in a range of horticultural crops to compare them with the Australian industry. This provided an opportunity to see how other countries are tackling ongoing challenges in improving productivity and profitability, particularly drought.

The group met with two of the world's leading agribusinesses for crop protection products and seed production, BASF and Corteva Agriscience, as well as leading irrigation company Toro. Participants toured the businesses' R&D sites and learned about their research into pest management and irrigation, and the ways they are implementing data and

technology to help them make more informed business decisions.

Meanwhile, the group stopped at Ratto Bros. in the San Joaquin Valley, which is home to some of the most fertile soil in the world. Situated on 1,000 acres, Ratto Bros. grows more than 70 varieties of herbs, leafy greens, fruits and other vegetables throughout the year. It plants the finest hybrid seeds available and takes weekly soil samples, which are monitored at an in-house lab to increase quality and yield.

A highlight of the California farm visits was Tanimura & Antle, an impressive large-scale production in Salinas. Tanimura & Antle is 100 per cent vertically integrated, and has growing operations in Salinas, Huron and Yuma that enables it to produce fresh produce 12 months of the year. The operation exports approximately five per cent of its produce. President Brian Antle took the group on a tour of facilities and spoke about succession planning. He explained that 30 per cent of the company is now owned by its employees. After a pre-determined length of service at Tanimura & Antle, full-time employees earn shares for every hour worked. Brian explained that due to the US inheritance tax, the Tanimura & Antle families were no longer able to retain 100 per cent ownership of the company; therefore, the business had to shift its investment measures in order to remain sustainable.

A desert landscape with water supply

Another highlight was a visit to the Imperial Irrigation District (IID) in California



Imperial Irrigation District (IID) operate more than 3000 miles of canals and drains.



Steve Alameda from Top Flavor Farms showing the group a PlantTape field.

and Arizona, where participants learnt about the simple, but very effective, irrigation practices in the desert region. The district provides raw Colorado River water for irrigation and for non-potable residential and industrial use. To facilitate its delivery, IID operates more than 230 miles of main canals, 1,438 miles of canals and laterals, of which 1,130 miles are concrete-lined or pipelined, and 1,406 miles of drainage ditches, of which 107 miles are piped.

With more than 3,000 miles of canals and drains, IID is one of the largest irrigation districts in America. As a public agency, IID strives to provide the highest level of service at the most economical price while preserving the unique ecosystem associated with this working landscape. The IID Water Department is responsible for the timely operation and maintenance of the extensive open channel system, and effectively delivers its annual entitlement of 3.1 million acre-feet, less water transfer obligations, to nearly one-half million acres for agricultural, municipal and industrial use. Of the water IID transports, approximately 97 percent is used for agricultural purposes, making possible Imperial County's ranking as one of the top 10 agricultural regions nationwide.

Reaching the summit

During the mission, the group enjoyed a visit to the two-day PMA Fresh Summit. With nearly 1,200 exhibiting companies, the Summit provided many networking opportunities. Participants formed many new connections while learning about various products and innovations within

the fresh produce industry.

The group also had the opportunity to attend the Australasian Reception on Thursday night, which was hosted by PMA Australia – New Zealand. Again, this provided a great networking opportunity for the growers to meet with an array of individuals from across the supply chain, retailers and other growers from the region to discuss industry issues of mutual concern and create new relationships within the Australasian region.

Sharing knowledge

Incorporating a range of growers from varying production systems, the study mission proved educational and thought-provoking. It challenged the group to think of ways that Australia can make better use of its limited resources, while recognising the parallels between production practices here and the U.S.A.

Upon their return home, the tour participants are encouraged to share information on what they have learnt and experienced with colleagues and peers throughout industry networks. Participants are actively remaining in contact and continuing the discussion on their new-found insights into vegetable growing technologies and emerging trends overseas.

Find out more R&D

A full project report will be released in the coming weeks and will be made available on the InfoVeg website: ausveg.com.au/infoveg.

The project has been funded by Hort Innovation using the vegetable research and development levy, contributions from Australian vegetable growing businesses and contributions from the Australian Government.

Project Number: VG18002



L-R Greg Fraser, Dr Jo Luck, the Hon David Littleproud MP, Andrew Metcalfe, Dr Gabrielle Vivian-Smith, Tim Lester and John Woods.

Plant health: The global vision for 2020

For the first time in history, the United Nations General Assembly has focused global attention on plant health by declaring 2020 the International Year of Plant Health. This was celebrated with an event at Parliament House in Canberra on 6 February.

Government, industry and research leaders joined diplomats to Australia to mark the commencement of the International Year of Plant Health, with events and activities being held around Australia.

The United Nations General Assembly declared 2020 as the International Year of Plant Health, which is an opportunity to raise global awareness on how protecting plant health can help end hunger, reduce poverty, protect the environment, and boost economic development.

AUSVEG was in attendance at the International Year of Plant Health Australian launch, and it recognises the employment of good biosecurity practices in maintaining strong plant health and promoting Australia's strong biosecurity credentials, particularly to key export markets. This is critical to ensure the future productivity and competitiveness of the Australian vegetable industry.

Biosecurity boost

AUSVEG CEO James Whiteside said that the Australian vegetable industry prided itself on the good biosecurity practices that keep so many pests and diseases that have devastated many other countries away from our farms and our plant industries. However, he added that Australia must not rest on its laurels and become complacent in the face of increasing global trade and the ongoing

threat of pests and disease incursions.

"Australia's strict biosecurity screening program has a strong reputation for safeguarding our plant industries, and it is important that reputation is maintained – biosecurity affects everybody," Mr Whiteside said.

"Our borders are at constant threat from pest and disease incursions that have the potential to decimate crops, impact farmers' livelihoods, damage the local environment, which would cripple regional and rural industries that rely on a strong, thriving agriculture sector to survive.

"The flow-on effects of pests and disease incursions are significant, not only to producers, but to businesses and consumers in capital cities and regional centres. If a pest or disease comes in, it can wipe out an entire industry.

"We market ourselves as a country with a clean and green image and a large amount of our \$60 billion agriculture industry is built on our global reputation for food production – biosecurity is a key component of this. If we compromise this, the agriculture industry, and the very food on your table, is at risk."

Encouraging collaboration

Plant Health Australia Executive Director and CEO Greg Fraser said the year presents the country with a unique opportunity for innovative collaboration in plant health.

"Peak industry bodies, research and development corporations, botanic gardens, governments and the community, will partner together and with the international plant health community to find new ways of combating emerging plant pest threats," he said.

Australian plant industry research and development corporations are

collaborating on addressing high priority plant health risks through the Plant Biosecurity Research Initiative.

Meanwhile, AUSVEG will be working with vegetable growers during the International Year of Plant Health to promote good biosecurity practices to reduce the likelihood of new pests being introduced or spread on-farm, as well as how growers can reduce the impact of endemic pests that they may already be dealing with.

A website has been created for the International Year of Plant Health in Australia to encourage all Australians to get involved in the year. To find out how you can help, events, stories and news about the year, please visit planthealthyear.org.au.

Find out more

Any growers interested in obtaining a Farm Biosecurity Plan Work booklet or an AUSVEG Farm Biosecurity Planner, which includes an extended biosecurity checklist and additional information about biosecurity practices and risks, can contact AUSVEG on 03 9882 0277 or at info@ausveg.com.au.

Biosecurity protocols for farm workers

- Provide footbath and scrubbing brushes for staff and visitors.
- Check clothing, footwear and tools for soil and organic matter before entering the farm.
- Train staff in biosecurity and hygiene practices.
- Provide a biosecurity induction for staff, contractors and visitors prior to entering the farm.

For more information about staff and visitor biosecurity, please turn to page 52 of this magazine.



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Offering further education opportunities to veg industry members

In July this year, a new 12-month Masterclass will commence with a focus on protected cropping. The course will include a combination of flexible online learning modules and intensive on-site workshops. Specialised units under the themes of science, technology, business and industry-focused research will be delivered to allow students to select those units best matched to their employers' requirements and participants' career objectives. *Vegetables Australia* reports.

Protected cropping is expected to drive the next wave of profitability (domestic and export) for the Australian horticultural sector. Many growers are already planning for significant expansion in protected cropping, which will require hundreds of new staff to meet projected demand.

Recognising this, Western Sydney University has joined forces with Hort Innovation and five industry partners to deliver the Masterclass in Protected Cropping, a one-year course that will offer a range of graded qualifications, culminating in a Graduate Diploma (Protected Cropping).

The course will include a combination of flexible online learning modules and intensive on-site workshops, and students and current employees of the protected cropping industry will have opportunities to enrol. Holding a tertiary qualification is not compulsory to apply for this course, and the first intake of students is planned for July this year.

Emerging Leaders in Protected Cropping (LP18000) is a strategic partnership under the Hort Frontiers Leadership Fund.

Developing skills

Western Sydney University Professor Zhong-Hua Chen is leading the project, and stressed its importance in filling an education gap in a rapidly growing industry.

"The protected cropping industry in Australia has been growing quite rapidly, at an average of around 4-5 per cent per year, and we do not have any single

horticulture course – let alone a graduate diploma-specific to protected cropping," Professor Chen said.

"As the industry's growing, it requires more skilled people, but it cannot get them. There are lots of other courses in agriculture, but they are more focused on cattle, field crops or broadacre production. Most of those students have limited knowledge and skills in horticulture because horticultural crops are very different to the crops they study."

Professor Chen explained that this is creating a problem for horticultural growers, especially major vegetable operations.

"Agriculture graduates from many universities have very little practical skills in protected cropping and it's difficult for the protected cropping companies to re-train those students to get sufficient skills to move into middle management or even in the office of major vegetable growing businesses," he said.

"One of the drivers for this project is to get their existing staff trained and to attract young people to the protected cropping industry."

The Masterclass in Protected Cropping will also be helpful for those already in the horticultural industry, particularly those junior growers who are looking to upskill and learn more about this sector.

Course structure

The Masterclass in Protected Cropping was designed by Western Sydney University with input from protected

cropping peak bodies, Protected Cropping Australia and the Hydroponic Farmers' Federation, and academics from Wageningen University Research in the Netherlands. It incorporates low-, medium- and high-tech cropping.

There will be six online units and two industry-focused research project units delivered during the Masterclass, including:

- Plant-climate interactions in controlled environments.
- Greenhouse crop production.
- Greenhouse control systems.
- Advanced greenhouse technology.
- Business operations and logistics.
- Strategic business management.
- Industry project.
- Extended industry project.

"The good thing about this graduate diploma is that we will run four workshops to replace the practical classes, which are usually associated with theoretical learning in the university system," Professor Chen said.

"These four workshops will focus on software and hardware systems; crop and produce management; integrated pest management; and fertigation systems. These will be offered during the off-peak times for the protected cropping industry.

"Effectively, the students will only need to come to the university for a total of two weeks to complete all four workshops. They can still work part-time and do most of the learning online, so this gives them a lot of flexibility."

It is expected that the Masterclass in



Education and training staff members and postgraduate students at the Hort Innovation and Western Sydney University's National Vegetable Protected Cropping Centre.



Protected Cropping will be merged into Western Sydney University's Master of Science (Greenhouse Horticulture), which will add an extra year of study for those students looking to take that extra step.

The bottom line

Professor Chen is optimistic that the inaugural Masterclass of Protected Cropping will be a success.

"I think this is a course that the horticultural industry – especially the protected cropping industry – wants to have, and Hort Innovation is supportive of it. For the broader vegetable industry, it has a very important value, especially when we look at the changing climate," he said.

"We have such a dry climate here. We're expecting that some growers may want to get into protected cropping, and this will

provide them with the opportunity to see the benefits of protected cropping. They may want to change or convert a quarter of their farm production into protected cropping (as a result), ensuring resilience of vegetable growing businesses into the future."

There is one final message from Professor Chen to the vegetable industry: Get involved.

"We want more participation in the future, especially from vegetable growers. If you are a vegetable grower, please provide a scholarship or an internship to any employees or identified students to participate in this course. They have the potential to become an emerging leader for the Australian vegetable industry, and it is likely to benefit your business."

Find out more R&D

Please contact Professor Zhonghua Chen at z.chen@westernsydney.edu.au or on 02 4570 1934 or 0466 544 696.

Emerging leaders in protected cropping is funded by the Hort Frontiers Leadership Fund, part of the Hort Frontiers strategic partnership initiative developed by Hort Innovation, with co-investment from Western Sydney University, Flavorite, Costa Group Holdings, Perfection Fresh, Australian Fresh Leaf Herbs, ICI Industries and contributions from the Australian Government.

Project Number: LP18000



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Heading north: Hort Connections returns to Brisbane in 2020

AUSVEG and PMA Australia – New Zealand Limited (PMA A-NZ) will join forces once again to deliver Hort Connections 2020, the biggest event in the fresh produce industry. This year's conference and trade show will be held at the Brisbane Convention and Exhibition Centre from 15-17 June 2020, and is the most important opportunity for industry networking, education and business development.

Following on from the successful Hort Connections 2019 in Melbourne, the event returns in 2020 – and it's in Brisbane for the second time in three years.

Approximately 3,500 delegates are expected to converge on the Brisbane Convention and Exhibition Centre from 15-17 June 2020 for the convention and trade show. This year's theme is *Sustaining the Future of Fresh*, with the speaker program including expert speakers addressing this topic.

Below are the key details for Hort Connections 2020.

Early bird registrations: If you would like to come along and experience what is truly 'the' event for Australian horticulture, register now! Early bird registrations close on Thursday 19 March. Visit the Hort Connections website (hortconnections.com.au) for full pricing details and to register.

Trade show: The expansive Hort Connections Trade Show will see yet again record numbers of exhibitors and delegates in Brisbane. With over 60 per cent of trade show booths sold, we recommend getting in quickly to book your spot. Booth registration details can be found online or for more information, please contact AUSVEG.

Plenary speakers: Headlining the Plenary Speaker Sessions in 2020 are Boost Juice Founder Janine Allis and award-winning social entrepreneur, broadcaster and campaigner, Jon Dee.

Janine is not your everyday self-made businesswoman. She grew her juice and smoothie empire in 2000 from her kitchen bench, and now Boost Juice Bars are in 15 countries with three new brands of Salsas Fresh Mex Grill, Betty's Burgers and Cibo Espresso, totalling over 600 stores. Janine's business approach has made her a leader in her field, with BRW listing Janine as one of the top 15 people

who have changed the way business is done in the last 25 years.

Jon is a leading expert on business innovation, sustainability and efficiency. He is currently the Australian Coordinator of the international RE100 initiative, and has been successful in getting 10 of Australia's biggest companies to commit to using 100 per cent renewable energy in their operations. Every week, Jon is on ABC Radio with the 'Good News with Jon Dee' segment, where he talks about the latest positive sustainability news.

Event showcase: This year, the Queensland Department of Agriculture and Fisheries (QDAF) is a major partner of Hort Connections, and it will conduct two showcase presentations during the conference.

QDAF Pre-harvest Showcase: Delivering solutions for industry

Hear how Queensland's leading researchers are harnessing new technologies in horticulture to make a real on-ground difference to Australia's fruit and vegetable industries. This showcase will provide a snapshot of the latest in horticulture research, development and extension (RD&E), including cutting-edge advances in breeding, agronomy and precision agriculture. Learn about the latest research into plant protection and soil disease from specialists who understand the commercial realities and challenges facing the industry. Delegates will have the opportunity to network, ask questions and exchange ideas on topics that matter to them.

QDAF Post-harvest Showcase: Improving Australia's fresh produce supply

Learn the latest in postharvest solutions to improve fresh produce quality and consistency for your customers. Hear



Jason Shields was crowned Syngenta Grower of the Year at the 2019 National Awards for Excellence.

from leading growers, service providers and RD&E specialists about innovative practices, technologies and data-driven decision-making helping businesses to access markets, optimise supply chain performance, reduce waste and enhance quality outcomes. This session will share successes and lessons learned with crops such as avocado, mango, vegetables, citrus and summerfruit. Delegates will also have the opportunity to participate in a Q&A session with refreshments following the presentations.

Find out more 

Please visit hortconnections.com.au. For further enquiries, please email info@hortconnections.com.au or phone 03 9882 0277.



Awards for Excellence – nominations now open!

The 2020 National Awards for Excellence will be presented at the Hort Connections 2020 Gala Dinner on Wednesday 17 June. The Awards for Excellence are a fantastic way to acknowledge and recognise the outstanding contributions of individuals and businesses to the horticulture industry.

There are 11 awards categories, including the highly coveted Syngenta Grower of the Year, Corteva Young Grower of the Year and Boomaroo Nurseries Women in Horticulture award.

The award nomination form can be found hortconnections.com.au/award-nominations.



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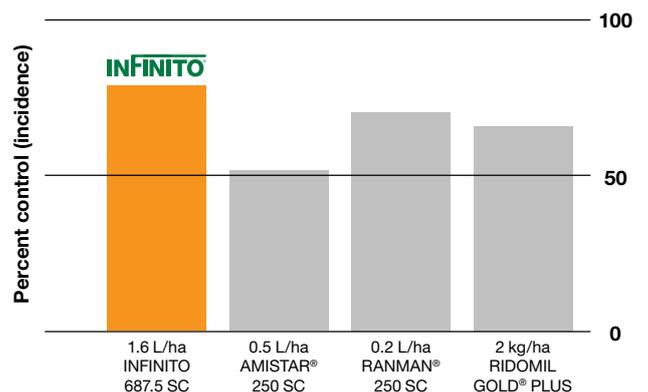
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Trial reference: QB42, QB43, QB78, QB80, QB81

Get ready! The East Gippsland Vegetable Innovation Days return



Image courtesy of Drone360.

Victoria's East Gippsland region is gearing up once again to host Australia's biggest vegetable field day event, and this year is extra special with the event incorporating the Tenth International Spinach Conference. *Vegetables Australia* shares some highlights from the East Gippsland Vegetable Innovation Days 2020, which are taking place from 7-8 May.

The location

Despite the vast area of land that has been burnt by the recent bushfires, the site of the East Gippsland Vegetable Innovation Days (EGVID) 2020 – Lindenow – has not been directly impacted. Planning for the events of May 2020 is well underway, and the week is now of paramount importance to local communities, the regions and the economy as they recover from the impact of the fires.

Lindenow is the geographic heart of Gippsland and one of Australia's most productive vegetable growing areas. EGVID 2020 will be bigger and better than the 2017 event, which grew out of the inaugural East Gippsland Leafy Vegetable Demonstration Day, held in 2014.

The people

These events were set in motion by Andrew Bulmer and Stuart Grigg, and 2020 will be organised by a committee made up of representatives from Bulmer Farms (Andrew Bulmer and Daniel Hammond); Stuart Grigg Ag-Hort Consulting (Stuart and Kate Grigg); Food and Fibre Gippsland (Shayne Hyman and Bonnie Dawson); and Elders (Noel Jansz).

The event

According to one attendee, 2017 was "a wonderful event and a huge contribution to the vegetable industry."

The purposes of EGVID are:

- To enable Australia's top 10 seed companies to showcase their new, favourite and innovative varieties for

growers and the industry at large.

- To provide a learning opportunity for growers and industry representatives to view exhibits from a broad range of service providers and research initiatives.
- To network, do business and celebrate being a vital part of the food chain in Australia and abroad.

The 2020 events are all about **Innovation, Future Farmers, Collaboration, Food Security, Sustainability and Wellbeing**. They shine a bright spotlight on the great work of Australia's vegetable industry.

At this year's event, there are:

- Eleven seed sites.
- For the first time, nine agricultural chemical demonstration sites.
- Industry supply chain companies exhibiting in the Supply Chain Hub.
- Machinery trial and exhibition area.
- Dynamic Speaker sessions to highlight improved practices and new products.

The site is now double the size of the 2014 event, and with the inclusion of the Tenth International Spinach Conference, this year's event is expecting more than 1,000 attendees – so come along for an exciting ride!

On Thursday 7 May, delegates are invited to an Industry Networking Dinner.

The region: Where to stay

Accommodation options in the service town Bairnsdale are filling up fast. Don't hesitate to book yours in. Alternatively, look further afield at Stratford, Maffra, Sale, Paynesville and Metung. And don't forget B&B accommodation!

Find out more R&D

Please contact VegNET Extension Support Officer Bonnie Dawson from Food and Fibre Gippsland on 0407 683 938 or email info@egvid.com.au.

Organisers would like to acknowledge the support of the following sponsors of EGVID 2020: Australias Seed Company; BASF Australia (Nunhems); Bejo Australia; BioFlora; Biostart; Boomaroo Nurseries; Corteve; E.E. Muir & Sons; Elders; Enza Zaden; Fairbank Seeds; HM.Clause; Incitec Pivot Fertilisers; Lefroy Valley Seeds; Monsanto/Seminis; Nufarm; Omnia; OneHarvest; Rijk Zwaan; South Pacific Seeds; Stoller; Sumitomo Chemical Australia; Syngenta Australia; Terranova Seeds; Leppington Speedy Seedlings & Supplies.

The great support from East Gippsland Shire Council and Hort Innovation is also appreciated by the organisers.

East Gippsland Vegetable Innovation Days and Tenth International Spinach Conference 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: VG19001

Hort Innovation | **VEGETABLE FUND**
Strategic levy investment

Save the date: 4 May

The Farm to Fork event, presented by Food and Fibre Gippsland, is set to be held on Monday 4 May. This event will connect the food services industry with leading seed companies to talk innovation and new lines as well as sharing ideas for the future. This will be followed by an engaging event that unites community by enjoying quality local produce.

International spinach event arrives in Australia

Registrations are now open for the Tenth International Spinach Conference, which will be held in the Victorian seaside town of Lakes Entrance on Wednesday 6 May. It will be the first time that this event – hosted by the 2020 East Gippsland Vegetable Innovation Days – has been staged in the Southern Hemisphere. Following the conference, delegates of the International Spinach Conference are encouraged to attend the East Gippsland Vegetable Innovation Days, which will be held over 7-8 May.

Since 2000, the International Spinach Conference has been organised by the University of Arkansas. Two decades later, the event heads to Australia where delegates are expected to converge on Lakes Entrance in far-east Victoria for a day of networking and learning from international spinach superstars. The Tenth International Spinach Conference will take place on Wednesday 6 May 2020 with pre- and post-conference activities the evening prior, and at the Innovation Days on Thursday 7 May 2020.

Planting the seed

In 2018, the East Gippsland Vegetable Innovation Days (EGVID) team took a diverse group of Australian spinach producers and influencers to attend the 2018 International Spinach Conference in Murcia, Spain, to listen, learn and ask questions of some of the best spinach minds in the business. Speaking to these delegates, International Spinach Conference founder Dr Jim Correll realised the importance of spinach

production in Australia, and he was invited to bring the conference 'down-under'. Although spinach is a major crop for the Australian vegetable industry, local production has many challenges. As it is quite a delicate crop, others around the world think it is crazy to be producing it in local adverse weather and growing conditions!

Key details

Headlining the conference is Dr Correll from the University of Arkansas, who will be presenting about downy mildew in spinach, race evolutions and emerging pathogens of spinach crops. Meanwhile, Washington State University's Dr Lindsey du Tiot will focus on *Fusarium oxysporum* in spinach seed production and soil treatments.

Other presentations will cover:

- Value chain, market trends, food safety.
- Organic farming and good practices.
- Research efforts.
- Climate change.
- Technology and agriculture.

Cruisy start to conference

The Tenth International Spinach Conference will commence with a sunset cruise on Gippsland Lakes. This will take place on Tuesday 5 May. It is recommended to book accommodation from the vast array on offer in Lakes Entrance from Tuesday night.

Find out more

Please contact VegNET Extension Support Officer Bonnie Dawson from Food and Fibre Gippsland on 0407 683 938 or email info@egvid.com.au. To register, visit trybooking.com/BHYDY.

Organisers would like to acknowledge the following sponsors of the Tenth International Spinach Conference: AusIndustry; Enza Zaden; Omnia; OneHarvest; South Pacific Seeds; Terranova Seeds; and Vilmorin-Mikado.

East Gippsland Vegetable Innovation Days and Tenth International Spinach Conference 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: VG19001

Passion and commitment leading to horticulture success

A proud advocate for Australian horticulture, Camilla Humphries has had a varied career in the industry to date. Camilla has enjoyed positions in horticultural research and winemaking and more recently, product development across a range of commodities, including vegetables, as part of her role at E.E. Muir & Sons. *Vegetables Australia* reports.

Helping on the family apple orchard from a young age piqued Camilla Humphries' interest in horticulture, and set her on a career path that is now well-established.

As a child, Camilla attended potting days at the University of Melbourne, Burnley Campus – then known as Burnley Horticultural College – with her mother, and then incorporated horticulture into her science subjects at school, where she developed an interest in biology.

Camilla then went on to study Agricultural Science at the University of Melbourne, finishing with a master's degree focused in biotechnology and plant nutrition. Subsequently, Camilla conducted a research thesis at the CSIRO Plant Industry in Canberra where she investigated the acquisition of phosphorus by wheat.

"Although the degree was focused on broadacre agronomy, crop nutrition can easily be transferred to the more intensive cropping of horticulture, to which I had a natural gravitation," Camilla says.

Camilla took up her first post-university horticultural field research role in Orange, central-west New South Wales, before moving to Sydney where she worked on industry research projects for Hort Innovation. This was followed by a winemaking stint over in Sonoma, California.

Over three years ago, she joined Australian-owned horticultural supply and consulting business E.E. Muir & Sons. This followed a consulting role with a subsidiary of the business, which is owned by the Muir family. Camilla's role is in Product Development, a recently-established branch within the business aimed at independently evaluating new horticultural products for its key suppliers and identifying a good agronomic fit to assist growers with their agricultural practices.

In addition to her Product Development position, Camilla is the Front Line Advisor for southern Victoria as part of the Apple and Pear Australia Limited Future Orchards Program. It is in this role where she returns to where it all started: in the orchard. Camilla conducts orchard field days and runs research trials to improve orchard productivity. One of Camilla's side projects is making her own apple cider and, as a committee member for her local Agricultural Show Society's Cider Show in Red Hill, is an advocate for value adding products out of Australian grown and processed fruit.

Building relationships

Camilla's desire to meet, engage and network with other young working

professionals in the horticulture industry led her to successfully apply for a position in the Growing Leaders professional development program (VG15030), a strategic levy investment under the Hort Innovation Vegetable Fund. Camilla was part of the 2018 alumni, and her project team devised a strategy to encourage growers to adopt best practices for a more sustainable vegetable industry.

"This project was aimed to be delivered as a series of regional field days to help provide stewardship to growers on new technologies, products and agronomic practices tailored to their regions and to be delivered as a 'bottom-up approach' to help empower growers," Camilla says.

While the project's bid for further funding was unsuccessful, Camilla gained valuable skills that have transferred into her role at E.E. Muir & Sons.

"I learnt how to think conceptually and strategise ideas. Through Growing Leaders, I was also given the chance to meet with other industry representatives and also gained a couple of industry friends who work with two major farming businesses in the south-eastern region (of Victoria) that are customers of E.E. Muir & Sons," she says.

"I thank E.E. Muir & Sons for giving me the opportunity to take part in the Growing Leaders Program."

Learning curve

Liaising with researchers, agronomists and growers, Camilla seeks out her horticulture knowledge from professionals who have been working in the industry for many years.

"I want to learn as much as I can from those nearing the end of their careers – before they go," she says.

Camilla also appreciates the work that VegNET, Victoria and the South Gippsland Food Cluster undertake, and she is eager for further learning opportunities to present themselves within the horticulture industry; an industry that she is proud to be involved in.

"It's not about public gratification for me; it is about my inquisitive nature,





conscientious work ethic, adaptability and work satisfaction that drive me to achieve. I have had a few wonderful opportunities to share my career experiences at Melbourne University's Agricultural Science Faculty dinners, and I'm also an advocate for the horticulture industry as a committee member for my local show society."

Camilla's passion for horticulture is evident by not just her varying roles since graduating from university, but her enthusiasm towards working with others within the sector.

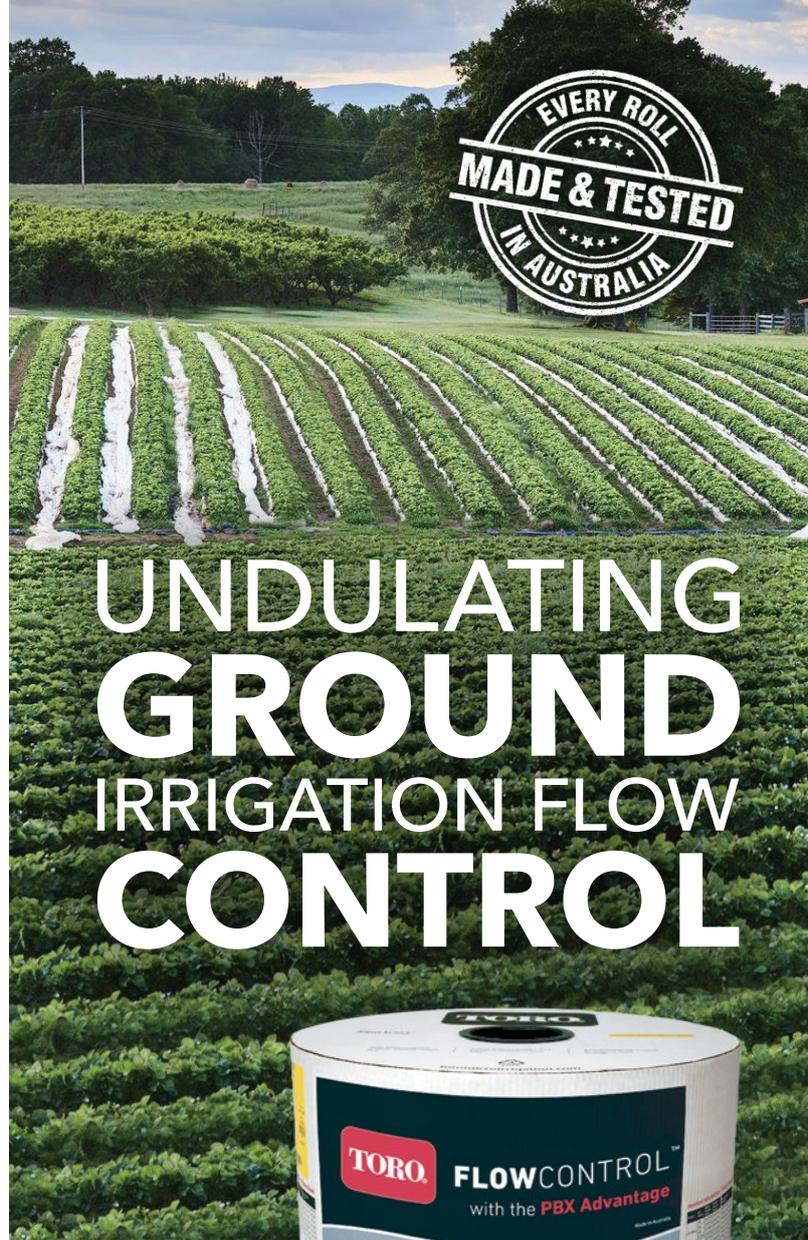
"I enjoy hearing from a happy grower as well as getting out in the field and applying science practically, and meeting people along the way."

She also has some words of advice for any young women who are looking to follow in her footsteps and enter the horticulture industry.

"The horticulture industry is a dynamic industry to work for and although there are more men in the industry, it shouldn't detract a bright young female graduate," Camilla says.

"There are many opportunities within the sector – we need to be savvy with adopting more efficient and sustainable ways of farming through research and innovation.

"You just have to be assertive, have faith in your own abilities and think outside the box; think of an idea which can differentiate you from the rest."



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Camilla's apple cider is one of many Mornington Peninsula ciders to be featured at the annual Red Hill Show on Saturday 7 March. For further details, please visit redhillshow.com.au/cider-show.



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Darryl Cislowski from Ace Ohlsson discussing zucchini variety performance at the Greater Sydney Local Land Services Demonstration Farm.

New zucchini varieties on show at field day

Zucchini varieties and precision agriculture were the focus of a field day held in late 2019 at the Greater Sydney Local Land Services Demonstration Farm. Over 80 growers and industry members converged on the site on the Richmond Lowlands in the picturesque Hawkesbury region of New South Wales. The event was coordinated by NSW Industry Development Officers, and delivered as part of the National Vegetable Extension Network (VegNET).

More than 80 people turned out to the New South Wales VegNET field day, which was held late last year at the Greater Sydney Local Land Services (GS LLS) Demonstration Farm on the Richmond Lowlands. GS LLS partnered with one of the biggest rural supplier in NSW, Ace Ohlsson, and seed companies Terranova, Lefroy Valley, HM Clause and South Pacific Seeds to showcase over 20 zucchini varieties.

"These trials were designed to look at the crop performance and susceptibility to diseases such as mosaic virus. This included the size and shape of the fruit and flowers, as some growers also market zucchini flowers, which is why they were included in the assessment," VegNET Industry Development Officer Sylvia Jelinek said.

As well as the varietal trial, a pollination trial was set up by Darryl Cislowski and his staff at Ace Ohlsson with the assistance from Adrian Grew, known as 'The Bee Farmer'.

A popular commercial zucchini variety was planted down an entire bed. One-third was permanently covered with floating row covers, one-third was covered in the morning until midday and one-third was permanently left uncovered. Growers were able to walk down the rows to judge for themselves the effect of row covers on pollination by seeing the amount of fruit. Adrian talked about the benefits of having beehives in or near zucchini crops to enhance pollination, improve good quality fruit and increase yield.

A number of suppliers and industry representatives also showcased a range of precision agricultural technologies, including XAG drones, Agerris' digital farmhand robot, Ecrotek's beekeeping systems and compost displays from Australian Native Landscapes.

Focus on precision ag

Julie O'Halloran, Senior Development Horticulturist at Queensland Department of Agriculture and Fisheries, provided excellent grower tips on how to use precision information technologies to better understand and manage crop variability.

Julie is working on the project *Adoption of precision systems technology in vegetable production (VG16009)*, a strategic levy investment under the Hort Innovation Vegetable Fund. She discussed grower case studies that demonstrated a range of precision information technologies, including EM38 mapping, Veris™ mapping, variable rate technologies, satellite imagery, yield monitoring and drones. All of these technologies are commercially available.

Sylvia said the field day gave vegetable growers a chance to see the first-hand results of the zucchini demonstration trials and the potential benefits of precision agricultural technology. This is what the VegNET project is all about – taking the latest innovations and outcomes from levy-funded R&D and showing growers how it can be applied in the real world.

Grower feedback from the day was positive. They reported an excellent mix of demonstrations and speakers and were impressed by the number of zucchini varieties that were showcased. They also gained a greater understanding about the role that bees play in crops.

Previous VegNET evaluations have shown that field days, such as those held at the GS LLS Demonstration Farm, greatly assist growers in making decisions in adopting innovative practices to enhance their businesses.

The GS LLS team is now busy preparing for a field day on sweet corn varieties, which is set to take place in March 2020.

Find out more

Please contact NSW Industry Development Officer Sylvia Jelinek from Greater Sydney Local Land Services on 0427 086 724 or sylvia.jelinek@lls.nsw.gov.au.

Regional capacity building to grow vegetable businesses – New South Wales 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



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2018 Green Leaders participants. Image courtesy of Jill Rigney from The Right Mind.

Growing the next generation of industry leaders

Applications are now open for a cross-industry program that will build leadership skills among young people in Australian horticulture. The *Growing Leaders* program will be delivered by The Right Mind, and will focus on a range of tools that are required to grow leadership skills.

Vegetable growers have the opportunity to participate in a horticulture-wide program to help them become sound leaders and learn how to inspire others in their workplaces and industry.

The *Growing Leaders Program* is a multi-industry levy-funded program where participants have the opportunity to meet, mix with and learn from leaders across a range of horticultural industries.

Delivered by David Hanlon and Jill Rigney from The Right Mind (TRM), the program seeks to challenge participants to reflect on what is expected of a modern leader, and to equip them with the tools they need to prosper. It was widely acclaimed in the adaptation for the nursery and turf industries and now is offered to a wider range of industries.

"It is a program based on our Rural Leader's Bootcamp, but there are modules containing real life industry examples that will ensure analytical skills are tailored to the participants' own industry," David explained.

TRM's program comes with a wealth of fresh and innovative training materials (evaluated by external peers)

that have been customised by highly-experienced facilitators to meet the specific needs of the industries involved. This comprehensive leadership-oriented curriculum is characterised by high-quality teaching materials, complemented by small and whole group theoretical and experiential learning.

"It is transformational in its approach and provides a personal stretch to participants beyond what is traditionally offered," David said.

"Participants leave with an urge to tackle things (either personally, organisationally or within their industry) that they have not done prior to taking on the program. For us, this is deeply rewarding."

Jill believes the wider mix will broaden the views of participants.

"Our experience over the past 12 years with the Rural Leader's Bootcamp clearly demonstrates participants learn the 'art of leadership' more quickly through having to apply principles, and not get bogged down in their own technical fields," she said.

Program activities

The program involves a number of elements, including two face-to-face workshop sessions, which David describes as a 'boot camp'.

"It is definitely full-on, and participants love that. It facilitates a more rapid understanding of their own leadership style and provides the latest tools to grow it," he said.

"The program is designed for people to improve their leadership skills for themselves, their team, their organisation,

and the wider industry in which they work. It's about working through the process of leading yourself and others."

The program includes learning about, understanding and identifying your own and others' communication styles; how to manage conflict; how to set and meet priorities for yourself and your business; how to manage risk; and understanding your customers' needs among others.

One of TRM's mantras is 'doing leadership'.

"It is so easy to sit and absorb with little going back to the participants' own business or industry," David said.

To overcome this, participants undertake a workplace project that is discussed with their immediate manager and supported by TRM during the program. This is through one-on-one coaching sessions, and specific webinar-delivered sessions to re-enforce participants' knowledge and skills.

"We have found that the participants' businesses love it. They are actively encouraged to provide feedback during the program, sit in on the webinars, and provide us with feedback at the end of the program," Jill said.

Developing skills

Outcomes from the program include a significantly deeper understanding of self and one's own potential. For the organisations participating, there is a greater knowledge around the 'hidden drivers' of performance and how to bring them to the fore.

Participants in the nursery and berry

industry program are also contributing to industry awareness.

"We were amazed at the number who conducted field days and did interviews for their respective new outlets," Jill said.

As an industry-funded program, TRM strongly encourages participants to step up and take on higher leadership positions within their industry body.

2020 Workshop dates

The first *Growing Leaders* workshop will be held in Brisbane from 11-13 May, and a second workshop will take place in Melbourne from 10-11 August.

The program is open to all industry levy-payers.

There is no cost to participate in the program, however travel costs to the workshop destinations and accommodation are at participants' expense.

Interested growers and industry members can log onto The Right Mind's website for more details and to access the application form. Applications close Friday 27 March.



Green Leaders 2019 pictured undertaking a familiarisation session with The Right Mind intranet portal. Image courtesy of Sam Cox from Cox Inall.

Find out more

Please contact David Hanlon from The Right Mind on 07 3869 3044, 0411 601 949 or email dhanlon@therightmind.com.au.

Further details can be found at therightmind.com.au.

This project has been funded by Hort Innovation using the potato – fresh, potato – processing, raspberry and blackberry, sweetpotato and vegetable research and development levies and contributions from the Australian Government.

Project Number: MT18016

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L-R: Des and Paula Chapman. Images by The Third House.

Building a growing enterprise in far-north Queensland

In a career spanning four decades, fruit and vegetable growers Des and Paula Chapman have endured three cyclones and drought on their Gumlu property in far-north Queensland. However, the couple has bounced back each time and today, Rocky Ponds Produce is thriving. Michelle De'Lisle speaks to Des about the business' latest innovation, its export activities and what lies ahead.

Forty years ago, Des and Paula Chapman purchased a small parcel of undeveloped land in far-north Queensland to create a horticulture enterprise. The husband-and-wife began their fruit and vegetable growing journey with one tractor and one truck for transportation, and no buildings at the Gumlu site.

"Everything had to be developed from scratch," Des says.

It came down to trial and error when choosing which crops to grow before Des and Paula eventually settled on three major commodities: melons, capsicum and pumpkin, which they – along with their son Evan – still grow today as Rocky Ponds Produce.

Des is Managing Director of the business, which involves overseeing the entire growing process. Off-farm duties include keeping up with all the relevant laws and legislation; keeping abreast of changes and developments in the industry; being aware of and adopting new trends; ensuring that Rocky Ponds has a

competent workforce; being responsible for on-farm capital investment, and maintaining relationships with suppliers and customers.

Today, Rocky Ponds' produce lines include honeydew, rockmelon and piel de sapo melon; red, green and yellow capsicum; and butternut and Kent pumpkins.

Facing challenges

Like most Australian vegetable growers, water has been an issue for Des and Paula, and the operation's early years were marred by drought and two cyclones directly hitting the property – there have been three cyclones experienced by the Chapmans across the past four decades.

"Over the years, we have built our own water storage with about 35 hectares being devoted to dams on the property," Des says.

"The farm has been hit with cyclones, which has created a bit of damage, but you clean up and kick off again. It's never affected us too much in our start and stop times; it's created other challenges with diseases and crop losses, but we still manage to start and finish roughly the same time. It does do a lot of damage though."

Des says that major challenges include maintaining a reliable workforce, along with keeping abreast of the red tape and huge compliance restraints on horticulture.

While these issues can be tricky to navigate, Des thrives working in the fruit and vegetable industry.

"There is always a challenge and a problem to solve. No season is ever the same due to the many variables, particularly weather conditions. I also enjoy marketing and managing our competition, as well as finding new markets and innovation with our own

products," Des says.

Des and Paula extend their enthusiasm for the industry to secondary school students, with Year 8 and Year 12 teachers encouraged to bring their classes out to tour the farm. To date, this has proved successful.

"Since starting this around eight years ago, we've already got probably 8-12 people in the district going into horticulture and then other kids looking for farm work so they can work their way up. So, if we've created 40 jobs in horticulture, I think we've done well," Des says.

"I think other growers should encourage it, and horticultural groups like Growcom should start saying that these jobs are out there and they're very much sought-after domestically."

Innovation focus

At the forefront of Des and Paula's minds is business sustainability, and they are always on the lookout for the latest technologies that can help to improve growing efficiency, as well adhering to consumer trends.

"I always look to innovations and there are some exciting developments that could make a real difference to farming. Robotics offers possibilities in planting and harvesting, while protected cropping could help fight some of the adverse weather issues that we face. Our temperature-controlled nursery can be further developed for this use."

The state-of-the-art nursery is the one of the recent investments made by Des and Paula, thanks to a \$400,000 grant from the Coles Nurture Fund. Rocky Ponds Produce has been supplying Coles for over 25 years.

Des says that the nursery has produced tremendous results, with a considerable amount of plants grown.



Des Chapman and his son, Evan.



"If it's too cold outside, the nursery all shuts up and retains the heat; if it gets too hot, everything opens up plus cooling curtains come across the top to get the temperature down. Plants grow at the maximum rate and we get better outputs," he says.

"We still buy seedlings from outside just in case something ever went wrong but we're starting to create our own destiny."

Des says that experience over 40 years has been a great lesson when it comes to maintaining disease resistance and ongoing sustainability of the farm.

"We now employ a full-time agronomist, and we undertake many variety trials to select the most disease-resistant plant varieties," he says.

"We grow cover crops and engage in crop rotation for soil health. We also operate computerised irrigation and fertigation for reliability of application, and soil monitoring probes to measure water use."

Export experience

Des and Paula have been exporting their produce for 35 years, entering markets in New Zealand, Singapore, Hong Kong,

United Arab Emirates and, more recently, Japan.

Over that time, there have been changes including a steep drop in exports to Hong Kong. Des can see the challenges that lie ahead.

"I think the biggest threat that we're going to see is that there are a lot of countries in the world now that are exporting. South America is very big – Mexico, Colombia and Brazil are exporting into Europe. I would say they're probably in front of Australia, so we've got a little bit to learn, and we need better shipping. They've got better port facilities and their wages are much lower than ours," he says.

However, Des isn't overly worried.

"These countries may have advantages over us, but I still believe Australian product is superior."

Closer to home, Des and Paula make sure that they look after their Australian customers and not focus solely on export activities.

"They helped build us in the beginning and are still supporting us now. We're extremely happy with the Coles system that we're under. They have supported us very well and we'll continue to support them."

Looking ahead

The future is bright for Rocky Ponds Produce, with Des and Paula's son, Evan, playing an active role in the business. Evan returned to the farm 10 years ago, and it is likely that a succession plan will go ahead.

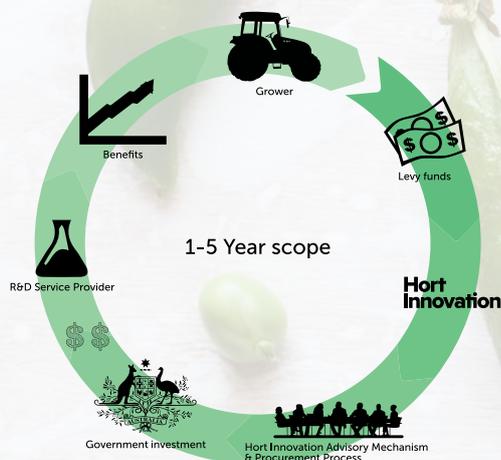
Meanwhile, Des is proud of what he and Paula have built over the past four decades, as well as their children's success.

"Surviving and succeeding in this industry is an achievement. We are among approximately 30 out of 160 growers in the Bowen/Gumlu/Burdekin region who are still operating after 40 years," he says.

"I am proud of the strong succession that is in place, with Evan taking on a major role in our farm management and exhibiting strong leadership and farming skills, while our three other children have their own businesses – and are doing well."

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.

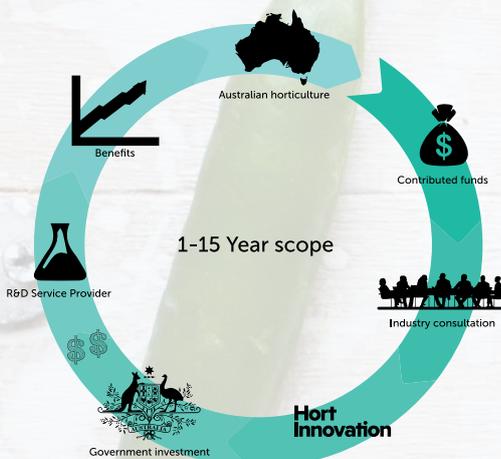
Strategic levy investments have a one- to five-year scope and the R&D is designed to directly benefit growers in the vegetable industry. Project topics range from pest and disease management to biosecurity matters, with findings communicated through a variety of channels, including *Vegetables Australia*.

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).



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Green peach aphid
(*Myzus persicae*)



Grey cabbage aphid
(*Brevicoryne brassicae*)



Silverleaf whitefly
(*Bemisia tabaci* biotype B)

Progress towards achieving 2020 export targets

According to the latest data from Global Trade Atlas, the value of fresh Australian vegetable exports increased once again in 2019. This continues the recent trend of the rising value of vegetable exports that is ensuring the vegetable industry is well-placed to meet its goal of 40 per cent growth to AUD\$315 million in fresh vegetable exports by the end of this year. AUSVEG International Trade Manager Sam Turner reports.

Data from Global Trade Atlas and Trade Map indicates that Australian vegetable exports have increased again in 2019. Export data for the calendar year indicates that export value has increased by 6.6 per cent to \$299 million and tonnage growth of 5.4 per cent to 230,890 tonnes (Figure 1).

The industry is well on its way to achieving its goal of a 40 per cent increase from 2015 in exports to \$315 million by the end of 2020.

The top five markets for Australian fresh vegetables remained largely stable for 2019. These are Singapore, United Arab Emirates, Japan, Malaysia and Saudi Arabia, which has replaced Hong Kong in fifth position. These five markets receive around 53 per cent of Australian fresh vegetable export volumes. The top export products for the period were carrots, onions, potatoes, asparagus, and brassicas with carrots representing 32 per cent of exported product value (see Figure 2).

Figure 1
Total Australian Vegetable Exports

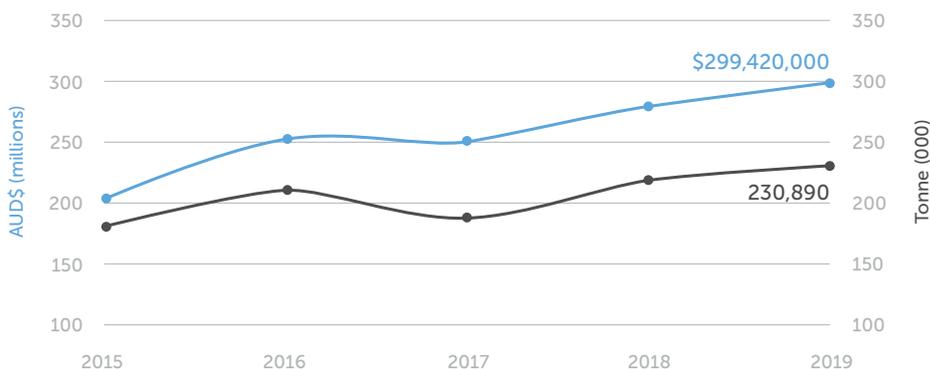
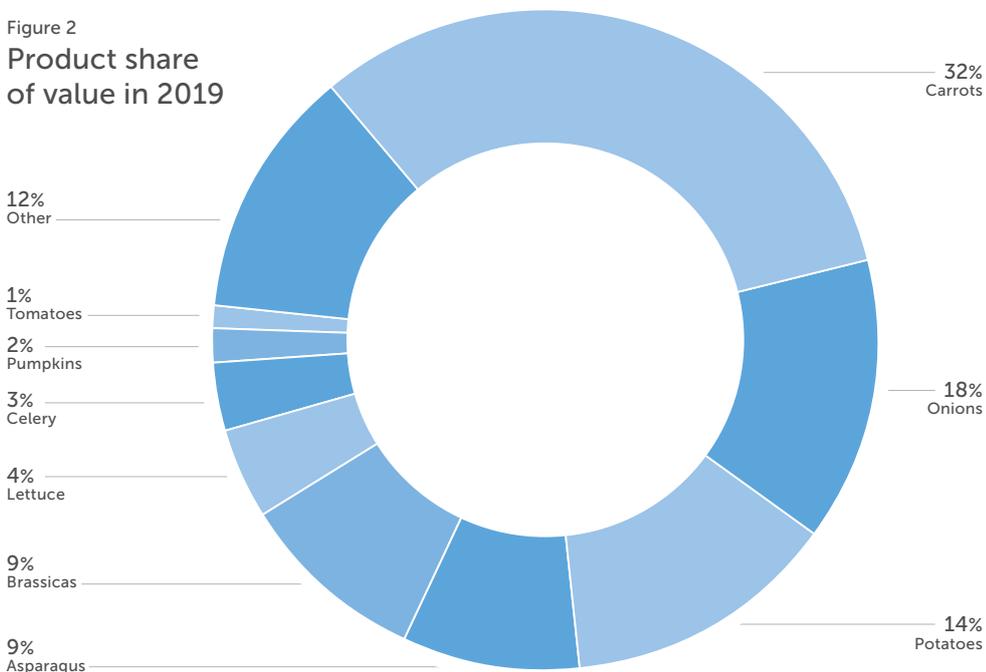


Figure 2
Product share of value in 2019



Source: Global Trade Atlas

Export focus: Onions

Onions delivered the greatest growth during 2019, increasing in value 67 per cent from 2018 (\$23 million to \$39 million) on the back of increased demand from European markets. The volume of onion exports also increased by 41 per cent, driven by a 57% increase in Tasmanian exports to 23,047 tonnes, Western Australian exports increasing 31%

to 10,609 tonnes and South Australian exports increasing 27% to 10,315 tonnes (see Table 1).

Much of this growth was driven by increasing exports from Tasmania to Europe with Belgium, France, Germany and the United Kingdom receiving large quantities of Tasmanian onions (see Table 2).

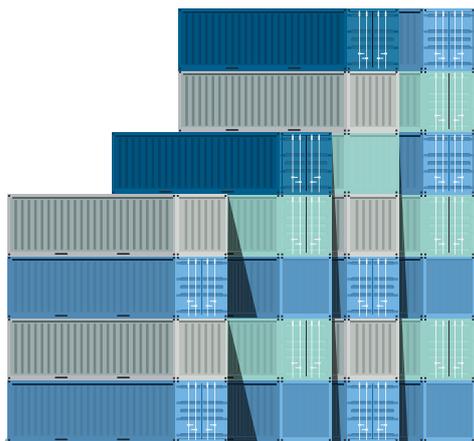


Table 1
Onion exports by state.

Trade Partner	2017		2018		2019		▲ \$	▲ t
	\$ AUD	Tonne	\$ AUD	Tonne	\$ AUD	Tonne		
Tasmania	\$9,007,069	13,714	\$9,969,908	14,659	\$19,030,957	23,074	91%	57%
Western Australia	\$3,778,064	5,527	\$5,436,169	8,087	\$9,096,820	10,609	67%	31%
South Australia	\$4,292,684	5,654	\$6,007,101	8,121	\$8,805,018	10,315	47%	27%
Queensland	\$1,136,194	716	\$1,198,161	1,069	\$1,397,890	1,001	17%	-6%
Victoria	\$819,670	440	\$943,558	617	\$1,217,348	1,107	29%	79%
New South Wales	\$312,624	154	\$388,263	215	\$477,541	201	23%	-7%
All States	\$19,489,804	26,290	\$24,030,753	32,801	\$40,046,385	46,314	67%	41%

Table 2
Tasmanian onion export partners.

Trade Partner	2017		2018		2019		▲ \$	▲ t
	\$ AUD	Tonne	\$ AUD	Tonne	\$ AUD	Tonne		
Belgium	\$440,752	745	\$964,183	1,246	\$3,423,339	4,227	255%	239%
France	\$908,743	1,576	\$1,366,105	1,969	\$2,794,995	3,344	105%	70%
Germany	\$727,917	1,331	\$743,670	1,304	\$2,037,798	2,760	174%	112%
United Kingdom	\$532,796	737	\$517,414	731	\$1,950,315	1,697	277%	132%
Japan	\$3,599,943	4,442	\$1,776,357	2,049	\$1,646,332	1,844	-7%	-10%
Total	\$9,007,069	13,714	\$9,969,908	14,659	\$19,030,957	23,074	91%	57%

Source: Global Trade Atlas

Despite challenging trading and production conditions in 2019, the continued growth in export markets can be partially attributed to an increasingly sophisticated trading network of growers and continued industry investment into export capability building and market development activities.

Project update

The *Vegetable Export Development Program* is a strategic levy investment under the Hort Innovation Vegetable Fund. Implemented by AUSVEG, the program continues to deliver a range of activities for export-oriented growers. The current investment is three years into a four-year program. Over this time, the project has delivered:

- Export training workshops to over 80 growers.
- Three reverse trade missions that have brought over 120 international buyers

to connect directly with growers and showcase local production capabilities.

- Participation in 13 trade exhibitions, showcasing Australian produce to the world.
- Ten market access applications to increase the number of available markets for Australian vegetables exports.

Upcoming events for 2020

There are multiple opportunities for growers of all levels of interest and capability in exporting to get involved in the *Vegetable Export Development Program*. These range from training and development to buyer interactions over the course of the year.

Some key events for growers to look out for include:

- Training workshops around the country, incorporating topics such as cultural business training, export

readiness and fresh produce business development.

- Opportunities to represent industry at a number of international trade shows, including Gulfood in Dubai; Foodex in Tokyo; Thaifex in Bangkok; and Asia Fruit Logistica in Singapore.
- Industry export communications and market intelligence.
- Information sheets on relevant topics.

Find out more R&D

Any growers interested in any export events or discussing export opportunities can contact the AUSVEG Export Development team on 03 9882 0277 or export@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: VG16061



Tour participants visiting Agritechnica.

Connecting Australian growers to European ag-tech innovation

In November, a group of vegetable growers travelled to Germany and the Netherlands, including a visit to Agritechnica, as part of the 2019 European Industry Leadership and Development Mission. AUSVEG Tour leader Shakira Johnson reports on the highlights of the mission and what the Australian growers learnt from visits to various locations showcasing innovative ag-tech solutions for modern farming.

Agritechnica: Hanover, Germany

As Europe's largest farm machinery and technology show, held at the world's largest exhibition grounds, there is no better place for ag-tech fans and those seeking to improve their farming operations than Agritechnica. A diverse mix of vegetable growers from across Australia made the journey to Hanover, Germany, to spend a week learning all about cutting edge technologies and innovations for agricultural systems at Agritechnica. This was followed by a week of tours to various locations around the Netherlands focusing on innovative technologies for horticulture.

The tour began at Agritechnica, a leading international exhibition for agricultural machinery and equipment, which takes place every two years in

Hanover. From massive tractors fitted out with the latest high-tech gadgets to low-cost IoT (Internet of things) sensors to support on-farm data collection, Agritechnica is considered one of the most important agricultural technology exhibitions in the world. In 2019, the event featured more than 2,800 exhibitors from 52 countries and 457,600 visitors from 130 countries.

Tour participants took advantage of the opportunity to engage with new and emerging ag-tech, look at new approaches to age-old on-farm issues and hear from research institutions from all over the world to develop a greater understanding of up-and-coming applications of research and technologies outside of Australia. Many participants were able to take advantage of the opportunities to meet with representatives from companies to discuss how they can implement new technologies on-farm back home.

Urban agriculture: Amsterdam's only vertical farm

The tour of the Netherlands began just outside Amsterdam at the city's first vertical farm, a start-up company called GROWx. The company focuses on the idea of local produce, working with chefs to develop and grow microherbs that they supply to restaurants in the Amsterdam area. Using renewable energy and circular packaging, the company has a focus on being environmentally-friendly and sustainable. The growing chambers

are located inside converted shipping containers, using a special combination of blue and red LED lights. Kevin from GROWx took the group through the process of germinating seed, energy usage, fertigation and watering processes and how they reuse and recycle each element of production.

Following the visit to GROWx, the group headed to north Holland to visit the smartfarm greenhouse, Bezoek Agriport, the world's largest greenhouse for production of orange and yellow capsicums. We were greeted by owner Petra Barendse, who led a tour of the facilities that included an explanation of the geothermal energy and natural gas system used to produce heat, carbon dioxide and electricity. The heat is stored during summer, used to heat the greenhouses in winter, and carbon dioxide is purified and used in the greenhouses. Rainwater is captured and stored in a large water facility on-site and used in fertigation of the plants in the greenhouses. Petra introduced their integrated pest management program, with a range of beneficial insects, pheromone traps, parasitic wasps and spiders used for crop protection. Participants also received a demonstration of Bezoek Agriport's smartfarm trolleys, which assist with traceability throughout harvest.

The next day, we travelled to the Hague to tour the facilities at Rijk Zwaan, where the group was led through the seed testing facility. The next stop was AppsforAgri, a unique IT agency that



boasts a team of software-developers, data analysts and agronomists. The tour group was impressed by the high-tech, low-cost SmartFarm technology that has been created to deliver complete solutions in the field of precision farming. This ranged from sensors to management information that allows growers to work efficiently and sustainably.

Wageningen University Entomologist Rob van Tol introduced the group to his research that focuses on improving effectiveness of visual traps for plant pests. He demonstrated an experiment that is designed to monitor insect behaviour with some promising leads on how traps may be improved in the future. The group was excited to see research outcomes leading to improved pest management.

Grower-owned international sales and logistics

Next, we headed to Barendrecht to visit The Greenery, an international sales organisation for fresh fruit and vegetables. The Greenery is owned by the Coforta grower cooperative, supplying fresh fruit and vegetables to supermarkets, wholesalers, caterers and the processing industry all-year-round. It has a unique system for pricing, offering growers flexibility to secure continuity in the purchase of their product. This is achieved by entering long-term partnerships with customers.

The Greenery has fully-automated logistics infrastructure and two modern

distribution centers. Products can reach the shelves within a day from the field or greenhouse. There is a sophisticated tracking system that provides insight into all stock, transport flows and real-time point-of-sale checkout information. The tour participants were impressed with the grower cooperative, particularly with the pricing structures and traceability of products.

The tour's final day began with a trip to World Horti Center, a knowledge and innovation center for international greenhouse horticulture that provides a learning environment for 1,200 senior secondary and higher vocational education students. It also has a modern research centre for technology, cultivation systems, crop protection and breeding, and a year-round exhibition with more than 100 leading horticulture businesses.

This was followed by a visit to Koppert Cress, a microgreens producer that has built a brand and marketing campaign, setting them apart as a premium producer. Koppert Cress sells to high-end Michelin star chefs and has left no stone unturned in marketing and providing a 'Cressperience' to anyone who visits their operation. Participants were treated to a tasting session of the cresses, including a glass of tea made with fresh herbs, as well as a tour of the facility.

Strengthening relationships

The 2019 European Industry Leadership and Development Mission – Agritechnica

offered participants the opportunity to build strong networks among the diverse group of tour participants. It connected 10 established and emerging horticulture industry leaders with peers, innovative agtech, growing operations and research institutions across Europe, while developing a greater understanding of global horticulture. Participants are encouraged to share this knowledge and insight with their peers upon their return to Australia.

Find out more R&D

A full project report will be released in the coming weeks and will be made available on the InfoVeg website: ausveg.com.au/infoveg.

The project has been funded by Hort Innovation using the vegetable research and development levy, contributions from Australian vegetable growing businesses and contributions from the Australian Government.

Project Number: VG18002

Hort Innovation
Strategic levy investment

VEGETABLE FUND



Paul Gazzola shows off fresh broccoli to the visiting schoolchildren.

Veggies in-focus for Victorian schoolchildren

AUSVEG VIC, the representative body for Victorian vegetable growers, has partnered with Boomaroo Nurseries and the Stephanie Alexander Kitchen Garden Foundation to create the 'Schools on Farms Program'. The program has been created by vegetable growers for primary schools to facilitate farm access and receive a hands-on, real-life experience of working vegetable farms.

In Victoria, there is a wide-variety of vegetables produced in urban and peri-urban areas such as Mornington Peninsula, Clyde and Werribee South; sometimes, these crops are just metres away from residents' backyards.

Despite this, a lot of people (particularly children) do not know where their fresh produce comes from, and how it's grown. A new pilot program is aiming to change this.

The 'Schools on Farms Program' is an AUSVEG VIC self-funded industry-led initiative, with support from Boomaroo Nurseries and the Stephanie Alexander Kitchen Garden Foundation. The idea of the program is to be adaptable to the school's curriculum so that the learnings on the farm can be taken back to the classroom. AUSVEG VIC conducts school excursions for grade three and four students that combine farm visits and supermarket visits, depending on what the school was looking to achieve from the day.

Aims of the pilot program include:

- Educating students by linking in with the curriculum through contextual learning.
- Introducing children to how vegetables are produced.
- Providing engagement with a new

generation of home gardeners, meal preparers and shoppers.

- Promoting healthy eating with younger generations.
- Promoting community engagement with food producers.

AUSVEG VIC State Manager Tom Cohen said the excursion is a 'paddock to plate experience'.

"Eating fresh produce out in paddocks including fresh broccoli straight off the plant; fresh cos lettuce; fresh carrots; celery straight out of the cool room – these are vegetables that the students may not necessarily eat," Tom said.

"It's seeing what is able to be achieved on a farm on a major scale, and they're tasting it fresh out of the dirt."

Industry involvement

In early 2019, the pilot program was bolstered by the announcement that the Stephanie Alexander Kitchen Garden Foundation will be jumping on-board.

"The Foundation has great connections with current schools that participate in its program. It's strong-minded in what it's trying to achieve in getting children and schools to eat healthily and understand where food comes, growing from seedlings in their school backyard and

taking it through to cooking," Tom said.

"We thought it would be a fantastic opportunity to adapt this 'Schools on Farm Program' into what the Foundation is also doing in schools. It gives that extra depth to its program, looking at a commercial scale, and showing children where their food comes from on a day-to-day basis, including the supermarket chain."

Along with the Stephanie Alexander Kitchen Garden Foundation, Victorian and Queensland-based business Boomaroo Nurseries has also thrown its support behind the initiative.

"Boomaroo is investigating other ways to support the program, including the supply of timeslot-appropriate seedling varieties to participating schools for use in their kitchen gardens, giving children a better chance at experiencing success across a broader range of crops," Tom said.

"Boomaroo also has a new facility up in Queensland, and there's plenty of opportunity for this program to expand once it becomes an established in Victoria. We've had people reaching out from Queensland, South Australia, Northern Territory and New South Wales, expressing their interest in this program."

Since it was launched at Hort Connections in June 2019, there have

been several Schools on Farm excursions, with positive feedback received from parents, teachers and students.

"We had a parent who emailed the school saying, 'I don't know what you've done for my child on this excursion out on the farm, but they came home and asked, could we have broccoli for dinner, please?," Tom said.

"It's opening a brand-new world of different tastes, and a number of these students have never had those fresh vegetables before. To give them access to that, help people eat more healthy foods and also educate them on where it has come from, is a fantastic step for industry."

Next steps

Tom hopes that the pilot program will continue to be delivered successfully during the first half of 2020. However, further funding is required and AUSVEG VIC is looking for new and innovative ways to secure funding.

"We'll look to talk to the State and Federal Governments and continue to work with other industry partners, looking at potential sponsorship for working with the program," Tom said.

"We'll also be looking to increase the number the farms where we are running these on-farm vegetable excursions, as well as working out a bit more of a program for the supermarket side."

Looking even further ahead, it is hoped that the broader horticulture and agriculture industries adopt the Schools on Farm initiative.

"If we're going to make this work for the whole industry and increase consumption of produce; increase workforce numbers as well as people's understanding of what farming is and changing their perceptions, we need to have every single industry body and farming organisation on-board and involved in this," Tom said.

"We'd love to see the program added to the curriculum for grades three and four across Victoria, with the view of establishing it across Australia."

Find out more

Growers who would like to get involved in the 'Schools on Farm Program' can contact AUSVEG VIC State Manager Tom Cohen on 03 9882 0277 or at tom.cohen@ausveg.com.au.

For further information about the Stephanie Alexander Kitchen Garden Foundation, please visit kitchengardenfoundation.org.au.



Schoolchildren received the opportunity to try whole hearts of cos lettuce as part of the 'Schools on Farms' program.



Knowledge grows

Growing your business

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Darren Long from MG Farm.

Cover cropping pioneer aiming to educate others

In mid-2017, a project was established to support Australian vegetable growers to effectively use cover crops to boost soil health and reap productivity benefits. *Vegetables Australia* speaks with long-time cover crop advocate, MG Farm's Darren Long, who has been involved in cover crop coaching clinics as part of this project.

For over 20 years, Tasmanian potato grower Darren Long has been involved in cover cropping and biofumigation, which is the use of specialised cover crops that are grown, mulched and incorporated into the soil prior to cropping.

Darren, who runs the family-owned operation in Sheffield on Tasmania's north-west coast, has been hailed by others as a leader in this field. Along with Dave Roberts-Thompson from Table Cape Tulip Farm, Darren successfully established Soil First Tasmania in 2016 to educate other growers about cover cropping and other innovative growing practices. Premium Fresh Tasmania Farm Manager Deon Gibson said that he was inspired by Darren to revive cover cropping on his property when interviewed for the 2018 *Vegetable Grower Success Stories*.

Both growers have been actively involved in a project led by Applied Horticultural Research scientist Dr Kelvin Montagu entitled *Optimising cover cropping for the Australian vegetable industry* (VG16068), a strategic levy investment under the Hort Innovation Vegetable Fund. Darren has been taking the opportunity to collaborate with growers involved in this project and pass on the knowledge that he has gained over the past two decades.

Early days

Darren's cover crop investigation began in the 1990s when he heard that Western Australian growers were using brassica crops to control potato-related diseases.

"We went out on our own to try and replicate what Western Australia was doing in controlling diseases with using plants or cover crops, rather than using chemicals," Darren says.

However, the early years initially proved unsuccessful and Darren found that the plants weren't controlling the disease. But there were other benefits, located deeper into the soil.

"What we were finding was that we were getting really good soil health with free-draining organic matter, which went in our favour. We were using less water, less fertiliser, and eventually we cracked the code that it wasn't the plants that were providing the disease control, it was the soils. We were finding a healthier soil that is able to tolerate these diseases," Darren says.

Getting involved

The easiest avenue to learn about different growing practices, such as cover cropping, is to speak to other

growers, according to Darren. Through his involvement in VG16068, he has attended cover crop coaching clinics where he has spoken to his peers and those involved in this project.

"I learn more off Deon (Gibson) than he learns off me. It's that collaboration: talking to a grower without the scientific background and just making it work on our farms. Because it's really easy to send them a brochure and search the internet but to put things into practice is really difficult. Farming has become such a tight operation and you can't afford mistakes," Darren says.

"I think the biggest advantage of these cover crop coaching clinics and having the Hort Innovation projects is that we get to talk to other growers. You can bounce some ideas off each other and that's what I've found – I get to go away and meet growers all around Australia that are like-minded, and we can actually talk about how they do things and what they see."

Further learnings

While Darren is guiding other vegetable growers along their journey into cover cropping, he is also gaining his own knowledge from Dr Montagu and his research team's findings.

“The biggest learning curve that we’re getting out of Kelvin’s research is what’s available and what is beneficial to the soil, how it works and the different types of root systems,” Darren says.

“The exposure to all of these new cover crops is taking out the guess-work. We can access material where the research tells us the companion plants that work well, which means we don’t have to guess what will work or not.

“We’re also starting to nail down the seeding rates we need for which cover crop. Growers can use a template – they’ve got a 20-hectare plot and they know what the seeding rate would be to get the best advantages out of that. We’ve also found other materials that we didn’t know existed, like tick bean and other types of new species, that we can use in our cover crop.”

Rapid advancement

Darren is surprised at how quickly cover cropping practices have changed, particularly over the past three years.

“The advancements in cover cropping have been the most advanced single change to farming that I’ve seen for 30 years. It’s an absolute game-changer,” he says.

“We haven’t really increased yields; the savings are at pack-out and reducing input costs to produce the crop, and

we’re at a stage now where we don’t even use fungicides or insecticides, and we’re nearly at a point where we’re not using herbicides. Brassicas, or the cover crops that we use, are controlling our weed problem.”

To those growers who haven’t adapted to these practices, Darren’s message is clear: Have an open mind.

“You might only implement 10 per cent of what we’re doing to make a change and then you’ll see the differences from there. If you’re a farmer and you want to change and your agronomist won’t let you change, then you need to get a new agronomist,” he says.

“That’s the biggest key for us. We’ve had the one agronomist, Peter Aird from Serve-Ag, for 30 years and he challenges me more than I challenge myself.”

Furthermore, Darren says that it’s important to join these projects to learn some of the terminology and language.

“The key factor there is the communication between researchers and growers. Kelvin’s been good because he gets growers involved, and takes us along so he can talk about the science and we can back it up with how we do it on-farm.

“We need to learn the same language so we know what we’re talking about and we can educate each other.”

Fast facts: Cover crops used by Darren Long

Caliente 199 –
8 kilograms per hectare
Nemat –
four kilograms per hectare

Used prior to main crop

Saia oats –
22 kilograms per hectare

Sown directly after harvest

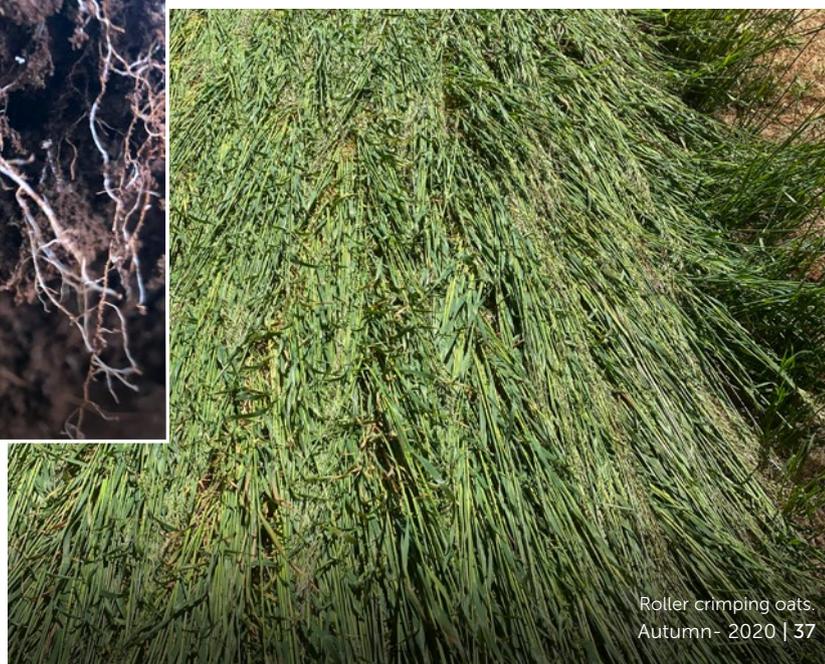
Buckwheat/ryegrass (summer grown).

Tillage rootmax, ryegrass and saia oats for silage and hay production.

“This is a starting point for readers to try ryegrass, oats and buckwheat rates, which are probably best left to growers’ discretion,” Darren says.



Root systems are key.



Roller crimping oats.
Autumn- 2020 | 37

Find out more R&D

Please contact Darren Long on 0408 997 410 or at mgfarm@outlook.com.

More about this project can be found at soilwealth.com.au/about-us/cover-crops-vg16068.

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

Project Number: VG16068

**Hort
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Strategic levy investment

**VEGETABLE
FUND**

Understanding brown etch of pumpkins

Brown etch, or rust mark, is a major issue for butternut pumpkin growers. A project recently completed by Applied Horticultural Research examined the causes of this disorder and what can be done to reduce the risk of it occurring in the field or after harvest. Dr Jenny Ekman provides a summary of outcomes from this strategic levy investment.

Growers of butternut pumpkins are likely all too familiar with brown etch, or rust mark. Although eating quality is unaffected (the brown areas are purely superficial), the appearance of etch greatly reduces the value of the crop. In some cases, it may not even be worth harvesting.

Initially, brown etch develops in the field. It usually develops from a contact point with the soil, a stem or other pumpkins. Etch can appear as either a pattern of concentric brown rings, or as irregularly shaped brown blotches spreading across the fruit. Symptoms can also develop after harvest, so that a freshly packed, clean bin of pumpkins at the farm can be riddled with etch by the time it arrives at the wholesale markets.

Examination of pumpkin skin using scanning electron microscopy reveals massive thickening of the cell walls in etched areas of pumpkin skin. This is due to accumulation of lignin, a key compound in wood and bark that is also often produced to defend cells from physical stress or fungal attack. As a result of this thickening, the cell contents are squashed and disrupted. Eventually the cells die, leaving behind the whitened skeletons of their cell walls.

Etch can be associated with infection by gummy stem blight or "black rot" (*Stagonosporopsis cucurbitacearum*). Immature pumpkins artificially infected

Table 1. Effect of accumulated time the plant was wet on risk of etch

Total time plants were wet during the fortnight before harvest	Estimated percentage of fruit likely to be affected by etch
<50 hours	0 to 5 per cent
50 to 100 hours	5 to 10 per cent
100 to 200 hours	10 to 30 per cent
>200 hours	More than 30 per cent

with this disease often develop symptoms of etch. In this case, the pathogen can be re-isolated from the etched tissue.

However, etch also occurs when plants appear totally free of this disease, with no other symptoms of infection or evidence of fungi from RNA analysis or microscopic examination.

Rain and etch

One thing that is certain is the correlation between etch and wet weather. Wet conditions due to rain or dew are strong predictors of the risk of etch in a crop. This is often cumulative. For example, the values shown in the Table 1 are based on a model using the total accumulated time spent wet during fruit maturation. These are estimates only; rates of etch are also likely to vary due to other factors.

However, a single extended wet period can trigger increased rates of etch, even if the crop stays relatively dry before and after this event. The graph below in Figure 4 is most useful as a guide to potential incidence after an extended rainy period.

Therefore, etch seems most likely to be triggered by stress. Etch can be a response to infection by gummy stem blight, but also to exposure to wet conditions.

If etch is observed in the field, then more is likely to develop during transport and storage. New blemishes can appear overnight on previously clean fruit, as well as continuing to expand on already affected fruit. While new or expanded etch mainly occurs during the first week of storage, it can continue to appear for up to two weeks.

Conversely, if there is little or no etch in the field, symptoms are extremely unlikely

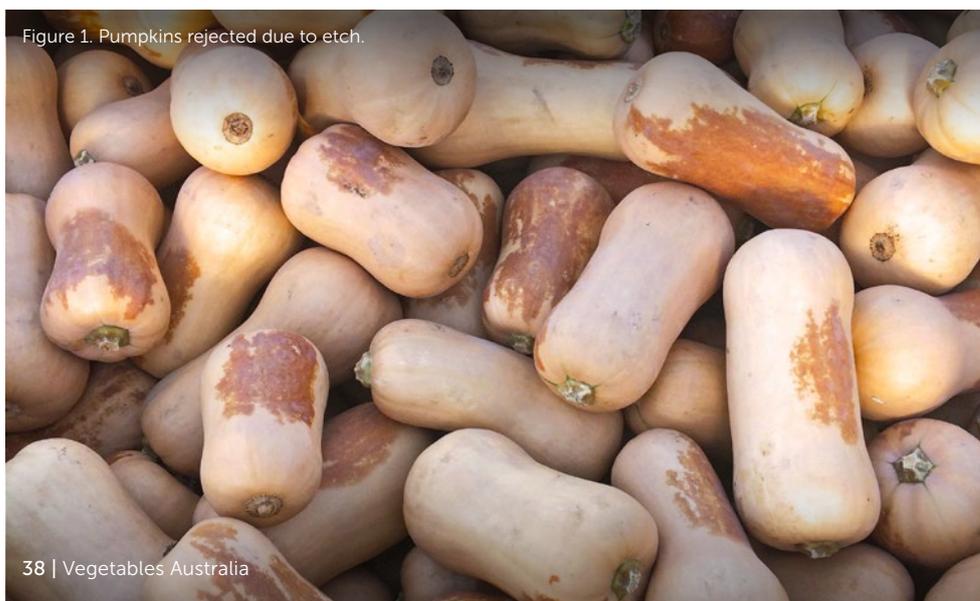
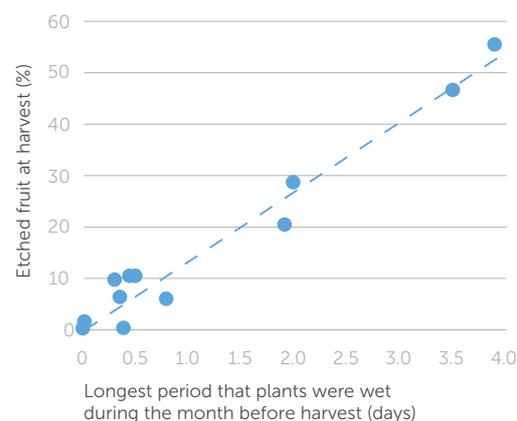


Figure 1. Pumpkins rejected due to etch.

Figure 4. Effect of a single extended wet period during the month before harvest on the level of etch in the crop. Each point represents the results from one field trial or commercial crop monitoring event.



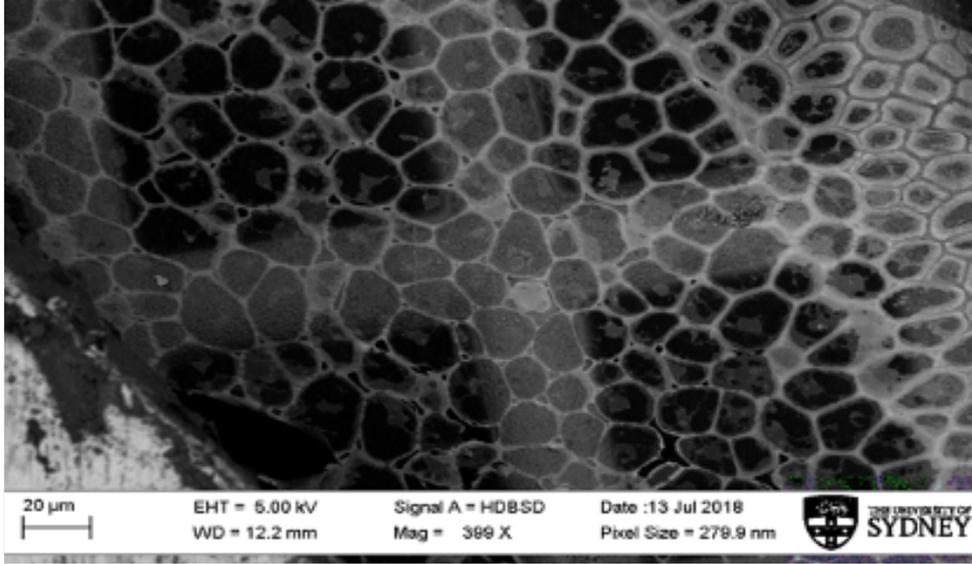


Figure 2. Scanning electron microscope image of the edge between etched and non-etched skin tissue.



Figure 3. Etched pumpkin, showing a typical pattern of concentric rings. In the centre the cells have died, leaving behind the white skeletons of their cell walls. Black fungal spores can be seen in the dead tissue.



Figure 5. Retail header cards used with clean and etched pumpkins.



to develop after harvest. We tested a large range of different products and techniques to reduce etch, including fungicides, nutritional supplements and products reported to improve plant defences. None were effective. There also appeared to be little difference in susceptibility between common butternut varieties.

Project findings

It seems likely that the best way to reduce development of etch is to keep relative humidity (RH) low and the crop as dry as possible. This could mean increasing plant spacing, avoiding planting in damp areas or growing with subsurface drip instead of overhead irrigation.

If etch is present in the field, it may be best to store harvested pumpkins for at least a week before re-packing into hat bins or crates. By this time development

of new etch will be minimal, allowing effective grading of the remaining fruit.

Development of etch during transport and storage may be reduced by keeping RH very low and, potentially, by cooling fruit. While five degrees Celsius storage reduced etch development by more than 75 per cent, more suitable temperatures have yet to be tested using fruit at high risk of etch development.

The current drought means that etch, at least, won't be a problem for pumpkin growers. However, rain will eventually fall again, raising the question of what to do with etched fruit.

Most butternut pumpkins are sold cut in half and overwrapped – the undamaged flesh is clearly displayed, despite the brown stain on the skin. We conducted a small retail study looking at consumer preferences. Header cards were included showing etched and non-etched fruit,

trying to clarify the difference between the two groups for consumers.

When we discounted etched fruit by 50 cents per kilo, we sold 12 per cent more etched than clean pumpkins. Even without a discount, etched pumpkins still sold well. This suggests that if people can see the flesh is good to eat, purchasing will be minimally affected.

Perhaps simply cutting etched fruit in half could solve what is, after all, a problem that is only skin deep!

Find out more R&D

For a fact sheet on brown etch of pumpkins, or for more information on this project, please contact Dr Jenny Ekman at jenny.ekman@ahr.com.au.

Improved management of pumpkin brown etch 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: VG15064

Assessing the economic impact of weeds in Australian vegetable production

In 2019, a case study assessment of the farm-level economic impacts of weeds in vegetable production was completed as part of a broader weed management project. The assessment focused on a range of weed management practices that have potential for more widespread industry adoption. Can vegetable growers employ new methods to manage weeds on their farm in a cost-effective manner?



Figure 1. Inter-row tillage within vegetable crop beds can also contribute to a reduced weed seed bank and reduced economic cost of weeds over time, especially when coupled with effective weed management in the crop fallow, timely herbicide application, and hand weeding to remove survivors within the crop.

Although the economic impact of weeds in vegetable production has previously been estimated at the national level, information on the farm-level impact of weeds in the industry has been limited.

Previous research suggests that vegetable growers have difficulty in reliably estimating the economic impacts of weeds within their crops. Adopting a case study approach, a team from the University of New England sought to evaluate the individual farm-level economic impacts of weeds in vegetable production. These were assessed using 'loss-expenditure' and 'partial-budgeting' approaches, evaluating the direct costs of managing weeds and their estimated economic impact on crop yield and quality. A number of innovative weed management practices were included in this assessment.

A strategic approach to weed management for the Australian vegetable industry (VG15070) is a strategic levy investment under the Hort Innovation Vegetable Fund.

Farm-level impacts

The economic impact of weeds was assessed on 19 vegetable farms in New South Wales, Victoria, Tasmania and Western Australia. Each case focused on a specific vegetable crop, including lettuce, cabbage, chard, potato, radish, leek, celery, parsnip, broccoli, green bean, rocket, and carrot. Four organic farms were included amongst the case studies.

Across the 19 farms, the weighted average reduction in operating profit due to weeds was found to be \$2,090

per-hectare. This comprised \$1,403 per-hectare net costs added due to weeds, and \$687 per-hectare revenue lost due to weeds. The reduction in operating profit due to weeds on organic farms was approximately six times higher compared to those relying on conventional (herbicide-focused) weed management approaches.

Assessing innovative weed management

For the purpose of this study, the term innovative weed control practice referred to practices that were not used commonly within the Australian vegetable growing industry, which may have been recently developed or have potential for more widespread adoption by vegetable growers as part of an overall Integrated Weed Management program.

The farm-level impacts of adopting innovative weed control practices was assessed on 15 of the 19 farms, focusing on a specific innovative practice within a single vegetable crop. On one farm, two innovations were evaluated separately, resulting in a total of 16 case studies.

The innovative weed control practices evaluated were:

- Cover cropping (oats, ryegrass).
- Biofumigant-based cover cropping.
- Diligent hand weeding to reduce the weed seed bank to a manageable level over time.
- Sheet steam weeding.
- Stale seed beds.
- Inter-row tillage.
- Flame weeding.



Figure 2: Diligently hand-weeding before weeds produce seed can cost more initially, but will provide longer-term economic benefits as the weed seed bank within a vegetable crop declines.

The per-hectare impact of adopting the innovative weed control practices on whole farm operating profit across all 16 evaluations ranged from -\$5,586 to \$152,199. The impact was negative in six of the evaluations, but positive for the other ten.

For four of the six innovative weed control practices evaluated as having a negative economic impact, their benefits other than for weed control (e.g. benefits for soil health and structure in the case of cover cropping) were noted by interviewees, but could not be valued. This means the economic impact of some of these practices might actually be positive for the farm overall, if it were possible to value all of their benefits.

This finding suggests that a vegetable grower's decision to innovate is not necessarily driven by a single outcome alone, such as improved weed management. Other priorities and their related benefits and costs will also be considered, even if it is difficult to place a value on these. Indeed, when all farm management priorities are taken into account, it may be preferable to somewhat increase the economic burden of weed management in order to accrue benefits in other areas.

Additionally, initial management and set-up costs for an innovative practice (such as inter-row tillage) may be high, but the economic benefits for weed management will accrue gradually over time.

Case studies of effective Integrated Weed Management in vegetable production

The University of New England team has been working with vegetable growers who have implemented different approaches to successfully reduce the weed burden in their vegetable crops.

Some video case studies of Integrated Weed Management (IWM) have been produced from this activity, and more are planned.

Although these specific cases are more relevant to some crops than others, the way of thinking (a willingness to try something different and sticking with it diligently once the approach has been proven to work) is relevant to everyone.

So far, the team has discussed diligent hand-weeding and pre-planting herbicides in cut-leaf vegetable crops with Maureen Dobra from Gingin, Western Australia and weed seed bank management using stale seed beds and inter-row tillage with Adam Schreurs from Clyde, Victoria.

Readers can watch IWM case studies on the project's YouTube channel by searching 'A strategic approach to weed management for the Australian Vegetable Industry'.

Find out more R&D

For more information, please visit une.edu.au/iwmvegetables, or contact Michael Coleman at mcolema8@une.edu.au or 0437 403 644 or Chris Fyfe at cfyfe3@une.edu.au or 0401 200 045.

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

Project Number: VG15070

Hort Innovation | **VEGETABLE FUND**
Strategic levy investment



Images by Anna Osetroff.

Jennifa D'Souza

Age: 26

Location: Wacol, QLD

Works: OneHarvest

Grows: Babyleaf lines: spinach, chard leaves, mizuna, tatsoi, rocket

How did you first become involved in the vegetable industry?

After completing my Masters' in Food Science and Technology from the University of Queensland, I found that Australia is rich in agriculture and all food industries directly or indirectly rely on agriculture and the vegetable industry. I started three years ago as a Graduate Technical Assistant at OneHarvest, looking after the quality of the raw material and finished goods. Then I moved down to our biggest manufacturing site as 'Site New Product Development (NPD) Technologist' in Bairnsdale, Victoria. I am now at the OneHarvest head office, looking after the NPD Process Team.

What does your role as NPD Process Manager at OneHarvest involve, and what are your responsibilities?

My role at OneHarvest specifically heads up the NPD trial and commercialisation function from farm through to processing trials and retail launch.

It is my responsibility to manage the national NPD team at four sites, customer interaction and help manufacturing sites with raw material concerns, wherever needed.

How long have you been in this role for and what have you achieved during this time in terms of developing new products?

I've been in this role for eight months and in that time, OneHarvest has had its busiest launch period. Over the initial five months, we have launched many new products into retail.

Since graduating, I have gained extensive knowledge about the industry and our sites.

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

I enjoy the process of bringing new products into action through trials and overcoming hurdles. Overcoming challenges and commissioning new projects keeps my enthusiasm going every day.

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

Weather changes are the biggest challenge when you work in the vegetable industry, an industry that is highly dependent on the weather. We supply customers with products all year-round and support our growers.

What new innovations, research and/or practices has your business implemented recently?

Just over a year ago, we launched our 'Love Potatoes' brand in two flavours



– garlic and herb, and BBQ flavoured potatoes. The flavoured and cooked retort potatoes are the first of their kind to be produced in Australia.

Where do you see opportunities for growth in the Australian vegetable industry?

Supporting our growers and lands with sustainability farming is where we see great opportunity is for both as a consumer, and as a part of the industry. We are not only saving our future in the industry, but also helping the environment to recover.

Where do you see yourself in five years?

To be a part of the OneHarvest business and its growth. Also, engaging with the Produce Marketing Association Australia – New Zealand and AUSVEG to learn more and implement new ideas to the business.

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

Having internships and showcasing the workplace culture, and explaining what we do, may encourage young people to join the vegetable industry.

You attended the U.S.A. Industry Leadership and Development Mission in October 2019. What were the highlights of this mission?

Large-scale farming in the ‘Salad Bowl of the World’ – Salinas Valley and understanding the weather impact and how growers overcome this by region selection.

In addition, seeing many aspects of farming and vegetable industries was a highlight as well, including seeding R&D, irrigation, crop research and future growth, and, crop protection. Attending the PMA Fresh Summit and Expo at Anaheim, California.

Additionally, our tour group consisted of people from different regions of Australia and belonged to various sector of the vegetable industry. That exposed the constraints at various level of the industry and helped us to understand the Australian horticulture industry.

Did you receive any advice and/or saw any practices while on the Mission which you have brought home to try and implement in the future?

I have not implemented these yet, however the below suggestions will be approached in near future.

- The auto-thinning process, for better efficiency and probability of planting.
- PlantTape: this technology will take additional resources to progress in Australia, due to quarantine and complexity of the process.
- Splitting the farming area to different

regions to accommodate changes in weather and ensuring supply all-year round.

Would you recommend the Mission to other growers and veg industry members and if so, why?

Yes, I would recommend it. Others can learn, relate and apply solutions and learnings to the farm and/or business. Each individual has different aspects that they take from the mission experience. This can help explore diversification with farming, helping Australia grow in the horticulture sector.



Diet matters: Veg consumption in the spotlight

In 2016, a multi-industry project focusing on Australian fruit and vegetable consumption was completed by researchers at CSIRO. The VegEze app was produced as a result, and it helped to boost consumption figures of the app users who participated in a 21-day challenge. *Vegetables Australia* spoke to Dr Gilly Hendrie about the research.

It is well-publicised that Australians are not eating enough fruit and vegetables, with over half of Australian adults not currently eating enough fruit – and over 90 per cent not eating enough vegetables – to meet Australia’s dietary guidelines.

A project that concluded in 2016 surveyed over 250,000 Australians to deliver insights into their fruit, vegetable and juice consumption through the CSIRO Healthy Diet Score.

‘Self-reported’ answers were then analysed, and they were based on the following topics:

- The proportion of respondents who met the fruit and vegetable consumption guidelines.
- How much variety they consumed.
- How various segments of the population differed.
- The importance of fruit and vegetable intake on overall Diet Score.

CSIRO partnered with digital health company SP Health to deliver *Consumption of juiced fruit and vegetables data analytics* (MT16008), which was a strategic levy investment under the Hort Innovation Apple and Pear, Citrus and Vegetable Funds.

Consumption focus

Project Lead and CSIRO Research Scientist Dr Gilly Hendrie said the data that was collected from this project supported the national nutrition survey results that indicated Australians are not eating enough fruit and vegetables.

“People feel like they eat more fruit and vegetables than they do, but when they actually report their intake patterns relative to guidelines (what’s expected of us), they’re falling quite short of what is recommended for good health and well-being,” Dr Hendrie said.

“While certain groups do better than others, men, younger adults, obese adults or unemployed adults have particularly low fruit and vegetable intake.”

One major finding was just how important variety is in driving overall consumption.

“People who had more different types of vegetables also had higher amounts of vegetables consumed,” Dr Hendrie said.

“This study also further validated the idea that vegetables are a marker of a healthy diet more generally, so people who consumed a greater variety and more amounts of vegetables also reported

higher diet quality and greater compliance with the dietary guidelines overall.”

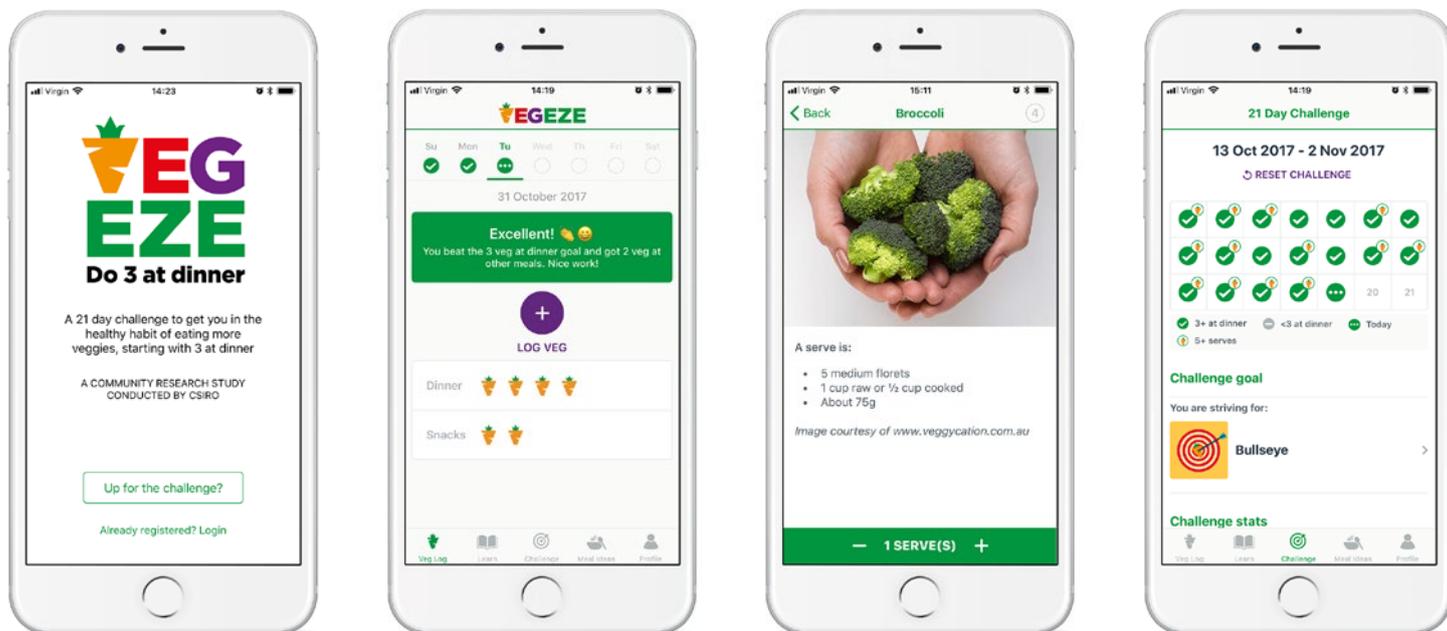
Variety the key

When looking at variety of vegetables, researchers recommended that we should always eat three types of vegetables with dinner.

“We thought that was a really practical and simple message to put into a behaviour change app, so we developed this 21-day challenge around that ‘three-veg-at-dinner’ idea, as a way to increase overall vegetable consumption,” Dr Hendrie said.

The VegEze app (*Boosting vegetable consumption through diet* (VegEze) – VG16071) was developed upon completion of MT16008, and its impact on vegetable consumption was measured through an intervention study whereby participants logged in and tracked their daily vegetable consumption through the app. Five thousand people participated in the baseline survey, with 1,000 following up and producing some promising results.

At the end of the challenge, the study found that, on average, people who used the app had increased their vegetable



consumption by 0.5 serves a day, and their vegetable variety had also increased by 0.4 types per day.

"The app was embedded with a strong, scientific evidence-base and established behaviour change techniques that we know help people to change their behaviour," Dr Hendrie said.

However, it remains to be seen if there has been ongoing increased vegetable consumption and consequently, increase in vegetable sales.

"In Australia, the vegetable consumption patterns have remained consistently low for a long time. It's really hard to shift unfortunately, despite some positive trends including Kalettes, which had a big boom (they were used in *Masterchef*) or the popularity of little snacking cucumbers or different coloured tomatoes. I have a feeling having greater variety and more novel products must improve sales, but I haven't seen any data on that yet," Dr Hendrie said.

"We should be looking at variety and diversification in the types, colours and the sizes of all these vegetables that make them taste better, more convenient, but don't impact on price. We know people choose food based on their convenience, taste, cost and health, and lately, sustainability."

"If we can give people lots of different options, remove any potential barriers that might stop them from consuming

vegetables (e.g. preparation required or their size or bitterness), then we would hope that it would drive consumption."

Further activities

Currently, CSIRO is focusing on increasing consumption among children through the five-year project *Tools and interventions for increasing children's vegetable knowledge: VegKIT* (VG16064).

"This project covers different settings, working with schools, childcare and food suppliers to determine best-practice, and then to develop and test interventions to try to increase consumption in Australian children," Dr Hendrie said.

She added that CSIRO is always looking for new ways to improve intake of vegetables and other healthy foods.

"One way to do that is to reduce consumption of unhealthy foods because that makes space on our plates for healthy foods.

"We're doing a few exploratory-type projects, looking at what strategies might reduce unhealthy or discretionary food intake, and the messages around reducing or switching an unhealthy food item to a healthier option."

Industry input

Vegetable growers and industry members are encouraged to get involved and

contribute to research projects such as VegKIT as these are becoming more 'co-designed'. In doing so, they can share their opinions, and researchers gain insights into areas that they may have little knowledge of, such as product value.

"With the VegKIT project, we have a grower on our Project Reference Group, and we have people from Hort Innovation or from the broader vegetable industry contributing to guide the research that we do," Dr Hendrie said.

"To get their perspective adds tremendous value to this research."

Find out more R&D

Please contact Dr Gilly Hendrie at gilly.hendrie@csiro.au.

The final report for this project is available on InfoVeg. Readers can search 'MT16008' on the InfoVeg database: ausveg.com.au/infoveg/infoveg-database.

Details about VG16071 can be found in Vegenotes 69, and more about VG16064 is published in Vegenotes 71. These can be found ausveg.com.au/news-media/publications.

This project has been funded by Hort Innovation using the apple and pear, citrus and vegetable research and development levies and contributions from the Australian Government.

Project Number: MT16008

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Green peach aphid – can we turn the tide of resistance?

The green peach aphid (*Myzus persicae*) is a crop pest with an extremely wide host range that includes grain and horticultural crops. The ability of green peach aphid to readily evolve resistance to insecticides is well-documented worldwide. In Australia, we are beginning to understand the extent of green peach aphid resistance and the implications for future management, as Dr Jessica Lye from Cesar explains.



Since 2012, Cesar and collaborators at CSIRO have been tracking the status of insecticide resistance in green peach aphid populations around Australia. During this time, researchers have also investigated the underlying genetic mechanisms that have allowed aphid populations to evolve resistance to a variety of agrichemicals.

Within the vegetable industry green peach aphid will feed on fabaceae, salanacae, and brassicaceae crops. However, no matter the industry, insecticide resistance is an issue that will inevitably 'crop up'. While the work of Cesar and collaborators has been focused on the status of green peach aphid insecticide resistance in Australian grain growing regions, our key findings also bear important messages for horticultural industries that may be impacted by this aphid. This is particularly true since many horticultural regions are found within close proximity to canola growing regions – a favoured host of green peach aphid.

So far, hundreds of aphid populations from around the country have undergone insecticide resistance screening via laboratory-based bioassays that test for aphid mortality after application of certain chemical actives, and molecular assays that allow us to genetically screen for insecticide resistance. The research has shown that green peach aphid insecticide resistance is widespread across Australia, with resistance having been detected to key Mode of Action groups (carbamates, pyrethroids, organophosphates, and neonicotinoids).

However, not all resistance is created equal. Based on our surveying results, green peach aphid resistance in Australia currently falls into two categories – target site resistance (in the case of pyrethroids and carbamates), and metabolic resistance (in the case of organophosphates and neonicotinoids). Target site resistance often arises from a conformational change at the active site of the protein

to which the insecticide is designed to bind. Such mutations can have a drastic effect on our ability to manage the pest. In the case of green peach aphid that are resistant to pyrethroids and carbamates, spraying these chemicals at the field rate will not provide adequate control of populations.

The impact of metabolic resistance to organophosphates and neonicotinoids has been observed to be less cut and dried. In this case, the aphid displays an increased ability to 'mop up' and detoxify the insecticide. Application at field rates may have an impact on green peach aphid populations if they do carry resistance to these chemicals; however, mortality rates can be variable and difficult to predict. Generally, resistance to neonicotinoids in Australian green peach aphid populations has been observed to be at a low level in most populations tested.

Can we turn back the tide?

Ultimately, it comes down to genetics. Being 'resistant' can often come at a fitness cost (for example, a shorter lifespan and fewer offspring). Without selection pressure from insecticides, a mutation that confers resistance may not be passed on as frequently to the next generation. If you can reduce the selection pressure by reducing the number of chemical applications each season, there is a chance of reverting a resistant population to a population with a greater number of susceptible individuals. This means taking an integrated approach to management of green peach aphid and other pests.

In addition, industries must remain vigilant for future control failures. Recently, it was confirmed that a sensitivity shift to sulfoxaflor (Transform™) had been detected in populations collected from

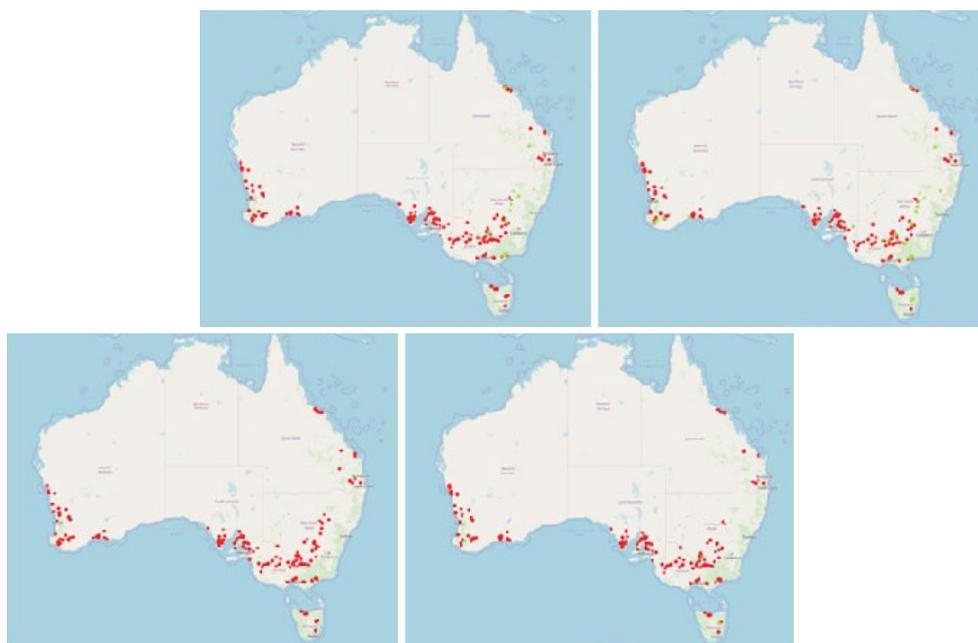


Figure 1. Summary of resistance surveillance results for synthetic pyrethroids (top left), carbamates (top right), organophosphates (bottom left), and neonicotinoids (bottom right). Red circles indicate resistant green peach aphid populations; green circles indicate susceptible green peach aphid populations.

Esperance in Western Australia. While sulfoxaflor remains a highly effective means to control green peach aphid, this recent finding is another important reminder that use of chemical options to control green peach aphid (and other pests) should be limited to only when absolutely needed, and in-line with a resistance management program designed for your farm, industry or region.

Considerations for the future

A biosecurity issue that has been identified is the threat posed by a mutation carried by green peach aphid populations in Europe and some Asian countries. It is called 'R81T' and it confers high levels of resistance to neonicotinoids, as well as cross resistance to sulfoxaflor. Cesar has screened green peach aphid populations throughout Australia for this mutation, including those populations recently found to have decreased sensitivity to sulfoxaflor, and the R81T mutation has not been found.

While the research results described here are derived from screening of aphid populations from predominantly Australian

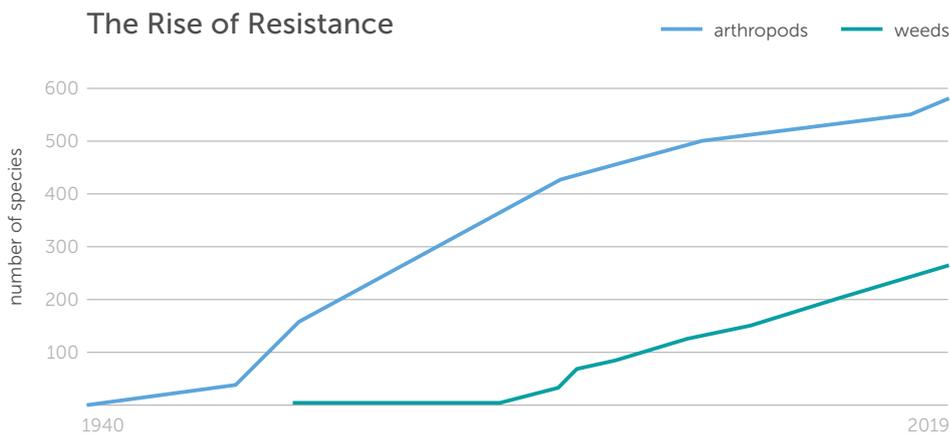


Figure 2. Representative schematic highlighting increases in cases of insecticide resistance in the modern era.

grain growing regions, including vegetable growing regions, keep in mind that aphids can travel large distances in their winged form, and they have no notion of 'industries' and state lines. Insecticide resistance is a cross-industry issue that horticultural industries, the grains industry, and other crop groups should be tackling together.

Find out more R&D

Please contact Dr Jessica Lye at jllye@cesaraustralia.com or visit cesaraustralia.com. The research has been supported by funding from the Grains Research and Development Corporation. Support has also been provided by Corteva Agriscience™. Project partners are Cesar and CSIRO.

Further reading:

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Meet the Soil Wealth ICP project team. From L-R: Donna Lucas, Dr Pieter Van Nieuwenhuysse, Dr Gordon Rogers, Carl Larsen, Dr Kelvin Montagu, Dr Doris Blaesing, Marc Hinderager and Dr Anne-Maree Boland.

2020: The year of soil biology and integrated weed management

The Soil Wealth and Integrated Crop Protection (ICP) project works with growers nationally to put soil management and plant health research into practice. In 2020, the project team will focus on putting soil biology and integrated weed management research into action to benefit the vegetable industry, after a strong focus on strip-tillage and nutrition management in 2019. *Soil Wealth ICP Phase 2 (VG16078)* is a strategic levy investment under the Hort Innovation Vegetable and Potato - Fresh Funds.

Biological Products Database

'Biological' products (also called 'biologicals') are defined as those that are derived from living organisms (plants, animals, microorganisms, fungi). The term encompasses a diverse range of products, and this is a fast-growing segment of agricultural inputs (definition from croplife.org).

About this database and how to use it:

The Biological Product Database is a tool for growers that will assist with navigating the array of 'biological' products currently available to their farming business. The project team has compiled the information in response to questions from growers about available products. The database is available in two different formats for ease of use:

1. Biological products sorted by trade name.
2. Biological products sorted by primary use and trade name.

The database includes a column that indicates whether products have Australian Pesticides and Veterinary Medicines Authority (APVMA) registration. Registered products are known as 'biological crop protection' products. If a product is used for crop protection (i.e. used as a biopesticide) it must be registered for use in the crop and situation it is applied in. Contact the APVMA or Hort Innovation for more information (details included in the Find out more section).

How was the database developed?

The project team has gathered information primarily from the manufacturers, via their websites and/or their representatives. It has attempted to strip away any confusion by laying out the bare bones of each product. The project team will include references to independent research in the database as the project progresses.

The database is a work in progress and is not comprehensive. The database will be updated and published regularly as information becomes available.

Is anything missing? If you know of any products or trial information that should be included, or details that are inaccurate or incomplete, please get in touch at rm@rmcg.com.au.

Technology for controlling weeds in vegetable production

Most new technology for controlling weeds will be a positive step forward for soil health and the environment, and will play an important role in our fight against herbicide resistant weeds.

An interactive webinar is available to learn from leading industry experts on some of the most interesting and practical advances in weed management.

The session covered non-selective fallow paddock weed control, as well as selective in-crop weed control, and delivery technology.

Get the latest updates from:

- Jeremy Winer, Weedtechnics:

Satusteam® – a weed killer safe enough to drink.

- Dave Farmer, Croplands: WEEDit and Recapture technology – what are they and how do they work?
- Robert Tucker, Agriculture Guided Implement Systems: Precision implement guidance in row crops using radio frequency – evolution and lessons from overseas.

The session was facilitated by Carl Larsen from RMCg.

You can access other great resources on weed technology, weed management, as well as spray application basics, on the Soil Wealth ICP website.

Find out more R&D

APVMA Guideline for the regulation of biological agricultural products can be found at apvma.gov.au/node/11196.

Search for APVMA Permits at portal.apvma.gov.au/permits.

For APVMA Registration enquiries, please phone 02 6770 2300 or email enquiries@apvma.gov.au. For further details, contact Jodie Pedrana from Hort Innovation at jodie.pedrana@horticulture.com.au.

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 and fresh potato research and development levies and contributions from the Australian Government.

Project Number: VG16078

**Hort
Innovation**



Dr Shaun Hood

Feeding behaviour and effective insect control

The spotlight is on insect pests and the products available to control populations, with Syngenta Technical Services Lead Dr Shaun Hood discussing the types of insecticides available to assist growers in the battle against these destructive pests.

Understandably, producers of horticultural crops tend to categorise insects as good or bad. The pests are the 'bad guys', which damage the crop and affect harvest quality, whereas the beneficial insects (predators and parasites), which feed on the pests, are the 'good guys'.

Insects can be distinguished by their mouthparts, which are adapted to particular modes of feeding. Two main types of pest insects are the chewing insects or the piercing and sucking insects.

The chewing insect pests include caterpillars, beetles and grasshoppers. Generally, their jaws move sideways like hand shears to cut, tear and chew food. Holes chewed in crops can severely reduce their visual appeal and value.

On the other hand, piercing and sucking pests damage plants by inserting their mouthparts into plant tissue and sucking up juices. Some sucking insects can also transmit viruses, which can also impact crop health.

Examples of sucking insect pests are aphids, leafhoppers, stink bugs and thrips. It's worth mentioning spider mites here too. While not an insect, these arachnids have eight legs that can also suck out juices from leaves and stems and reduce the overall health of the plant.

Choosing effective control

Understanding how insect pests feed and move throughout the crop is important if we are going to effectively control them with an insecticide. It can also help us to select what type of insecticide we need to use.

Contact insecticides, many of which tend to be older chemistry, are effective but can be tough on some of the beneficial insects. For these to be effective, the pest has to either be directly contacted by the spray or come into indirect contact by moving across spray residue on the plant surface. The product remains on the leaf surface or in soil where it is exposed to environmental elements and breaks it down over time.

Translaminar insecticides work a little differently. They are formulated to

penetrate into the plant tissue.

PROCLAIM OPTI® is a great example of a translaminar insecticide. It penetrates the leaf surface quickly and moves into the plant tissue. Within the plant it forms a protected reservoir for the active ingredient, which provides extended control of foliage feeding lepidoptera larvae, even when they are not contacted directly. Within the treated leaves the active ingredient is protected from the elements, so it stays active longer and is safely away from a whole host of beneficial species.

Systemic insecticides can be effective at sites other than where they are applied. They may be soil-applied and enter the plant via the roots or shoots and move (translocate) through the plant to work at distant sites which were not directly sprayed.

A good example of systemic activity is DURIVO® which, when applied as a soil drench to vegetable seedlings, is readily taken up by the roots. The soil acts as the reservoir for the active ingredient and when it moves upwards to the shoots, it delivers extended control of key lepidopteran, sucking and chewing insect pests.

New products on the market

Syngenta is also developing a number of exciting new horticultural insecticides. MINECTO FORTE® (registration expected in 2020) is a wide-spectrum, foliar insecticide, which will control some of the most important cucurbit and fruiting vegetable pests including Lepidoptera, aphids, mites and whiteflies. It harnesses the power of two complementary active ingredients, cyantraniliprole and diafenthiuron, in one convenient premixed formulation.

Diafenthiuron (Group 12A) is a brand-new mode of action for cucurbits and fruiting vegetables offering control of insect pests resistant to existing chemistry. MINECTO FORTE will also protect against multiple pest populations that overlap or occur at the same time.

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.



Robert Hayes, State Manager – MADEC, National Harvest Labour Information Service.

Take time to get piece rate right

Many growers see the use of piece rates as an attractive option to avoid paying overtime to casual workers employed under the Horticulture Award. While piece rate workers are not subject to the overtime provisions of the Horticulture Award, changing to piece rate payment is not a simple or easy process. State Manager – MADEC, National Harvest Labour Information Service Robert Hayes reports.

Following a decision of the FairWork Commission on 2 April 2019, a number of changes were made to the Horticulture Award, including the requirement to pay overtime to casual workers from 15 April 2019. Nothing in the decision changes the payment of a casual employee on a piecework agreement. This means that the pieceworker does not get overtime or the night loading, and neither the overtime rate nor the night loading is factored into the calculation of the piece rate, but additional payments for working on public holidays still apply.

When can a piece rate be used?

A number of criteria must be followed before workers can be paid on a piece rate. This is as follows:

- The award or registered agreement must allow for piece rate payments. Most horticulture workers are paid under the Horticulture Award 2010, which allows for piece rate payments.
- A piece rate can only be used when the weight, volume, or unit picked or packed by individual workers can be measured. So, there is no opportunity for a group piece rate where, for example, two workers share picking into a bin, or a group of workers share how much is picked using a mango picking aid.
- If an employee is doing an hourly paid task and achieves 304 hours before the eight-week overtime period is finished (which would trigger overtime payment), they cannot then be switched to piece rates (that don't attract overtime) for the same task. If they have been doing an hourly paid shed job and then switched to

a different piecework paid job such as picking, that will not attract overtime.

How to implement piece rate payment

A number of criteria must be met before making piece rate payments. Head to the FairWork Ombudsman website for information on piece rate payments – fairwork.gov.au/pay/minimum-wages/piece-rates-and-commission-payments.

- There must be a written and signed piecework agreement setting out the pay rate per piece and how it is measured, before any work commences. An employer has to keep the agreement as part of their records and give a copy to the employee. If the agreement is varied, it must be agreed to in writing by the employee and employer.
- Piecework rates must enable the average competent employee to earn at least 15% more per hour than the minimum hourly rate in the Award for their type of employment and classification level. Competence is not to be confused with motivation, attitude, behaviour or proficiency. These are attributes or levels of skills that may determine how much a worker picks and is ultimately paid, but they are not indicators of competence.
- Piece rates may change several times a day if workers move to different paddocks/fields where crops might be heavier or lighter, or fruit smaller or larger etc. In this case workers must be aware, and agree to the new piece rate.
- It is recommended that a timesheet is used for each worker that records

the number of hours worked for each piece rate, including breaks.

Calculating the piece rate

Determining what an average competent worker is can be difficult. It may need adjustment if it doesn't allow for an average competent worker to earn at least 15 per cent above the minimum hourly rate in the Award.

Where historical data exists, use this to assist in calculating the piece rate. Where data does not exist, use a best estimate derived from neighbouring farms or similar crops in other areas. Workers can also be initially paid on an hourly rate to help determine realistic targets for piece rates.

It is preferable that the piece rate is calculated using sample data from as many workers as possible to ensure it is representative of the workforce.

Piecework is not intended to be mechanism to reduce wages costs. Piecework provides a 15 per cent loading for workers as they are being placed on a productivity form of payment. If all workers on a property were considered to be competent, it follows that the total wages cost could actually be higher than if workers were paid on an hourly basis.

Remember, piece rates are an important productivity tool allowed for in the Horticulture Award. When calculated and implemented correctly, piece rates can be a win-win for both growers and workers.

Find out more

Please visit madec.edu.au/national-harvest-labour-information-service or jobsearch.gov.au/harvest.

The National Harvest Labour Information Service connects growers with workers and is provided as a no-cost service through a call centre and website. It is funded through the Australian Government and managed by MADEC, a not-for-profit organisation.

Labour Agreement applications open to industry

Over the past 12 months, AUSVEG has been working with growers, industry and government to find ways for the horticulture industry to access an efficient, reliable and competent workforce. One of the most important outcomes from 2019 was the development, submission and acceptance of a Horticulture Industry Labour Agreement. *Vegetables Australia* explains what this means for vegetable growers.

In December 2019, AUSVEG together with the Minister for Agriculture announced the signing of a Horticulture Industry Labour Agreement (HILA), which sees a select list of skilled and semi-skilled occupations acknowledged by Government which the horticulture industry needs to fill with workers, often where local growers can demonstrate there are no local workers able or willing to fill them. The HILA provides recognition of 31 occupations for horticulture, which can be accessed, and applications are now open.

This is an important piece of the horticulture labour puzzle, as it is another option to help businesses get the skilled workforce they require to help to continue to grow their business.

However, the HILA is not available for picker or packing roles, as these were not accepted by Government as part of industry's labour agreement submission. AUSVEG, along with other industry

bodies, will continue to advocate for improvements in those roles to allow growers better access to an efficient, competent and reliable workforce across all skill levels. The list of occupations can be found at immi.homeaffairs.gov.au/what-we-do/skilled-migration-program/recent-changes/new-horticulture-industry-labour-agreement.

AUSVEG was successful in developing the proposal for this important agreement with the support of the wider horticulture industry through the Horticulture Council, which includes about a dozen industry representative bodies that are working together on issues that are common across all of horticulture, as well as other horticulture industry bodies.

enable approved businesses to sponsor skilled overseas workers when there is a demonstrated need that cannot be met in the Australian labour market and standard temporary or permanent visa programs are not available.

Industry-specific labour agreements are developed between the Australian Government (represented by the Department of Home Affairs) and industry. These are agreements for a specific industry with fixed terms and conditions. Businesses within the industry can individually apply for a labour agreement and access these pre-set terms and concessions.

What is a Horticulture Industry Labour Agreement?

Industry-specific labour agreements

Find out more

Please contact AUSVEG National Public Affairs Manager Tyson Cattle on 03 9882 0277 or email tyson.cattle@ausveg.com.au. Further details can be found at ausveg.com.au/ausveg-advocacy.

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Staff and visitor biosecurity

One of the best defences against pest and diseases is to implement on-farm hygiene practices, which will limit the entry, spread and establishment of pests and diseases, and help to protect your crops. AUSVEG Biosecurity Officer Madeleine Quirk reports.

As international trade and tourism increase, Australia is at greater risk of plant pests coming into the country. But how does this affect vegetable producers? With increasing globalisation, it will be easier for plant pests to enter and move around Australia more rapidly, potentially affecting vegetable production regions.

Farm hygiene is the practice of implementing simple yet effective measures on-farm to reduce the risk of entry, spread and establishment of plant pests on-farm. Farm hygiene is the first step to helping growers protect their own business and the wider horticulture industry, while minimising production losses and unnecessary costs associated with pest outbreaks.

This article focuses on some common farm hygiene practices relating to farm staff and visitors. Every day, staff, contractors, service providers, suppliers, industry representatives, and in many cases, tourists and school groups, work on or visit vegetable farms. This can create a significant biosecurity risk, as many organisms can hitchhike on clothing, hands, footwear and vehicles, and they can seriously affect a grower's bottom line. However, if implemented correctly, farm hygiene practices have the potential to significantly reduce these risks.

Visitor inductions

The first step to limiting the spread of pests and diseases on-farm is to install biosecurity signage at property entrance points. Gate signs should display a contact mobile number in clear, large writing, encouraging visitors to register their presence with the business owner or farm manager prior to entry. Additional signage directing visitors to a designated parking area may be useful.

When a visitor arrives at the designated parking area, further signage should direct them to the farm office to sign-in. Keeping a visitor register is important for both biosecurity and safety purposes, and should request details including name, phone number, sign-in time, sign-out time, and purpose of visit.

Induction of all staff (including casual workers and backpackers), contractors, service providers, and suppliers should be undertaken prior to commencement of any work on-farm. Induction sessions should outline the following:

- Biosecurity measures to be undertaken on-farm.
- The business' biosecurity plan.
- Biosecurity checklist.

- Risks posed by exotic and endemic pests to the business.
- Key exotic pests of concern.

An example of a farm biosecurity induction manual can be found online at: farmbiosecurity.com.au/wp-content/uploads/2019/03/Biosecurity-Induction-Manual-for-Bundaberg-Horticultural-Farms.pdf. Biosecurity signage is also available from AUSVEG free-of-charge. Please send an email to science@ausveg.com.au or call 03 9882 0277 to request signs or for further information on developing a biosecurity induction.

Come clean, go clean

Many pests and diseases are spread mechanically by footwear, clothing, gloves, hair, cars, and personal equipment. To ensure that staff, contractors, service providers and other visitors 'come clean and go clean', meaning they are not spreading diseases or insect pests from one farm to another, staff and visitors should have access to the following items and should use them when required:

- Footbaths and scrubbing brushes.

Urban Plant Health Network: Healthy plants, healthy future

The Urban Plant Health Network (UPHN) has recently been established to connect communities with industry and government to help identify and manage exotic plant pests and diseases in urban environments. Through the website and various social media platforms, the network will publish seasonally relevant articles and posts about garden pests and diseases, as well as tips for managing them.

The UPHN is a joint initiative of the Australian Department of Agriculture and Agriculture Victoria, and AUSVEG is a contributor to the project.

For further information, visit extensionaus.com.au/urbanplanthealthnetwork/home.

- Disposable booties.
- Disposable overalls.
- Hand sanitiser.
- Clean gloves.

It is very common for contractors, service providers, casual staff, and tourists to visit multiple properties in one day and with that comes a greater risk of spreading pests and diseases from one property to another. Entry on-farm should always be conditional to a biosecurity induction.

Limiting on-farm vehicle movement

Limiting worker, contractor or visitor movement from different areas of the property can reduce the spread of plant pests, both on-farm and between farms.

Separating a farm into different zones will help to limit movement between different areas. A farm can be separated into an exclusion zone, separation zone, and farming zone.

- The exclusion zone restricts non-essential visitors and staff from internal roadways, pathways, and farming areas. Visiting vehicles are to be limited

to specific car parks at the farm entrance.

- The separation zone consists of internal roadways and pathways on-farm. Only essential vehicles should have access to these areas.
- The farming zone is considered the area where crops are grown. Only dedicated farm vehicles and machinery should operate in these areas.

Zones should be separated by physical barriers such as fencing and signage. It is also important to ensure that proper sanitation procedures are in place between zones, and only essential vehicles and personnel can access these areas.

On-farm biosecurity can be simple, yet these simple steps can significantly protect your farm business. For information on other farm hygiene practices, including advice on managing biosecurity risks associated with packaging/pallets/bins, waste and weeds, planting material, and wind, please visit farmbiosecurity.com.au/essentials-toolkit.



Footbath setup.



Biosecurity kit.

Introducing farm biosecurity checklists

A farm biosecurity checklist is a good way to monitor your existing practices and identify the current gaps. Below is a checklist that can be used when assessing your 'staff and farm visitor' practices.

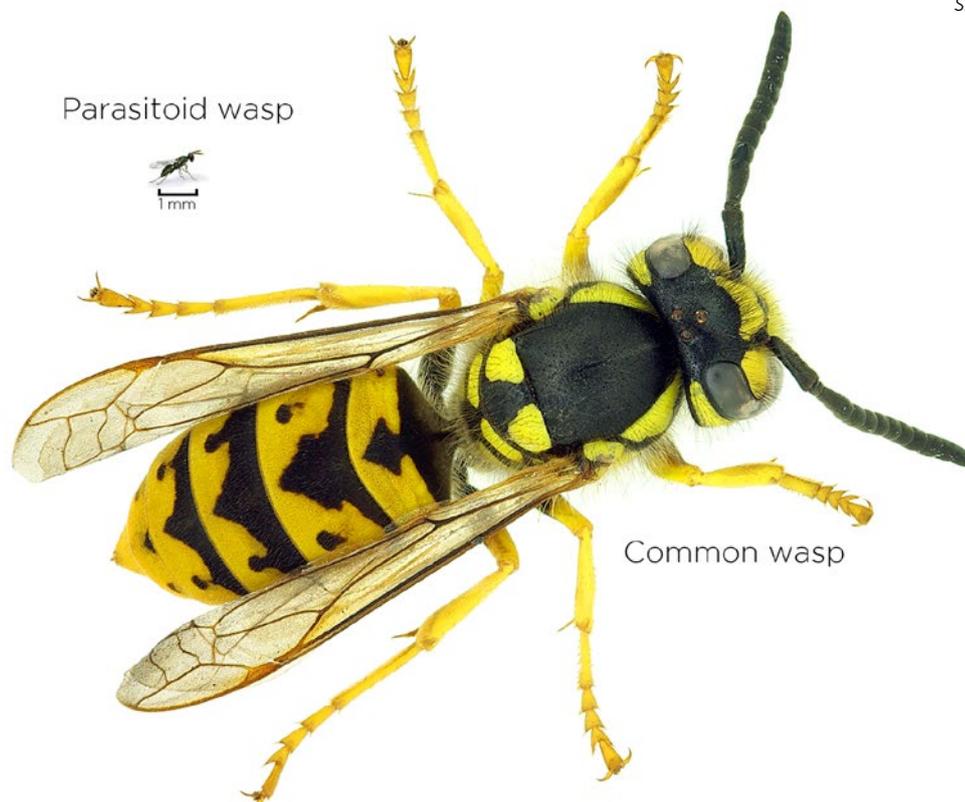
Biosecurity practice	In place	In progress	Not practiced	N/A
Staff and farm visitors				
Footbaths and scrubbing brushes are easily accessible for staff and farm visitors.				
Visitor clothing, footwear and tools are checked for soil and organic matter before entering the farm.				
Staff is trained in biosecurity and farm hygiene practices.				
Visitors are inducted in biosecurity expectations prior to moving around the farm.				
Visitors sign a register in order to monitor on-farm movements.				
Appropriate hygiene supplies are available to staff and visitors (hand sanitiser, gloves, boots, overalls).				
Contractor entry is conditional to a biosecurity induction and hygiene protocols.				

To download a full Farm Biosecurity checklist, visit pages 12-13 of the AUSVEG biosecurity toolkit: ausveg.com.au/app/uploads/2017/05/Biosecurity-R-1.pdf.

Find out more R&D

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.



How parasitoid wasps are helping to fight the leafminer battle

In 2017, a Hort Innovation Vegetable Fund project was established to recognise the damaging impact that vegetable leafminer could have on some of Australia's fresh produce industries if it were to move into production regions. AUSVEG Biosecurity Officer Madeleine Quirk explores the role of parasitoid wasps in controlling vegetable leafminer populations in far-north Queensland, the importance of parasitoid wasps overseas, and research conducted into reservoirs of parasitoid wasps within Australia's non-pest leafminers.

Vegetable leafminer (*Liriomyza sativae*; VLM), potato leafminer (*Liriomyza huidobrensis*) and American serpentine leafminer (*Liriomyza trifolii*) are exotic flies that cause significant damage to horticultural commodities overseas, and potentially threaten Australia's vegetable, nursery, melon and potato industries.

VLM established itself in the Torres Strait in 2008 and was subsequently found on mainland Australia, in Seisia on the Cape York Peninsula, in 2015. However, VLM populations have not reached problematic levels – instead, they seem to be held in check largely by tiny biological control agents called parasitoid wasps.

What is a parasitoid wasp?

Parasitoid wasps that attack leafminer flies are less than two millimetres long. Female wasps lay their eggs on or inside fly larvae or pupae, and when the eggs hatch, the wasp larva eats the fly larva/pupa before completing its development and emerging as a new adult wasp. Some of the adult wasp species also kill large

numbers of leafminer larvae by directly feeding on host larvae to acquire nutrients for the development of additional eggs in the wasp.

Dr Peter Ridland from the University of Melbourne has conducted a literature review of the wasps that parasitise leafminer flies in Australia and internationally.

"Those native and invasive leafminer species studied in Australia have a large range of parasitoid wasp species attacking them. Some of these wasps are also exotic and presumably arrived in Australia many years ago with their host leafmining flies," Dr Ridland said.

"Australia has at least 50 species of parasitoid wasps known to parasitise native leafminer flies. Many of these species are known to attack vegetable leafminer overseas, including *Hemiptarsenus varicornis* and *Diglyphus isaea*. The good news is that Australia will not need to import any new parasitoid species for the biological control of vegetable leafminer."

News from the incursion front

Cesar Research Scientist Dr Elia Pirtle has undertaken extensive field research in the Torres Strait and Cape York Peninsula, studying parasitoid wasps and their relationship with VLM.

"Some of our Australian species already show signs of very effective vegetable leafminer control on the incursion front in far-north Queensland. We have found at least six species of parasitoids attacking vegetable leafminer and, in some cases, unassisted field rates of parasitism can reach as high as 80 per cent," Dr Pirtle said.

"While there may be a lot of factors contributing to vegetable leafminer's limited mainland distribution, we predict that it is, in part, due to these wasp populations slowing down its spread."

Chemical use: a global problem

Although the tiny parasitoid wasps are keeping leafminer numbers low in far-north Queensland, they are extremely

sensitive to chemicals and can be wiped out by a single spray. When a crop is sprayed, beneficial insects such as predators and parasitoid wasps are knocked out while VLM, sheltering in the soil as pupae or as larvae in mines, continue to breed and multiply.

This is referred to as a secondary pest outbreak, meaning that it is not until its natural enemies are destroyed that the surviving leafminers become a problem for growers. That is especially true when they start to develop resistance to common insecticides, even if the insecticides are targeted at other pests in the crop.

“Overseas, excessive use of non-selective insecticides has caused devastating leafminer outbreaks for growers,” Dr Ridland said.

“On the other hand, it has been demonstrated repeatedly that conservation of parasitoids is one of the foundations of a successful integrated pest management system.

“While we can’t say for sure how parasitoids might affect vegetable leafminer populations in Australian production regions in the future, we are confident that this approach will underpin its successful management.”

Examining relationships

Marianne Coquilleau is a Master of Philosophy Candidate at the University of Melbourne. For two years, she has been sampling mined plants and rearing specimens from six sites around Melbourne to examine the effect parasitoid communities have on several local leafminer fly species.

“The four common leafminers are *Liriomyza brassicae*, *Liriomyza chenopodii*, *Phytomyza plantaginis*, and *Phytomyza syngenesiae*,” Ms Coquilleau said.

In Victoria alone, Ms Coquilleau found that those four flies that feed mostly on weeds are attracting and maintaining a healthy community of nine genera of parasitoid wasps.

“Though this number may seem low, it’s a good start for focusing on species and populations already established and suited to the Australian climate,” she said.

Parasitoid wasps are not fussy when it comes to their diet and tend to overlap with each other in their favourite leafminer to eat. In fact, *L. brassicae* was found to be parasitised by every wasp species that our project team found around Victoria. This supports Dr Pirtle’s findings from Seisia: there are a wide range of local biocontrol

agents that could be utilised for vegetable leafminer control, and it is likely that more wasp species will develop a taste for VLM if it spreads.

“We are banking on that being the case for the local parasitoids to shift onto invasive exotic leafminer species,” Ms Coquilleau said.

Some of the parasitoid wasps found in Victoria are distributed across the Torres Strait and Cape York Peninsula, and already appear to be attacking VLM in the north. These include *Zagrammosoma latilineatum* and *Hemiptarsenus varicornis*.

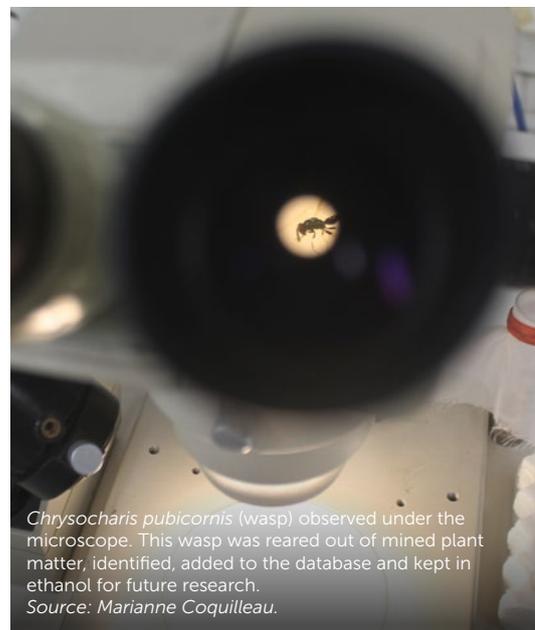
“More research needs to be done to look at parasitism levels over time, and across different wasp species combinations. These detailed studies cannot be undertaken until vegetable leafminer invades the Australian production regions, which we hope is delayed for a long time,” Ms Coquilleau said.

Overall, Ms Coquilleau’s research reinforces that local Australian parasitoids will be the cornerstone of future integrated pest management strategies, and we already have several species to choose from. She also hopes that it is a first step towards looking at the temporal presence of wasps of interest and their non-pest hosts, so that it can be taken into consideration when it comes to spraying schedules.

What we do know for certain is that if vegetable leafminer spreads to agricultural regions, it will become essential for growers to protect and promote their parasitoid wasp communities and integrate them into their pest management regimes.



Marianne Coquilleau examining mined plants in a temperature-controlled location. Wasps and flies enclosed inside can take several weeks to emerge. Source: Marianne Coquilleau.



Chrysocharis pubicornis (wasp) observed under the microscope. This wasp was reared out of mined plant matter, identified, added to the database and kept in ethanol for future research. Source: Marianne Coquilleau.

Find out more

For more information, contact AUSVEG Biosecurity Officer Madeleine Quirk on 03 9882 0277 or madeleine.quirk@ausveg.com.au. Alternatively, you can visit the project page on the AUSVEG website at ausveg.com.au/biosecurity-agrichemical/biosecurity/mt16004.

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).

The Research, Development and Extension program for control, eradication and preparedness of vegetable leafminer has been funded by Hort Innovation using the vegetable, melon, and potato research and development levies and contributions from the Australian Government.

Project Number: MT16004

**Hort
Innovation**

Subscribe for leafminer project updates

Be sure to keep up-to-date on VLM project updates and upcoming workshops by subscribing to the AUSVEG Front Line e-Bulletin. Please visit <https://ausveg.com.au/biosecurity-agrichemical/biosecurity/> to subscribe.



Managing worker fatigue

Growcom's Fair Farms Initiative team discusses worker fatigue, how it can affect employees when performing everyday tasks, and how employers can mitigate the risks that are associated with fatigue.

Working in horticulture is characterised by hard work with long days to match. It's not uncommon for workers to put in 12-plus hour days, seven days a week in peak harvest times. While the extra pay at the end of the week is tempting, the risk of fatigue is extremely high. Fatigue is defined as mental and/or physical exhaustion that reduces workers' ability to perform work safely.

Workers who are fatigued:

- Are more likely to make mistakes.
- Have difficulty making judgement calls.
- Have trouble managing their emotional reactions.
- Are more likely to injure themselves or others.

Employers who don't properly manage their workers' fatigue are not only jeopardising the safety of their workers, but also possibly increasing their cost of production through lower productivity, more mistakes and workers' compensation liability.

To ensure workers are safe and productive, the Fair Farms Standard requires that:

- Where workers work additional hours, they should not work more than 60 hours in any seven-day period.
- In exceptional circumstances (including unexpected production peaks, accidents or emergencies), workers can work more than 60 hours, but never more than 80 hours in a week.
- Workers are not to work more than

18 hours in a single day under any circumstance.

- Workers should receive at least one day off in every seven-day period, or two days off in every 14-day period.
- Employers put appropriate safeguards in place to manage the risk of fatigue for their workers.

How to implement

Every grower knows that when your produce is ready, it must be picked and packed. No exceptions. So, how do you manage and prevent fatigue? The first step is to identify what factor may cause fatigue at your workplace. This might include long hours, not enough days off, early morning starts, late finishes and hard physical labour. For each of the factors you identify, implement a control measure that mitigates the risk for fatigue.

For example:

- Split long shifts into shorter shifts.
- Instead of working seven days per week, have a rolling five-day roster with different workers, allowing everyone to have time off.
- Rotate staff through different tasks every few hours.
- Make sure workers have regular breaks with access to drinking water.

These, and other important topics, are covered in the Fair Farms Standard, which sets out the accepted principles of fair and ethical employment in Australian horticulture.

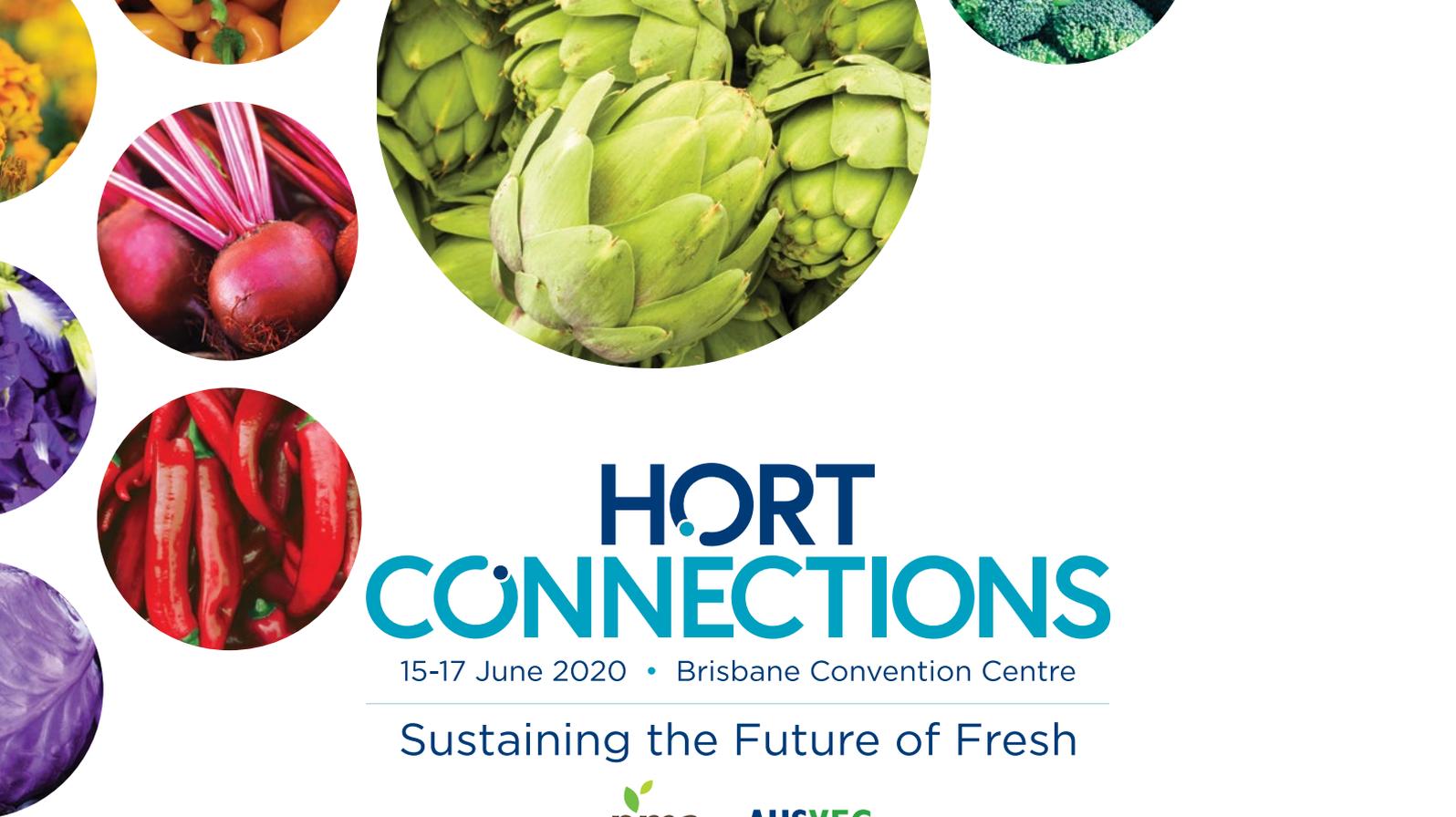
For more information, including how to become a Fair Farms certified employer, visit fairfarms.com.au or email fairfarms@growcom.com.au. More about fatigue can be found at the Safe Work Australia website: safeworkaustralia.gov.au/fatigue.

Find out more R&D

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

The Fair Farms Initiative is delivered by Growcom, in collaboration with industry and supply chain stakeholders. It is supported with seed funds from the Fair Work Ombudsman community engagement grants program.





HORT CONNECTIONS

15-17 June 2020 • Brisbane Convention Centre

Sustaining the Future of Fresh



NATIONAL AWARDS FOR EXCELLENCE 2020

Nominations now open

The prestigious National Awards for Excellence are a fantastic way to acknowledge and recognise the outstanding contributions of individuals and companies to the industry.

Awards will be presented throughout Hort Connections 2020.

Syngenta Grower of the Year



Industry Impact Award

MOYA Marketer of the Year Award
(#MOYA2020)



Boomaroo Nurseries
Women in Horticulture



PMA A-NZ Tech Innovation Award



Community Stewardship Award

Corteva Agriscience Young Grower
of the Year Award (35 years or less)



Butler Market Gardens Environmental
Sustainability Award



Bayer Researcher of the Year



Exporter of the Year

Nominations here... www.hortconnections.com.au



Veg growers' battle against aphids intensifies

A new insecticide has been launched to assist vegetable growers in controlling various aphid species, as well as helping manage silverleaf whitefly populations. North Queensland Agronomist Chris Monsour discusses the latest crop protection product on the market and the benefits it provides to growers.

One of the key benefits of Versys insecticide is that it is soft on beneficial insects and pollinators such as the brown lacewing, which feeds on aphids.

The ideal new insecticide for horticulture is one that hits target pests very hard while being soft on beneficial insects, including pollinators such as honeybees.

However, as Chris Monsour from Prospect Agriculture in north Queensland points out, even products that tick the first box can't be taken for granted.

"Going back four or five years, aphids were almost uncontrollable in capsicums and cucurbits in our region," Chris recalled.

The previous chemical options were failing and the use of beneficials was not as widespread or sophisticated as it is now.

"Transform[®] came along and it was a saving grace. But the danger was that, with only one effective product, it would be over-used."

Now with the launch of Versys from BASF in 2018 growers have an important new option. Chris agreed that it was a product that growers needed in the battle against aphids.

"This has a new mode of action (Group 9B) for sucking pests that's very effective against green peach aphids and melon (or cotton) aphids," Chris said.

"In the year or so it's (Versys) been available so far, it's performed very well. I was involved in the development work and trials with this product, so it's quite satisfying from a scientific point of view to see it performing as well as expected."

Chris emphasised that the key to effective use of Versys is to apply the product when the early stages of aphid infestation are first detected.

"It (Versys) has been able to provide commercially acceptable control of developing aphid populations. What you can't do is expect Versys to clean up a major problem when aphid numbers are already very high. Good spray coverage is also essential. We've used it successfully as part of a bigger program that incorporates regular crop monitoring, application of soft insecticides and deployment of beneficial insects," he said.

"What we don't want to do is come in with something that will blow the

beneficial insects away. Because this product is very soft and safe to beneficial insects, it helps with the overall program to control aphids as well as other key pests like silverleaf whitefly."

Effective control

Versys is registered for suppression of silverleaf whitefly, but Chris's point when managing all pests is that pest management really does require an integrated approach.

"With this softer chemistry, we're not flaring other pests," Chris explained.

"So, we're not spraying as much and that's a saving for growers as well."

While this insecticide won't be a first line of attack on silverleaf whitefly, Chris viewed it as having a fit in the overall approach – which again typifies the role innovative chemistry plays in a genuinely integrated program.

"We will use it for whitefly in tomatoes and cucurbits when it's appropriate, and for resistance management," he said.

"There's a range of effective tools being used in pest control now, so we're not automatically relying on a product to knock down large populations. There are places where silverleaf whitefly pressure is very high, but cultural controls, like avoiding new plantings next to mature crops can reduce pressure because the whiteflies can't just move across."

Efficient management of aphids also involves a variety of control tools, but Chris expected Versys to become one of the preferred options for growers.

Find out more

For more information on Versys insecticide, please speak to your local BASF Area Sales Manager or visit crop-solutions.basf.com.au/products/versys.

Introducing the new EnviroVeg website

It's finally here! The EnviroVeg program has launched a new website to ensure technical resources and up-to-date information is readily available to levy-paying Australian vegetable growers. AUSVEG EnviroVeg Coordinator Danielle Park explains how the website can be used.

The new EnviroVeg website is aiming to increase awareness around the vegetable industry's environmentally responsible practices. It focuses on the emerging sustainable production methods that are beginning to be adopted to continue to improve industry resilience.

The EnviroVeg program was established to improve the longevity of vegetable growing regions, benchmark industry environmental performance, and develop recognition for environmentally sustainable production methods and growers. This new website is a great resource to access if you would like more information about the program.

The *EnviroVeg Program 2017-22* is a strategic levy investment under the Hort Innovation Vegetable Fund.

Program changes

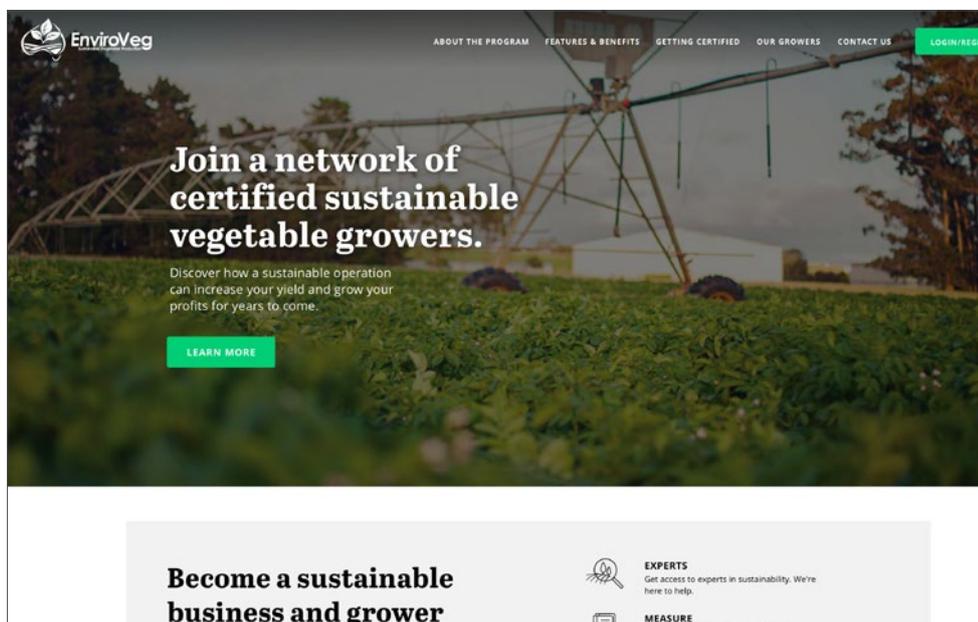
The program has recently undergone a significant review, and improvements have been sought and captured from vegetable growers from key growing regions around Australia.

Following the review that took place throughout 2019, a number of improvements have already occurred. One of the necessary improvements identified was a more user-friendly and accessible website.

Register to access the EnviroVeg Technical Manual

The website provides vegetable growers with access to EnviroVeg technical resources from across a wide range of aspects of vegetable production, which include:

Land and soil: This section addresses risks to soil health and structure, soil stability and soil degradation.



Biosecurity: This focuses on biosecurity at the property scale – it outlines the hazards and management practices that can guard against the entry, establishment and impact of exotic pests, pathogens or diseases.

Water: This considers each of the key aspects of water management in vegetable production systems, including water sources, water application/irrigation, irrigation water quality, produce washing water, wastewater and run-off, and the maintenance of healthy waterways.

Crop nutrition, fertiliser and soil additives: This addresses nutrient management in vegetable crops and the responsible storage and application of fertilisers and soil amendments.

Pests, weeds and diseases: This addresses the integrated and environmentally sustainable management of pests and diseases in vegetable production systems.

Chemicals: This addresses all chemicals potentially used in vegetable production including agricultural crop protection products, growth regulators, cleaning products, sanitisers, water treatment products, fuels and oils.

Air: This considers aspects of vegetable production that may result in air pollution – including dust, odour, smoke, noise and light.

Energy: This addresses energy sources, energy use, energy efficiency in vegetable production systems and the responsible storage and management of fuel and oil. It also includes opportunities to reduce greenhouse gas emissions in vegetable production.

Waste: This considers a broad range of waste materials that may be generated through vegetable production, including surplus/reject produce and other organic matter, paper and cardboard, timber, plastics, glass, metals, tyres, oils, liquids and gases.

Biodiversity: This focuses on the actions that can be taken by vegetable producers to protect native plants, animals and ecosystems and to enhance biodiversity – both on the property and in the wider landscape.

Business: This details procedures and key topics for making environmentally responsible, sustainable management decisions in vegetable production systems including community relationships, catchment priorities, local objectives, access to expertise and support, supply chain management, farm layout and farm plans.

Business management underpins all the other sections within the scope of EnviroVeg and can affect how practices are implemented on-farm.

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



Potato tuber movement assured between eastern states

AUSVEG National Tomato-Potato Psyllid Coordinator Alan Nankivell discusses the outcomes of a workshop between Plant Health Committee members and industry stakeholders to develop a risk mitigation framework for the movement of potatoes across borders in the event that CLso is detected in the eastern states.

In February 2017, tomato-potato psyllid (TPP) was detected in Western Australia. As a result, quarantine measures were put into place that stopped trade of potato tubers (and particularly seed potatoes) and other solanaceous crops to the eastern states. It was soon recognised that if TPP was detected in the eastern states, and similar quarantine measures were put into place, then trade restrictions would cause a calamitous impact on the potato industry.

As a result, negotiations commenced in late 2017 with the Plant Health Committee (PHC), which consists of all Chief Plant Health Managers from all states and the Commonwealth, to identify how to ensure business continuity while also mitigating the risk of the spread of TPP and the potential bacterium *Candidatus Liberibacter Solanacearum* (CLso), which causes zebra chip complex. Early in the initial detection of TPP it was unknown whether CLso was present.

Industry communiques

In December 2018, the PHC released its first Communique to industry saying that if TPP was detected, and that it had originated in Western Australia, then movement of potato tubers across borders would be ensured.

Industry stakeholders were concerned that this did not go far enough and further negotiations, discussions, workshops and the sharing of international evidence has led to a second communique from PHC, released in January 2020.

These communiques are located on the AUSVEG website via the TPP portal (ausveg.com.au/tpp).

Risk mitigation

A workshop was held in November 2019, which was led by AUSVEG National TPP Coordinator Alan Nankivell and involved PHC members and key industry

stakeholders. The result of this workshop was the development of a high-level risk mitigation framework for the movement of both processing and ware potatoes across regions and borders in the event of TPP carrying CLso being detected in the eastern states.

Pathways hazard points were identified for both processing and ware potatoes, and likely approaches to mitigating these pathways were identified to ensure business continuity. The PHC endorsed the workshop outcomes in December 2019 and recognised the importance of continued movement of ware and processing potatoes during the incident definition phase in the event of a detection of TPP/CLso in the eastern states.

The PHC has tasked its subcommittee on Domestic Quarantine and Market Access (SDQMA) to prepare formalised movement conditions during 2020. While this is occurring, it is expected that the risk framework developed at the workshop will guide actions to maintain business continuity in the event that TPP is detected in New South Wales, Queensland, South Australia or Victoria.

Further work is required to work through the implications to industry if CLso is detected in seed potato crops. A further workshop on this matter will explore the pathways and what resultant risk mitigation frameworks may already exist or need to be put in place.

Find out more

A copy of the Communiques can be viewed through the AUSVEG TPP Portal at ausveg.com.au/tpp.

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

**Hort
Innovation**



A ryegrass-clover cover crop being cut for hay at Cowra, New South Wales. Images courtesy of Applied Horticultural Research.

Should you be making hay from your cover crop?

Hay there! In this column, the spotlight is on hay crops and what to consider when introducing them into a growing operation. Dr Kelvin Montagu from Applied Horticultural Research takes a look at the positive impact hay crops can have on soil health as well as the economic benefits of haymaking.

With hay prices through the roof, and farmers desperate for fodder to keep their breeding stock alive, it seems almost criminal to plow in a cover crop.

However, before you call the hay contractor, think about how taking a hay crop may affect your next vegetable crop. Here are a few things to consider:

- 1. Soil compaction.** Cutting hay needs 3-5 tractor passes along different tracks to your normal operations. Each of these operations has the potential to compact your soil. If you have permanent beds/wheel tracks, this could undo a lot of your work to improve the soil. This compaction could have the biggest impact on your next crop.
- 2. Loss of the soil's protective covering.** Hay removal reduces cover crop residues, mainly affecting their longer-term benefit. Root biomass and stubble cut relatively high will provide some ground cover for the short term.
- 3. Reduced organic matter input.** A major aim of cover crops is to

increase organic matter input into the soil. Taking a hay crop reduces the amount of organic matter input by about two-thirds. This may well be your best choice economically for the short-term, and your soil health benefit will still be well ahead compared to leaving a fallow field.

- 4. Nutrient removal.** Hay removal is a major export of nutrients from the paddock, but hay crops are often deeper-rooted crops than vegetables, which lessens the overall nutrient removal impact. Vegetable farms are usually irrigated, diverse, and between 0-30 centimetres fertility is high and monitored closely. Just make sure you balance up any nutrient losses through your vegetable fertiliser programs. Taking a hay crop removes up to two-thirds of the cover crop organic matter, but the soil still benefits from cover crop roots and stubble. The figure below illustrates that even with hay removal, cover cropping improves soil structure and biology over fallow.

Economics of hay

Finally, do some calculations on the economics. Many cover crops produce between 5-10 tonnes per hectare of dry matter. With the hay market currently ranging from \$250-\$650 per tonne ex farm, there are some short-term economic benefits. Check regional pricing (dairyaustralia.com.au/industry/farm-inputs-and-costs/hay-report) and if you are new to haymaking, then check out the *Tips for a Profitable Hay Season* booklet (feedcentral.com.au/tips-for-a-profitable-hay-season-19-20/).

Retaining 100 per cent of the cover crop pays back over a longer period of time in infiltration rates, increased soil water holding capacity, improved biological fertility, slow release of nutrients and reduced erosion.

But with prices and demand for hay so high, it is worth looking at the hay option.



Taking a hay crop removes up to two-thirds of the cover crop organic matter, but the soil still benefits from cover crop roots and stubble. Even with hay removal, improvements in soil structure can be seen under the cover crop compared to the fallow.

Find out more R&D

Please visit soilwealth.com.au or ahr.com.au, or contact Dr Kelvin Montagu on 0421 138 019 or at kelvin.montagu@gmail.com.

Information for this article was adapted from *Optimising cover crops for the Australian vegetable industry*, a strategic levy under the Hort Innovation Vegetable Fund.

This project is funded by Hort Innovation using the vegetable research and development levy and funds from the Australian Government

Project Number: VG16068

Crop cultivation system supporting vegetable growth

Over the past five years, a novel crop cultivation system has been trialled in rural Australia and the United States. This system features a supply tank and tubing that allows a crop to grow at the desired rate with increased nutrient and water absorption, while reducing the impact on soil and groundwater.

The world's population is growing rapidly. In June 2019, the United Nations released a report revealing that the world's population is expected to increase by 2 billion people in the next 30 years. It currently stands at 7.8 billion and is expected to reach 9.7 billion in 2050.

This poses the question: how can we continue to feed the world? With this rapid rise in population, it is essential for the agriculture industry to implement stable and sustainable food production practices. However, ensuring consistent food supply poses challenges: access to water for agricultural use and the need to reduce the excessive use of fertilisers and other crop protection products are two issues that are faced globally. Labour and production costs are also rising, opening up an opportunity for technology to help growers produce higher value crops at a lower cost.

Encouraging growth

To assist with growing premium quality produce on a larger scale, Mitsui Chemicals has developed iCAST® (Integrated Cultivation-Accelerating System), a simple system consisting of a supply tank and crop cultivation tubing (see Figure 1). This tubing contains the Integrated Cultivation-Accelerating Material, known as iCALM®.

This accelerating material can retain water or a nutrient solution from the supply tank for as long as crop growth

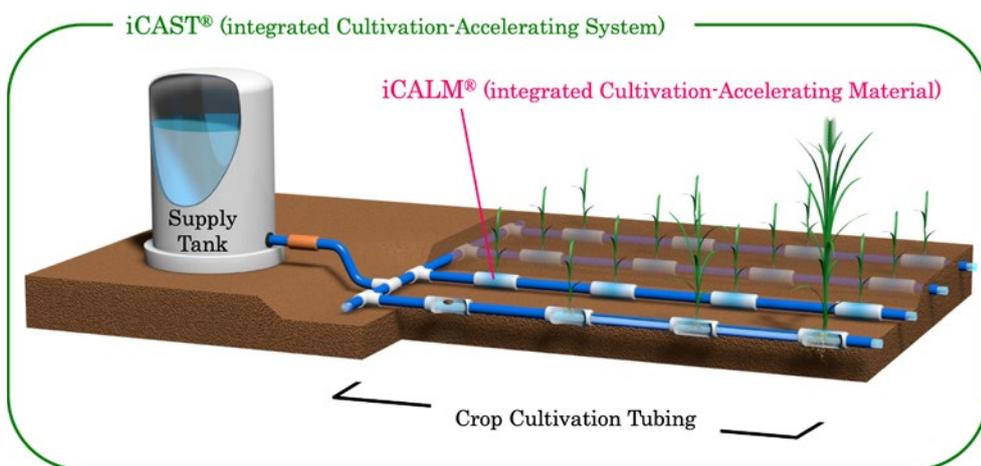


Figure 1: Conceptual drawing of iCAST.

is required. It also allows a plant to absorb more water for longer, and reduces the impact on soil and groundwater.

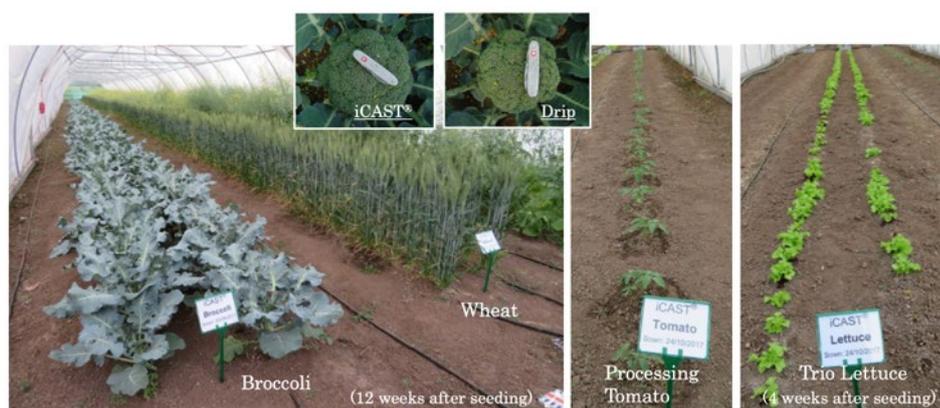
Due to its unique structure, the crop roots developed in and out of iCALM® can obtain the ingredients essential for crop growth as required, such as water, nutrients and oxygen.

Over the past five years, Mitsui Chemicals has conducted the field trials of iCAST® with rural development partners in Australia and the United States. Figure 2 outlines the recent results obtained from trials in Victoria involving broccoli, processing tomato and lettuce crops. Additionally, it has developed the machines required to install/uninstall crop cultivation tubing in the field.

Looking ahead

According to Mitsui Chemicals, this type of crop cultivation system can allow vegetable growers to harvest higher-value crops with lower production costs.

It can also help growers contribute to sustainable growing practices, save water and minimise the use of fertilisers, chemicals and energy on-farm contributing to the reduction of labour costs; and ultimately bridging the gap between population growth and stable food supply.



	Broccoli		Processing Tomato		Trio Lettuce
	Head Weight (g/plant)	Visual Quality (See below)	Lycopene (mg/100g)	Sweetness (Brix, %)	Vitamin C (mg/100g)
iCAST®	307.6	4.1	35.0	7.1	4.7
Drip Irrigation	304.1	2.5	20.0	5.3	3.0
Advantage		Big Difference	x 1.8	x 1.8 (+ 1.3)	x 1.6

[Visual Quality Rating] 1: Very Poor, 3: Fair but Saleable, 5: Very Good
 [Water Consumption] 50 to 60% of that by drip irrigation

Figure 2: Field trial data in Victoria, Australia.

Find out more

Please contact Mitsui Chemicals New Agribusiness Development Leader Hirozumi Matsuno at hirozumi.matsuno@mitsuicheicals.com or visit jp.mitsuicheicals.com/en.

Minor use permits

Permit Number	Crop	Pesticide Group	Active	Pest/Plant disease/ Target weed	Date Issued	Expiry Date	Permit Holder	States
PER81867	Fruiting vegetables – cucurbits, fruiting vegetables – other than cucurbits (excluding mushrooms and corn), head lettuce, legume vegetables, root and tuber vegetables, stalk and stem vegetables	N/A (Insect growth regulator)	Cyromazine	Leafminer (<i>Liriomyza sativa</i>)	02-Dec-19	31-Dec-22	Hort Innovation	Qld only
PER88179	Sweet corn	Miticide	Propargite	Two-spotted mite	04-Dec-19	31-Dec-22	Hort Innovation	All states*
PER14858	Parsnip	Herbicide	Pendimethalin	Broadleaf and grass weeds	16-Jan-09	31-Mar-25	Hort Innovation	ACT, NSW, Qld, SA, Tas and WA only
PER10938 Version 4	Snow peas and sugar snap peas	Insecticide	Imidacloprid	Greenhouse whitefly and green peach aphids	01-Jul-15	31-Jan-25	Hort Innovation	All states except VIC

Please note:

*The use of registered 300 g/kg propargite products in Victoria do not require this permit, as their Control-of-Use legislation means a permit is not required to legalise this off-label use in that state.

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.



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Commodity Profile: **Radish**

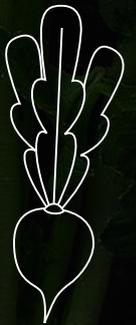
8.7%

of Australian households purchased radish over the past 40 weeks. There is an opportunity to introduce this crisp and attractive vegetable into more households and make use of the range of varieties, colours and tastes that are available; however, more recipe and trial ideas are needed to increase sales.

Source: Harvest to Home

According to Veggycation®, bacterial black spot is a problem in some production locations and will develop in postharvest storage at warmer than optimum temperatures. Refrigeration is the primary control but washing roots in chlorinated water is reported to significantly control this disease.

A Harvest to Home case study reported that more than eight-in-ten (81%) households who purchase radish say they use it as a salad ingredient. Given that 83 per cent of Australian households purchase fresh salad, a sizeable opportunity exists for radish to be included in more of the salads we eat. If radish increased the percentage of buying households by just two per cent, it would equate to an incremental \$1.03 million in category sales which equates to 40 per cent of current radish sales.



0°C

is the optimum storage for radish according to Veggycation®. Rapid cooling is essential to achieve the full storage potential of both bunched and topped roots. Radish is suitable for icing to maintain temperature and contribute moisture for retaining a crisp texture.

Project Harvest Wave 39 revealed spontaneous awareness of radish varieties remains low, with approximately two thirds of consumers unable to recall a type. Consumers are generally prompted by colour for radish varieties.

Harvest to Home states that similar to vegetables such as eggplant and leafy Asian greens, radish is also more popular in ethnic households. Growers could take advantage of the growing ethnic population and consider planting more daikon or radish varieties suitable for cooking.



Radishes originally grew in Asia and the eastern Mediterranean. They eventually appeared about 4,000 years ago in Egypt (where they were used to make radish-seed oil) and in Greece. The English took longer to develop a taste for radishes, which became popular in the early 16th century.

Source: The Better Health Channel



The new Aqua-Traxx FlowControl is the latest advancement in precision drip irrigation providing high-level of uniformity, efficiency and yield.



A new irrigation solution available to Australian veg growers

Vegetable growers are always investigating innovative methods to boost their inputs, save valuable time and reduce on-farm costs. An Australian-made drip tape has been released onto the market that is aiming to help growers with the uniformity of their flow rate and improve overall irrigation efficiency.

Taking control of an irrigation system's flow rate can prove to be an expensive and effort-consuming exercise for vegetable growers.

However, there is a new product available on the Australian market that is set to alleviate this problem. Trusted to bring growers the best in drip tape solutions, Toro® is proud to announce its newest product, Aqua-Traxx® FlowControl™ Drip Tape.

Designed to give growers the best of both worlds, with optimal features of a pressure-compensating tape and non-pressure compensating tape, FlowControl offers more uniform irrigation for any terrain and the flexibility to control the overall system flow rate.

For years, growers have dealt with irrigation technology that is unable to consistently water uneven, sloped and hilly terrain – trying to achieve a healthy crop at low and high elevations can prove challenging. With this new technology, growers can move away from poor performance irrigation systems, get the best from their yield, and start to meet market demands.

Key features

While standard drip tapes offer growers the ability to apply water and fertiliser efficiently, uniformity is sacrificed over longer runs and uneven ground. But with this tape's unmatched durability, clog resistance and precision placement

of valuable water and fertiliser, longer runs are now made easier with better uniformity in steeply sloping fields resulting in higher quality yields for growers.

Before, growers who wanted consistency and quality over their challenging terrain had to resort to expensive heavy wall pressure-compensating drip lines with closer emitter spacing. Compared to thick wall pressure compensating drip lines, Aqua-Traxx FlowControl, with its wide range of available wall thicknesses, provides cost effective solutions for those farming on challenging terrains.

"Maximising crop yield and quality has a lot to do with irrigation application uniformity. Using Aqua-Traxx FlowControl gives the grower a valuable tool to help improve this," Toro Australia's Product Marketing Manager Pam Marasigan said.

The tape is available in a wide range of wall thicknesses and offers one price point for any emitter spacing between 15 and 60 centimetres – providing growers with their desirable wetting pattern.

Toro Aqua-Traxx FlowControl Premium Drip Tape is primed to help growers take control of their irrigation. It provides a new level of uniformity and efficiency for any grower's farm and offer complete control of the flow, no matter the terrain.

Find out more

Please visit toro.com.au.

Hort Innovation vegetable fund investments (levy projects)

Project code	Delivery partner	Project title	Project lead contact details	Project description
AH13027	AKC Consulting	Plant protection: Regulatory support and co-ordination	Kevin Bodnaruk at AKC: kevinakc@bigpond.net.au	Due to the complexity of domestic and international pesticide regulation, it's important that Australian horticultural industries are kept aware of any developments in regulatory oversight and provided with an opportunity to consider and develop responses to issues arising from actions proposed that impact on grower ability to access and use needed pesticides. This project has components related to plant protection product access (developing responses to chemical reviews, input into Strategic Agrichemical Review Processes etc), communication to industry and more. One of its outputs includes twice-yearly Ag Chemical Updates circulated to industry and available on the Hort Innovation website.
AH13033	AgriFutures Australia (formerly RIRDC)	Investing in youth successful scholarship applicant	Debbie van der Rijt: debbie.vanderrijt@agrifutures.com.au, 02 6923 6917	The AgriFutures Horizon Scholarship is an initiative supporting students enrolled in full-time study at an Australian university, providing a bursary of \$5000 per year for the first two years of their degree; professional development workshops; annual industry work placements aligned with the scholar's areas of interest and their sponsor's industry; and opportunities to network and gain knowledge at a range of industry events.
VG15077	Australian Bureau of Agricultural and Resource Economics and Sciences	Financial performance of Australian vegetable farms 2016-2017 to 2018-2019	Johanna ten Have: johanna.tenhave@agriculture.gov.au, 0477 369 025	This investment is responsible for producing annual economic surveys of the vegetable industry, collecting comprehensive production and financial performance data, production intentions and issues of particular interest to industry stakeholders.
VG16019	Freshcare	Removing barriers of food safety certification for vegetable exporters though GLOBAL G.A.P. co-certification	Fiona Grime: fiona@freshcare.com.au, 02 8039 9999	This investment has been supporting the benchmarking of the Freshcare Food Safety and Quality Standard (FSQ4) against the internationally recognised GlobalG.A.P. standard. Successful completion of this benchmarking, and recognition of the Freshcare Standard by GlobalG.A.P., will help streamline compliance processes for Australian growers accessing export markets.
VG16060	AUSVEG	Vegetable agrichemical pest management needs and priorities	Patrick Arratia: patrick.arratia@ausveg.com.au, 03 9882 0277	This project aims to prioritise agrichemical efforts. With close consultation with growers, it is tasked with identifying pest priorities for vegetable commodities. These outcomes will aid in updating industry Strategic Agrichemical Review Processes (SARPs), inform industry direction at the annual AgChem Collaborative Forum, and lead the progression of minor use permits and chemical registrations.
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
MT17017	Nielsen	Vegetable cluster consumer insights program	Chanel Day: chanel.day@nielsen.com, 02 8873 7669	'Harvest to Home' brings growers insights into household shopping behaviour and attitudes for 28 commodities across the vegetable, onion and sweetpotato industries. Launched in December 2017, the online platform (harvesttohome.net.au) allows growers to quickly identify how well commodities are selling in each state, how often consumers are buying, how much they are spending on each occasion, triggers & barriers to consumption and more.

Project code	Delivery partner	Project title	Project lead contact details	Project description
FF18003	University of Western Sydney, with Primary Industries and Regions South Australia (PIRSA)	SITplus: Port Augusta Qfly SIT factory	Please visit hortfrontiers.com.au/fruit-fly-fund .	This investment is continuing support for the pilot operation of the facility, allowing delivery of sterile flies to an associated pilot release project. It is also delivering further research to optimise the SIT approach and improve the production of healthy and high-performing sterile fruit flies.
MT18017	Produce Marketing Australia (PMA)	Taste Australia retail program	Please visit hortfrontiers.com.au/asian-market-funds .	This multi-industry investment is targeting key international retailers with training and educational resources about selecting, storing, handling and displaying Australian fresh produce in store, including apples and pears, avocados, citrus, table grape and vegetables.
VG15009	South Australian Research and Development Institute (SARDI)	Improved soil-borne disease diagnostic capacity	Mike Rettke: michael.rettke@sa.gov.au , 08 8303 9414, 0401 122 124	This project is using world-leading DNA testing technology to provide growers with a way to assess the risk of soilborne diseases caused by select pathogens prior to planting. This knowledge, when applied with sound disease and soil health management strategies, will contribute to a reduction in the losses from soilborne diseases. The project has close links with <i>A multi-faceted approach to soilborne disease management (VG15010)</i> .
PH16000	University of Western Sydney	Stingless bees as effective managed pollinators for Australian horticulture	James Cook: james.cook@uws.edu.au , 02 4570 1372	Part of the Hort Frontiers Pollination Fund, this project will develop the use of stingless bees as alternate managed pollinators for horticultural crops.
MT13059	South Australian Research and Development Institute (SARDI)	SITplus: Developing and optimising production of a male-only temperature-sensitive-lethal strain of Q-fly, <i>B. tryoni</i>	Peter Crisp: peter.crisp@sa.gov.au	Now part of the the Hort Frontiers Fruit Fly Fund, this project is developing a 'temperature-sensitive lethal, male-selecting' strain of Qfly. To put simply, the research will allow for male-only, sterile fruit flies to be bred in large numbers. The vegetable industry is one of several contributors to the investment.
VG16020	Hort Innovation	Vegetable industry minor use program	Jodie Pedrana: jodie.pedrana@horticulture.com.au	Through this project, levy funds and Australian Government contributions are used to submit renewals and application for new minor use permits for the vegetable industry, as required. These submissions are prepared and submitted to the Australian Pesticides and Veterinary Medicines Authority (APVMA).
VG15064	Applied Horticultural Research	Improved management of pumpkin brown etch	Dr Gordon Rogers: gordon@ahr.com.au , 0418 517 777	This project seeks to improve the management of brown etch, also known as 'rust mark', in pumpkin crops. The research is set to confirm the cause and environmental conditions conducive to brown etch; investigate varietal resistance/susceptibility in current commercial varieties; develop and evaluate suitable control measures; and extend management strategies to growers.
VG16005	UniQuest	ProbiSafe - development of biocontrol agents to inhibit pathogen growth	Mark Turner: m.turner2@uq.edu.au , 07 3365 7364	This project has a focus on keeping vegetables healthy and safe. It is developing, verifying and ultimately making available new biological control agents (new strains/blends of beneficial bacteria termed 'ProbiSafe') to inhibit the growth of harmful bacteria on vegetables. The result will be an additional level of safety in both fresh and processed produce.



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AUSVEG SA

AUSVEG SA held its 2019 Annual General Meeting at the South Australian Produce Markets on 15 November 2019, where board members Kingsley Songer and Renee Pye were renewed and confirmed as full Directors of the Association. AUSVEG SA congratulates Kingsley and Renee on their appointments, and thanks them for their service to our association.

At a board meeting following the AGM, longstanding Director Kingsley Songer was re-elected as Chair for the coming year and Renee Pye was elected Deputy Chair, with Graeme Pitchford electing to vacate this position. AUSVEG SA would like to thank Graeme for his service and input as Deputy Chair, noting he will continue his service as a Board Director.

In other industry news, a number of key growers on Kangaroo Island have faced considerable challenges and losses resulting from the recent bushfires. AUSVEG SA has been coordinating with other industry groups and government agencies in order to assist where possible and will continue to work with affected growers.

The broader industry in South Australia has faced its own challenges as a result of a harsh summer period. As we move into autumn, AUSVEG SA will deliver a number of key workshops and events for growers including a weed management workshop in early March and our annual dinner in May, as well as a number of other key programs throughout this period.

Calendar

27-30 April 2020
Northern Australia Food Futures Conference

Where: Darwin, Northern Territory

The Northern Australia Food Futures Conference is Australia's leading conference on agricultural development in the north.

The program features over 50 national and international speakers, workshops, farm visits and technical sessions on cotton, grains, horticulture, fodder, forestry and niche crops. Hosted by the NT Farmers, the Conference will have a strong focus on development and the environment, as well as discussions set to identify investment opportunities in agribusiness.

Further information: foodfuturesntfarmers.org.au

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

4-8 May 2020
East Gippsland Vegetable Innovation Days

Where: Lakes Entrance and Lindenow, Victoria

The East Gippsland Vegetable Innovation Days are back in 2020, incorporating the Tenth International Spinach Conference for the first time ever in the Southern Hemisphere. There's an action-packed agenda of activities including A Farm to Fork Grazing Event, vegetable operations tours, industry networking dinner and much more!

Further information: foodandfibregippsland.com.au

23-25 September 2019
Asia Fruit Logistica

Where: Lakes Entrance and Lindenow, Victoria

Asia Fruit Logistica is Asia's leading trade show for the international fresh fruit and vegetable business. Last year's event attracted more than 12,000 high-quality trade professionals from all over the world, who made the most of the opportunities to meet and do business with over 800 exhibitors from more than 40 different countries.

The Logistica is accompanied by Asiafruit Congress, which takes place the day before the trade show.

Further information: asiafruitlogistica.com



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Growcom

This year is shaping up to be incredibly important for the Queensland horticulture industry. At farm level, we continue to grapple with the impacts of a prolonged drought that has a couple of our major production regions in its grip.

While the impacts of drought on agriculture are generally well-understood in the community, we continue to highlight with governments at all levels the ways in which this drought is hurting horticulture, and the regional towns that depend on our industry.

We know the effects on farmers will flow on for years and through local towns. And with no significant relief in the form of rain on the horizon, we've requested the Queensland Government consider putting in place more forms of temporary support. In particular, relief from fixed costs that are unavoidable whether a crop is in the ground or any harvest is likely, including local government rates and water access charges.

The drought has also brought into sharper focus our need for greater water

security here in Queensland. The major growing regions of Bundaberg and the Granite Belt are in desperate need of a dam that's safe or under construction respectively. In both cases, we're asking the Queensland Government to move quickly to shore up these dam issues to ensure confidence is maintained within industry and local communities.

Our view is that securing the supply of water and food is among the top, if not the very first, responsibility that any government has to its people. Drought and water security issues then will definitely be front and centre of our policy platform leading into our next state election in October.

Growcom, and Queensland horticulture as a whole, is already planning on welcoming the rest of the industry back to Brisbane for Hort Connections in June. While the coffee is arguably better in Melbourne, the weather undoubtedly is not. So, under clear blue skies and through days warm enough to wear shorts, we'll be sharing with you all the good work being done up here.



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AUSVEG VIC

The AUSVEG VIC 2020 Awards for Excellence will be held on Friday 15 May at Cricket Victoria's headquarters, the Junction Oval in St Kilda.

The evening will celebrate the effort and achievements of Victorian growers and businesses throughout the past 12 months.

Ticket sales for the awards are now open. Please note that they will be limited, so be sure to secure yours early.

AUSVEG VIC is proud to be facilitating the new Schools on Farms pilot program, which was launched at Hort Connections 2019, in conjunction with Boomaroo Nurseries and the Stephanie Alexander Kitchen Garden Foundation.

The Schools on Farms program allows primary schools in Victoria to access Victorian vegetable farms to learn about vegetable production, where fresh produce is grown and to taste fresh vegetables fresh from the paddock.

In November and December 2019, the program hosted two primary schools on Victorian vegetable farms. St Macartan's Parish Primary Schools and Ripponlea Primary School visited two local vegetable farms and a local supermarket in Somerville.

The Schools on Farms Program is an industry-led initiative that is going to need more grower involvement. If you are interested in participating or would like to find out more, please contact State Manager Tom Cohen (further details can also be found on page 34 of this magazine).

In other news, AUSVEG VIC is creating a networking group along the Murray River in the Sunraysia region to build connections between northern Victorian growers. This networking group will also present the region's growers with opportunities to speak to their state representative body, and voice any political concerns or R&D that they would like to see adopted in the area.



VGA trading as AUSVEG VIC



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NSW Farmers Association

Since returning to the office this year, everyone at NSW Farmers has had bushfires front of mind. The fires have impacted a wide variety of agricultural enterprises in New South Wales, from oyster sheds on the south coast to apple orchards in Batlow and Bilpin, and honey producers.

Individuals and communities have been affected in a range of ways. Farmers have lost essential fodder that would have helped them feed remaining stock as the drought deepens; horticulturalists have lost productive fruit trees and greenhouses; grain growers have had paddocks scorched and all have lost essential operating infrastructure.

Around Batlow, critical on-farm water infrastructure needs to be replaced, and new flying fox netting has to go up quickly. The destruction of a service station meant that residents and growers were without fuel to help the immediate clean-up.

Our Horticulture Committee chair, Guy Gaeta, visited growers in Batlow at the end of January to see the impact of the fires first-hand. While many horticulturalists were affected, the greatest impacts were in the

apple industry, which lost around 30 per cent of trees in the region. Some trees will return to productivity, but many won't, and growers are left to deal with the bureaucracy of disaster grant applications.

Farmers and community members affected by fires have been selfless – volunteering to fight fires, helping out at evacuation centres, and supporting those who have lost homes and infrastructure.

Of course, we can't forget the ongoing impacts of drought. Despite some welcome rain, water availability is still top of mind for growers across the state, and some towns are facing no-water scenarios.

Stories of rural communities banding together to support each other through drought and fire have been inspiring, but like the drought recovery process, there will be challenges ahead and we need ongoing support from all levels of government. Growers also need a commitment from governments to deliver much-needed aid quickly and efficiently, so they can start to rebuild their homes and businesses.



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vegetablesWA

The devastating bushfires in the southern and eastern states have been dominating the media and our minds for some weeks now. While Western Australian growers did not face the catastrophic conditions of our interstate counterparts, the closure of Eyre Highway saw the movement of produce between east and west come to a halt and this presented a unique set of challenges. Some WA growers went to extraordinary lengths and airfreighted produce east to meet demand.

We haven't been completely immune to bushfire this summer, as growers in Woodridge came under threat in December. The scale of the threat wasn't as great as in the east, but understandably it was a stressful time for these growers.

News reports that the price of fresh produce as a consequence of the bushfires were unhelpful in Western Australia. The reports from Queensland were promoted on social media by Western Australian ABC news outlets, leading WA consumers to believe

that the price of fresh produce was likely to double. As speculation has died down and prices remain relatively stable, consumer confidence is returning.

In December, Manus and I attended an information session held by the Department of Agriculture in Perth on their proposed increases to the Export Certification Cost Recovery Charges. vegetablesWA is opposed to the increased costs as it will significantly impact the profitability of exporters and reduce Australia's international competitiveness. This is particularly true for high volume commodity crop exports, such as carrots, where there is little room for exporters to increase their prices as any increase in cost will reduce already tight profit margins. vegetablesWA, together with other industry associations, is calling on the Australian Government to support grower exporters and value their significant contribution to regional economies rather than increasing the burden on industry.



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Tasmanian Farmers and Graziers Association

As we begin the new year, Tasmanian vegetable and potato growers are busy growing and preparing for harvest. A major concern for growers is the continuing dry weather with a drier than average spring recorded. This continued into the summer along with most of country, with the driest December on record. Strong and gusty winds have also been of a concern for growers throughout the spring. With the continued low rainfall, growers are facing pressure of water usage with restrictions in place for irrigation in the south-east of the state. Bushfires are also a major concern with the ongoing dry weather with fires already impacting on the east coast and south of the state.

With the continuing dry weather, water demand and accessing managed water schemes has been an ongoing issue for growers. Due to the lack of rain, some growers have forgone crops with high water demands and the seasonal conditions have also led to a later than expected maturing of peas. Potato growers have experienced the driest planting period in memory, with planting unhindered, but as the dry weather persists the need for rain continues to be on the forefront of growers' minds.

With pressure on growers during this busy time, we encourage all growers to take care and look after themselves and each other. Stress and fatigue can lead to serious injuries and the TFGA wants to remind growers that services are available to help. Rural, Alive and Well (RAW) is a free service

for Tasmanian producers and offers mental health support for rural communities.

They are always available to have a chat and can be contacted by calling 1300 4357 6283. Rural Business Tasmania is also available to support Tasmanian businesses with information on financial counselling, business programs and the rural relief fund, and can be contacted on 1300 883 276. The TFGA is also always available to assist members with any issues.

At the end of 2019, the Tasmanian Institute of Agriculture (TIA) provided an update of horticultural research at its Open Day. A variety of speakers presented on a range of topics highlighting research, development and management practices being developed in potato and vegetable production. Professor Calum Wilson from TIA spoke about his work in powdery scab and research in further understanding the disease and management techniques. Following on from the presentations, TIA's Forthside Research Facility was toured with demonstrations on farm of ongoing research and management techniques. The importance of horticultural research was highlighted throughout the day, and the continuing innovations being achieved in vegetable production and management by research in Tasmania demonstrated.



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Lawrence Cowley
General Manager, Harvest Farms Tasmania



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