

# AUSTRALIAN GROWER

2024 SPRING

VEGETABLES / ONIONS / POTATOES



**Hort Connections  
2024 is a winner**

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Northern Territory  
Reverse Trade Mission  
strengthens export markets**

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Innovation**

National Vegetable Extension Network  
**VegNET**

**POTATOLINK**  
AUSTRALIAN POTATO INDUSTRY  
EXTENSION PROJECT



# TOP CHOICE

## THE START OF A SUCCESSFUL CROP

Kubota's RM3005V 3 Furrow Reversible plough is everything Adam Bremner was looking for. "In our operation, the reversible plough pays us back in time & efficiency. With the Auto-reset system it allows you to start at one end of the paddock and keep going to the end, you don't have to lift the plough out of the ground as you go along – which saves time and money," Mr Bremner said.

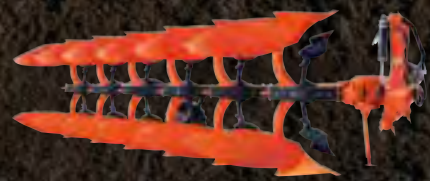
Adam Bremner **Wombat Forest Organics, VIC**



SCAN TO LEARN MORE



**RM2005 SERIES**  
3-5 Furrows



**RM3005V SERIES**  
3-6 Furrows



**RS7005V SERIES**  
6-8 Furrows

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**PREPARE FOR BROWN MARMORATED STINK BUG!**

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# Editorial Contacts

**Bill Bulmer**  
AUSVEG CHAIR

**Michael Coote**  
AUSVEG CEO

**Andrew MacDonald**  
NATIONAL COMMUNICATIONS  
MANAGER

**Deborah Hill**  
WRITER / EDITOR

## CONTRIBUTORS

Marije van Beek

Rosalie Daniel

Tom Bicknell

Andrea Lin

Kathleen Mullen

Zarmeen Hassan

Georgia Thomas

## EDITORIAL

AUSVEG  
Phone: 03 9882 0277  
communications@ausveg.com.au


**PRINT**  
Metro Print

**GRAPHIC DESIGN**  
Sam Behr


## ADVERTISING


Jack Boyle  
Event Sales & Partnership  
Executive  
Phone: 03 9882 0277  
jack.boyle@ausveg.com.au

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AUSVEG WOULD LIKE TO THANK  
ITS LEAD STRATEGIC PARTNER





**Cover.** Rocky Lamattina & Sons were the outstanding winners of the Syngenta Grower of the Year award at Hort Connections 2024. *Image courtesy of Andrew Beveridge. See Page 14.*

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## Message from the AUSVEG Chair

Australia's horticulture sector came together in June for another record-breaking Hort Connections, once again co-hosted by AUSVEG and the International Fresh Produce Association – Australia, New Zealand.

This year's event in Melbourne was special, not just because it attracted more than 4,200 delegates, including more than 1,200 growers.

The fact it was held at a time when us growers are facing some of the toughest operating and business conditions in recent memory made this biggest-yet Hort Connections even more notable.

The vegetable, potato and onion growers represented by AUSVEG, as well as growers across horticulture have been hit hard in recent years.

Regional and commodity issues might be slightly different, but a lot of the challenges we're experiencing are common to most of us – unmanageable costs of production, workforce issues, the burden of red and green tape, and challenges securing fair prices, to name a few.

If you want evidence, look at the submissions and information given by growers and their peak bodies to this year's inquiries into the supermarkets. Or look at the news, and the regular stories about tough times, surging costs, growers shutting up shop, and horticulture operations going up for sale.

Exactly what role the tough times played in drawing record numbers to Hort Connections is hard to say for sure. But when you look at the bigger picture, there is a lot that a united industry can achieve.

Hort Connections' growing appeal also wouldn't be possible without the support of partners. Commitment from across the sector is critical, and AUSVEG is grateful for the long term support of key partners, including the Department of Agriculture, Fisheries and Forestry, Syngenta, Muirs,

and Principal Convention Partner Hort Innovation – when you consider current industry challenges, innovation and productivity gains are vitally important.

Congratulations also to the winners of this year's Horticulture Awards for Excellence, announced at the Hort Connections Gala Dinner. Their stories show what businesses and individuals in our resilient sector are continuing to achieve, and serve as much needed inspiration.

The period around Hort Connections also saw focus in the media around fragmented industry representation and advocacy, not just in horticulture but across all of agriculture.

In our horticulture sector, where large numbers of peak bodies of different scale and influence operate, these aren't new discussions.

There does seem to be a disconnect though, when you consider that this issue came back into public focus at the same time as a Hort Connections that brought together over 20 of those peak bodies, growers from across the sector, as well as key industry, supply chain and Government stakeholders, including the Federal Minister for Agriculture.

Clearly our industry wants to come together, and with the urgent issues we are all facing as growers, that momentum should be built on.

When trying to influence Government policies, progress can be slow, and achieving even small wins takes resources and scale.

This was a key consideration in the merger of AUSVEG and Onions Australia, just over

12 months ago – two commodity groups joined together, resulting in a bigger grower base, and a stronger peak body.

Already there has been some progress, even if it might not always feel like it on the farm. Concerted industry advocacy has seen the Government shelve (at least temporarily) its proposed biosecurity tax on farmers, and hold off on more changes to the PALM scheme.

These concessions might fall short of addressing the many additional pressures we are all still facing, but if it wasn't for the advocacy carried out by groups like AUSVEG, the situation could be even worse.

While progress with advocacy can be slow, changes can also come quickly. This was evident in the recent Federal ministerial reshuffle, resulting in the appointment of Julie Collins MP as the new Minister for Agriculture, and Senator Anthony Chisholm as Assistant Minister for Agriculture - ahead of a Federal election due by next May.

In welcoming Minister Collins and Senator Chisholm, AUSVEG will continue to engage across the Government, to advocate for changes that make a genuine positive difference to growers' bottom lines.

In the lead-up to the Federal election, AUSVEG is committed to driving and achieving meaningful change for the growers it represents, as a key part of the wider horticulture sector.

**Bill Bulmer**  
AUSVEG CHAIR



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## The state of the sector with the AUSVEG CEO

Hostile economic conditions and the associated cost-of-living crisis have continued to loom large over 2024.

With this certain to remain the case up until at least the next Federal election, the pressures Australians are under due to persistent high inflation are firmly locked on the political and media radar.

Given the flow on effects of volatile domestic and international conditions on the wider Australian economy, we can also expect impacts to continue playing out in businesses across a range of different sectors. Our own vegetable industry is no exception, as we continue to confront a cost-of-production crisis.

### Pressure on business

In recent weeks, these wider economic pressures have been reflected in CreditorWatch statistics indicating business failures in the hospitality industry are expected to rise to more than nine percent over the next year, with one in 11 businesses in that sector set to fail.

This negative outlook was affirmed in new Australian Securities and Investments Commission (ASIC) figures revealing hospitality businesses failed at the fastest rate on record in the 2024 financial year.

That data showed accommodation and food services insolvency appointments rose faster than any other sector – up by 50 percent to a record 1,667 compared to its previous high of 1,114 in 2023.

The hospitality sector may be particularly vulnerable, given the higher costs of food, power and workers, coupled with customers having less money for discretionary spending due to higher mortgage repayments, rents, power bills and other essentials. But this is not an isolated phenomenon.

Retail trade insolvencies jumped by 42.2 percent to 768, while overall insolvencies were up 39.1 percent to 11,049 – another record.

For many vegetable growers, these statistics will ring alarm bells – not only because of the loss of hospitality businesses and their demand for vegetable produce – but also because many of the contributing factors and the current economic context will sound very familiar.

### Vegetable industry context

The Australian vegetable industry has been grappling with its own severe and worsening case of margin squeeze in recent years, as prices for just about every key input used in the production and supply of fresh produce to Australian and international markets have surged.

From fertiliser, fuel, power, transport and machinery, to the relentlessly increasing cost of wages, to more and more resources and time required to address the burden of compliance with Government and third party schemes and regulations – costs and time demands have grown exponentially.

Take transport as one example. Domestically, growers of all sizes continue to report steady increases in freight charges to bring their produce to customers and market. As has also been widely publicised, international ocean freight rates have jumped by as much as 300 percent due to global conflicts and ongoing disruptions to international shipping routes.

These are yet more expenses for individual vegetable growers to absorb, and for a vegetable industry heavily reliant on the transport supply chain and imported inputs, they are worrying indicators. This is not only because of what they might signal for future transport and imported input costs, but for the additional pressures they may bring across the economy – particularly for retailers, food service operations and food manufacturers, who are among the key customers of vegetable, potato and onion growers.

Considering many of these key customers are grappling with the same set of economic

pressures, it has become increasingly challenging for growers to secure fair and sustainable farm gate prices.

Add in the context of this year's many inquiries into grocery retailer practices – and big supermarkets remaining under immense pressure to keep prices lower for consumers – those challenges could become harder still – particularly if the prices of imported food and other goods sold in the same shops are driven up.

While it has been welcome to see several measures proposed by AUSVEG to retailer inquiries adopted for implementation by the Government, that implementation must be effective and is needed now.

It is worrying but not surprising that our own Industry Sentiment surveys have continued to show that more than one third of growers are considering walking away from the sector in the next 12 months – an even bigger forecast attrition rate than the CreditorWatch estimate for the hospitality sector.

Cost of production, compliance burden, workforce shortages and challenges securing viable farmgate prices are regularly identified as among the top reasons growers are considering leaving the industry.

### Food industry challenges

While different industries are experiencing different versions of the issues, there are many common experiences.

A recent farmer/agribusiness outlook survey conducted by Roy Morgan reflected many of the key themes identified by our own sentiment surveys. Economic conditions including inflation and prices (57 percent), Government policy (23 percent), staffing issues (18 percent), weather and business viability (both 16 percent) were the top five challenges confronting surveyed farmers in the Roy Morgan poll.

CONTINUED ON PAGE 6 >

## The state of the sector with the **AUSVEG CEO**

### Similar issues are also playing out in the wider food industry.

This was clear at the recent Global Food Forum where heavy regulation, surging energy, wage and rent costs as well as tax burdens, were repeatedly identified as major barriers stifling innovation, profitability and productivity for food producers and manufacturers.

The forum also heard warnings from a supermarket executive that food inflation is still a major concern, and from the CEO of a major milk producer concerned that high costs meant Australia risked pricing itself out of food manufacturing.

This echoed comments earlier this year from the local head of Cadbury owner Mondelez, citing a 'cost-of-manufacturing crisis', that could see food manufacturers shut down and shift overseas.

This all looms ominously for a vegetable industry which is equally: a foundational block of the national food system; heavily reliant on supplying a range of retail, food service and manufacturing customers; and already grappling with major economic threats to the long-term viability of many vegetable growing businesses.

Whether the regular news stories about businesses in both our sector and the wider economy closing down, or horticulture business being placed on the market is a sign of more to come, remains to be seen.

**But based on all the indicators, ongoing international volatility and the issues being faced by businesses across the Australian economy, the hard times likely have some way yet to run.**

### Addressing the issues

Fundamentally, the further loss of vegetable growing and supply businesses risks driving food price inflation higher still, and ultimately threatens Australia's food security.

With the stakes so high, it is clear that Government must act urgently to alleviate the many burdens threatening businesses that grow and supply food for Australians.

Given the universal nature of some issues across the economy, as well as sector specific impacts, responses are needed at a range of levels.

The macro response must consider ways to reduce operating costs across the economy, including the price of key imported goods and materials, and soaring domestic wage, power and transport costs.

Crippling governance and compliance burden must also be addressed. From reducing the ever-growing complexity of the huge array of Government schemes and initiatives relied upon by industry, to simplification and adjustment of taxation arrangements, everything must be on the table to incentivise businesses – particularly those involved in growing and producing food – to not only survive, but to innovate, invest and thrive.

In the vegetable industry, specific measures are also needed. Notably, with widespread workforce shortages ongoing across the sector, AUSVEG continues to advocate for a fit-for-purpose suite of workforce solutions to ensure vegetable growing business can access the workers they need, when they are needed.

Given these ongoing workforce shortages, it is staggering that the Government is considering removing the 88-day regional work/specified industry requirement for Working Holiday Makers to receive visa extensions, as part of its Review of Regional Migration Settings.

At a time when more, not fewer, horticulture workforce solutions are needed, AUSVEG has strongly opposed this

proposal in its ongoing engagements with key Government decision makers.

Urgent attention and investment is also needed to boost waning vegetable consumption, particularly in light of new baseline analysis indicating that Australians are eating even less than the reported 2.4 serves per person per day. This new research, conducted by AUSVEG as part of a Hort Innovation vegetable levy-funded study, identifies that the already critically low figure is closer to 1.8 serves per Australian per day, when wastage is taken into account.

A concerted effort to boost vegetable consumption would not only provide a much-needed boost to our industry but significantly improve the health of Australians and reduce the cost burden of preventable disease on our under-pressure healthcare system.

On these and the range of issues outlined, AUSVEG will continue advocating to Government for changes that improve the sustainability and viability of Australian vegetable farming businesses.

In welcoming the recent appointment of Julie Collins MP and Senator Anthony Chisholm to the roles of Minister for Agriculture, Fisheries and Forestry and Assistant Minister for Agriculture Fisheries and Forestry, respectively, AUSVEG has emphasised it will continue pushing for solutions to the many challenges vegetable growers are facing.

With a Federal election due anytime from now until next May, the time is right for the Government to commit to measures that keep growers in business, that alleviate operating costs and pressures, and that prevent food inflation from climbing further still due to more growers leaving the sector.



**Michael Coote**  
CEO, AUSVEG

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# Horticulture Awards for Excellence recognise inspiring industry achievements



Leading lights of the Australian horticulture industry were recognised at the Horticulture Awards for Excellence 2024, presented in front of more than 1,500 delegates at the sold-out Hort Connections Gala Dinner in Melbourne on 5 June.

The annual Horticulture Awards for Excellence are awarded to leading growers and industry members for exceptional achievements and innovations across multiple categories, and are widely regarded as the industry’s most prestigious honours.

Ten horticulture industry leaders and pioneers were recognised in this year’s Horticulture Awards for Excellence, and the group included growers, researchers, technology providers, educators and more.

“Each of the winners of this year’s Horticulture Awards for Excellence have made major contributions to the Australian horticulture industry, and they provide clear examples of the innovation and dedication that drives this industry forward,” said AUSVEG CEO Michael Coote.

## Horticulture Awards for Excellence 2024 winners

**Syngenta Grower of the Year Award**  
Rocky Lamattina & Sons

**Corteva Agriscience Young Grower of the Year Award**  
Zeke Zalsman,  
Zaldeesh Farms

**Bayer Researcher of the Year Award**  
Doris Blaesing, RMCG

**Butler Market Gardens Environmental & Sustainability Award**  
End Food Waste, Australian Banana Growers Council and Melons Australia

**UPL Tech Innovation Award**  
RapidAIM

**Muir's Community Stewardship Award**  
VEG Education

**Hort Innovation Exporter of the Year Award**  
Nutrano Produce Group

**Boomaroo Nurseries Women in Horticulture Award**  
Bree Watson, Bundaberg Fruit & Vegetable Growers

**VISY Industry Impact Award**  
Ian Layden (Gatton Smart Farm Ag Tech Showcase), QDAF

**Seeka Marketer of the Year Award**  
Perfection Fresh

Images courtesy Andrew Beveridge.



“For the leadership and value they bring to the Australian horticulture industry, I thank and congratulate all of our winners, as well as the strong field of nominees in this year’s awards.”

## WINNER PROFILES



*Syngenta Grower of the Year Award*

### Rocky Lamattina & Sons / VIC

In 2024, Rocky Lamattina & Sons secured the Vegetable Farm of the Year award at the AUSVEG Vic Awards for Excellence. Across three generations, their involvement ensures a comprehensive understanding of the business.

The grower’s ongoing capital investment has driven efficiency in production, harvesting, and processing. Their blend of traditional expertise and modern innovation yields consistent, high-quality products while embracing sustainability. This dedication has earned the business industry recognition, solidifying their leadership in the horticultural sector.

L-R. David Van Ryswyk, Managing Director, Syngenta ANZ; Angelo Lamattina



*Corteva Agriscience Young Grower of the Year Award*

### Zeke Zalsman / Zaldeesh Farms, WA

Zeke is the first grower in the country to commercially and independently adopt heat pump technology for greenhouse heating, and has championed the first ever successfully-funded Hort Innovation VegNET Innovation Fund project.

He took on great risk to his business to the benefit of industry, with the goal of attracting national attention to heat pump technology with the aim of increasing the accessibility of a technology capable of future-proofing protected cropping businesses against rising costs, carbon footprint and threats to social licence.

L-R. Nick Koch, Agriscience Marketing Manager, Corteva; Zeke Zalsman



*Bayer Researcher of the Year Award*

### Doris Blaesing / RMCG, VIC

Doris works for national agricultural and environmental consultancy RMCG and has been a longstanding contributor and supporter of the SA horticultural industry. She is a strong ongoing resource for industry leaders and agronomists in the field of soil management, biosecurity and certification, and contributes regularly to industry programs in South Australia.

Doris was instrumental in supporting industry to receive recent funding for a new FertSmart project which will work with industry to trial new fertiliser and organic amendments in industry and quantify their benefit. Doris is heavily relied on by industry to manage issues around certification, and is known for her willingness to give her time for free to assist with industry issues. This award recognises her commitment to industry over the years, as well as recent work around potato certification, fertiliser efficiency and commitment to assisting the sector grow the research programs available to support industry.

L-R. Senator Murray Watt, the-then Minister for Agriculture; Dr Doris Blaesing; Warren Inwood, Managing Director for Crop Science, Bayer



*Butler Market Gardens Environmental & Sustainability Award*

### End Food Waste Australia, Australian Banana Growers’ Council and Melons Australia

The Banana and Melon Food Waste Action Plans produced by End Food Waste Australia in collaboration with the Australian Banana Growers’ Council and Melons Australia are dedicated to sustainable practices that actively help Australia reduce the three million tonnes of fruit and vegetables wasted annually. This benefits people, the planet and industry profitability.

These plans outline priority actions to prevent food waste occurring initially, repurpose waste to new resources, increase food donation and enable policy and other initiatives to streamline reduction activities. The award is a recognition of the winners’ true sustainability leadership via collaboration.

L-R. Minister Murray Watt; Rick Butler, Butler Market Gardens CEO; Melissa Smith, End Food Waste Australia; Jonathan Davey, Melons Australia; Doriana Mangli and Tayla Mackay, Australian Banana Growers’ Council

## WINNER PROFILES



*VISY Industry Impact Award*

### Ian Layden / The Gatton Smart Farm AgTech Showcase, QLD

In 2023, Ian led the Gatton Smart Farm in the delivery of a groundbreaking showcase of ag technology with a program of live field AgTech demonstrations on a scale unseen before in Australia.

The Gatton AgTech Showcase attracted 700 visitors, including 220 growers, to see advanced field tech like FarmDroid's autonomous seeder and weeder and Stout's Smart Cultivator. It was the first event in Australia to bring domestic and international ag tech companies together for the horticulture sector. The Showcase has set a new standard for ag tech field days in this country.

L-R. Minister Murray Watt; Ian Layden, Director Vegetables, Systems and Supply Chains - Dept Agriculture and Fisheries (QLD)



*Muir's Community Stewardship Award*

### VEG Education / VIC

VEG Education pioneers innovation in horticulture education and community engagement. Their Fresh Safe Program sets new safety standards, while initiatives like Farm Gate and Veg Influencer promote agricultural awareness and healthier communities. Through strategic partnerships and innovative platforms, VEG Education exemplifies excellence in industry impact and community stewardship, shaping a sustainable future for the horticulture sector.

L-R. Minister Murray Watt; Catherine Velisha, VEG Education; Ian Muir, Chairman Muirs



*Seeka Marketer of the Year Award*

### Perfection Fresh / NSW

The Quke O'Clock campaign by Perfection Fresh Australia aimed to increase awareness and sales of Qukes® baby cucumbers by promoting them to drive incremental snacking consumption, stealing share from more processed alternatives.

The campaign utilised a 360-degree marketing approach, spreading cohesive messaging across multiple customer touchpoints. Unique elements of the campaign included a licensing partnership with Sesame Street to appeal to both children and adults, which drove sales and captured attention.

The campaign employed various marketing tools such as television advertising, programmatic out-of-home advertising, content marketing, radio advertising, and search advertising. Overall, the campaign demonstrated innovation, strategic planning, and effective execution.

L-R. Michael Franks, Seeka CEO; Kristie Emerson, Perfection Fresh



*Hort Innovation Exporter of the Year Award*

### Nutrano Produce Group / NSW

Established in 2016, Nutrano is one of Australia's leading produce companies, founded on a deep respect for their people, growers and the communities in which they operate in. The Nutrano farming footprint spans over 2,000ha of farms and facilities in Queensland, Victoria, New South Wales and the Northern Territory, with more than 300 dedicated employees – increasing to 600 during peak season.

The vertically integrated grower's core categories are citrus, tropical fruits and blueberries. Nutrano supplies both the domestic and international markets, providing premium fresh produce with export certification to key international markets including Asia, the Middle East, Europe, New Zealand, USA, and Canada.

L-R. Mathew Roberts, Nutrano Produce Group; Julie Bird, Chair Hort Innovation

## WINNER PROFILES



UPL Tech Innovation Award

### RapidAIM / QLD

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L-R. Minister Murray Watt; Ian Cass, Marketing & Business Development Manager, UPL; Dr Nancy Schellhorn and Nathaniel Clark, RapidAIM



Boomaroo Nurseries Women in Horticulture Award

### Bree Watson / Bundaberg Fruit & Vegetable Growers, QLD

Bree has been a local leader and mentor for over 14 years, and was appointed the first female Chair of the Queensland Horticulture Council. She is sought out to speak at motivational events, was declared Bundaberg's most influential person in 2023, has co-authored academic papers and featured in many national publications.

She was instrumental in advocating for the reinstatement of Paradise Dam, and through several appearances on Sky News and other media worked tirelessly so Australians knew the value of water security for the farming sector.

L-R. Jo van Niekerk, Head of Sales & Industry Engagement, Boomaroo Nurseries; Bree Watson, CEO Bundaberg Fruit and Vegetable Growers



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## Orange turns to gold for Rocky Lamattina & Sons



**Victorian carrot grower Rocky Lamattina & Sons' focus on sustainable, efficient farming has been recognised with the Syngenta Grower of the Year Award.**

The trio of brothers behind Victorian grower Rocky Lamattina & Sons focus most of their attention on the colour orange, but in June they got a taste of gold when they were presented with the Syngenta Grower of the Year Award at the Hort Connections 2024 Gala Dinner.

One of the largest carrot growers in Australia, Rocky Lamattina & Sons has expanded to a 5,000ha business through an approach the Lamattina family calls 'growing low risk'.

Since its establishment in the early 1990s, the grower has tried its hand at a number of complementary businesses beyond the farmgate. In recent years, however, Rocky Lamattina & Sons has recentred itself on what it sees as its core competency – efficient farming that's sustainable both ecologically and economically.

"The thing we really look at is being consistent, and to have a process in place that our children and their children can continue utilising," says company director Angelo Lamattina.

### A carrot focus

Angelo runs the business alongside his brothers Phillip and John, as well as a team of more than 100 staff, after taking over day to day operations from their father, company founder Rocky Lamattina.

The Lamattinas migrated from Italy in the early 1950s when Rocky was five years old, and the family bought a four acre property in Clayton where they set up a market garden, then on the outskirts of Melbourne and a major hub for market gardens and fruit orchards. Rocky worked on the farm with his father and two brothers.

The family farm relocated to Cranbourne in the early 1970s, then to the Mornington Peninsula in the late 1980s, before Rocky and his brothers split the operation to go out on their own. One stayed in Cranbourne, one on the Mornington Peninsula, and Rocky settled on the northwest Victorian town of Wemen.

"He was probably ahead of his time when we talk about sustainability, but he was looking for somewhere where there was water availability and the land was economically priced," says Angelo.

Rocky's dream had originally been to grow carrots and potatoes, but he eventually realised that competition from washed potato growers in South Australia was too hot.

"The customer base was heading more towards a South Australian grown potato rather than a Victorian potato, so that's where we decided that we would concentrate on just growing carrots," Angelo explains.

In 1991, Rocky and his wife Kathy bought a 200ha property in Wemen. His sons Angelo and Phillip came on board straight away, and their brother John joined them a few years later after finishing school.

Close to the Murray River, Wemen offered the ability to grow carrots all year. Two years later, the Lamattinas bought another 200ha in Wemen, the first in a number of expansions to their Wemen operation.

"We felt that we could grow carrots in our Wemen home base year-round, but when we had the millennium drought come along, we changed our focus a bit," says Angelo.

The lack of water threatened the ability to grow carrots at Wemen during summer.

**"Around midway through the drought we needed to do something to survive, and we ended up purchasing land south of Wemen, originally in Naracoorte in South Australia before finding a more suitable property near Kaniva," says Angelo.**

*Above. Angelo Lamattina accepts the Syngenta Grower of the Year 2024 award for Rocky Lamattina & Sons at the Hort Connections 2024 Gala Dinner. Images courtesy Andrew Beveridge.*

The Kaniva farm is now the focus for summer production, while Wemen covers spring. In mid-winter, however, carrot growth on both properties was slower than the Lamattinas liked.

The last piece to the puzzle was a small property in St George in Queensland purchased in 2017, which fills that 10-week winter production window from September to November.

“Now here at Wemen we’ve got 2,200ha, and at Kaniva its about 2,400ha, and then up in St George it’s 320ha,” says Angelo. “We’re producing 55,000-60,000 tonnes of carrots a year.”

### Everything for the carrots

Everything about Rocky Lamattina & Sons’ farming operation revolves around maximising carrot quality and yield.

Their carrots are grown in a three or four year rotation, with each carrot crop being followed by a cereal break crop, a brassica biofumigant crop that’s chopped back into the ground, and then depending on timing an additional sorghum crop.

“We’re harvesting one of the fussiest root crops, carrots,” says Angelo. “If your soil isn’t healthy, the issues you can have can be a detriment to the business. You get cavity spots, other diseases, nematodes, stuff like that.”

The crop rotation, particularly the biofumigant crop, is a major part of Rocky Lamattina & Sons’ weed and pest management, and the additional organic matter in the soil reduces fertiliser requirements and increases water use efficiency.

### Refocusing on farming

In an effort to diversify, over the years Rocky Lamattina & Sons has been involved in a number of business ventures beyond carrot production.

Faced with unreliable plastic packaging supplies, in 2001 the grower set up the Adelaide-based Wing Flexible Packaging, which supplied them and other customers with produce and ice bags.

In 2014, the grower bought a carrot juicing plant near Mildura to turn second grade carrots into juice concentrate for export to Japan, where it was reconstituted and sold through vending machines.



“We don’t use any chemicals at all for nematode control because of the natural fumigation we get out of our cover crop,” explains Angelo.

But while both side businesses were going well, they were a step too far outside the core focus of Rocky Lamattina & Sons as a grower.

The juice business has since been sold, and the grower now instead sells second grade carrots to a number of other companies who produce juice for the domestic and international markets.

The packaging business has also been sold in order to refocus on the farming side of the business.

“We sold the packaging business last year, and the main reason we’ve done that is to stay in our expertise of farming,” explains Angelo.

“The plastic industry was fantastic while we were in it, but we found a very good company to purchase the business, and we still buy bags off them.”

### Expanding into a new crop

With the decision to focus the business on its core farming expertise, Angelo says the drive to diversify has led to the expansion into a crop other than carrots – the first in the business’s 33-year history.

Rocky Lamattina & Sons is in the process of establishing a pistachio farm, spurred on by rising demand for the nut from Australian consumers. The grower has planted around 240ha so far, with another 60ha going in this year. The eventual target is 450ha of pistachio orchards.

“That’ll give us something else to keep ourselves off the street for a little bit,” says Angelo. “They do take about 10 years to produce, so it’s a long-term project, but with the next generation coming along

and looking for something to do, we felt that it was a good idea.

“There wasn’t many people who felt pistachios were ticking the box for them because of the time it takes to get a return. That suited us because we’ve got our carrot income, and we felt the risk was lower of doing something that less people were doing.”

### Sustainable process for the next generation

Alongside the new pistachio operation, Angelo says every part of the business is driven by a desire to hand an efficient, sustainable business on to the next generation.

Two of Phil Lamattina’s sons are already in the business, and more of Phil, John and Angelo’s younger children seem likely to join in coming years.

“That’s what we’re doing it for,” he says. “My dad was working for his kids, and I work for my kids, and my kids will work for their kids.

“You’ve got to be confident that you can hand over the reins in a way that you know is going to work. It’s not like you just say, you know, we’ve done the best we could but it’s not really working, so here’s the reins and see what you can do. That’s not what we want.”

“We find that the way we operate, we know that our children and their children can continue doing what we’re doing, and it will continue working.”



## Stats

**4,200+** DELEGATES

**1,200+** GROWERS

**200+** EXHIBITORS

**75+** INDUSTRY SPEAKERS



MC Giaan Rooney. Inset. Minister Murray Watt. Images courtesy Andrew Beveridge.



# HORT CONNECTIONS

**WRAP UP**

## The biggest Hort Connections yet!

The largest ever Hort Connections wrapped up in Melbourne in June, with AUSVEG and the International Fresh Produce Association - Australia New Zealand joining forces to once again deliver a record-breaking event for Australian horticulture.

Across three action-packed days from 3-5 June at the Melbourne Convention and Exhibition Centre (MCEC), more than 4,200 delegates joined this centrepiece gathering of the Australasian horticulture industry to learn about the latest research, industry trends and product developments, while coming together to consider the big issues confronting the sector.

With a theme of 'Grow. Connect. Thrive', Hort Connections 2024 included a conference program packed with expert speakers, a record-breaking trade show, off-site farm and retail tours, the Horticulture Awards for Excellence, Gala Dinner, and a variety of networking events for growers and members of the horticulture supply chain.

Hort Connections 2024's success is the result of input from all the event's partners, sponsors, exhibitors, speakers, and delegates, said AUSVEG CEO Michael Coote.

"The fact so many delegates – and particularly growers – have been drawn to Hort Connections highlights how important events like this are, particularly in light of the challenging operating environment many in the industry are facing," he said.

"Hort Connections is not only an opportunity for growers to keep up with the latest

trends, innovations, and technology to enhance their business profitability, but also a chance to connect and network as an entire industry experiencing some tough times."

Across the trade show speakers and plenary sessions, Hort Connections hosted a stellar lineup of 75+ industry expert speakers, delving into topics such as grower-retailer relationships, scaling sustainability, rethinking labelling, enhancing farming profitability, onion production, and strategising for export development.

With high-profile sessions hosted in the MCEC's world-class plenary amphitheatre, speaker sessions were also held in two dedicated rooms built on the trade show floor.

### Farm tours

The off-site bus tours gave growers and industry professionals the opportunity to tour a range of properties and facilities across Victoria.

There were three farm tours this year: the Bacchus Marsh and Werribee Farm Tour, the Yarra Valley Farm Tour, and the Mornington Peninsula Farm Tour.

Attendees were given the chance to see how some of the region's leading operations are innovating in the field, connect with other growers and producers, and enjoy some delicious lunches.



Above L-R. **Farm tours:** Melbourne Market - Epping, Tripod Farmers, Butler Market Gardens.



**AVIS**

From harnessing hyperlocal weather to unlock productivity, to learning the latest in bio-synthetic innovation, soil wealth, and the secret to building better businesses, the Annual Vegetable Industry Seminar (AVIS), funded by Hort Innovation, using the vegetable research and development levy and contributions from the Australian government, was an invaluable experience for growers and vegetable industry professionals.

**Perfection Fresh Breakfast**

The Perfection Fresh Breakfast was a proud showcase of the amazing produce from Perfection Fresh Australia. Attendees learnt all about doing business differently with keynote speaker Lucy Bloom and fuelled up on a delicious breakfast.

**Boomaroo Nurseries Diversity Equity and Inclusion / Women in Horticulture session**

The Women in Horticulture session, sponsored by Boomaroo Nurseries, has become an important fixture on the Hort Connections conference program. This year attendees heard inspiring presentations from Debbie Lee, National Women's and Action Plan Lead, Australian Football League, and Brooke Hanson OLY OAM, Chief Motivation Officer at Lane 6 Australia.

As one of Australia's most recognised Olympians, and now a motivational keynote speaker, Brooke shared how her keys to success – self-belief, accountability, and finding purpose through passion – can unlock the potential for women from all corners of the horticulture supply chain.

Brooke's resounding message to women in the industry was, "Show up, and when you show up, do your best. Give it 100 percent, be all in and be fully committed. It doesn't matter what you do – strive for excellence and success will definitely come your way."

**Plenary sessions sponsored by Hort Innovation**

The-then Agriculture Minister the Honourable Murray Watt addressed attendees at a Hort Connections plenary session, to talk support for the sector, investment in export market development, competition, and workforce challenges.

Dr Craig Emerson discussed his review of the Food and Grocery Code of Conduct, his recommendations, and what they mean for fresh produce suppliers.

**Trade Show inspires growers**

The Trade Show of Hort Connections featured more than 200 businesses and services for the horticulture industry across Australia and New Zealand.

Proudly sponsored by Australia's Fresh Produce Markets, delegates gained valuable information and inspiration from seed producers, agtech, packaging and processing and much more.

The Trade Show spanned the full three days of the event, providing a not-to-be-missed opportunity for businesses to showcase their cutting-edge products and solutions.

**Gala Dinner shines**

A highlight of the event, the Gala Dinner welcomed more than 1,500 guests as the culmination of the three days, and to bear witness to the winners of the Horticulture Awards of Excellence.

Sponsored by Fresh Select and Nutri V, guests were treated to a sumptuous dinner provided by the Melbourne Convention and Exhibition Centre, with Nutri V vegetable powders added to every dish – including dessert!



Above Inset L-R. Lucy Bloom provided colour and inspiration during the Perfection Fresh Breakfast. Brooke Hanson, OLY OAM spoke during Women in Hort. Dr Craig Emerson discussed his review of the Food and Grocery Code of Conduct. *Speaker images courtesy Andrew Beveridge.* Left. Mornington Farm Tour.

# Checking in on 2024's supermarket inquiries

AUSVEG PUBLIC AFFAIRS



Cost-of-living and retailer practices have remained a hot topic of public and political attention, and with Federal election speculation mounting, we can expect that to continue.

Flowing on from the raft of formal reviews and inquiries into the supermarkets from the end of last year and in early 2024, a number of significant developments have now been recorded.

These include the release of the Senate Select Committee Inquiry into Supermarket Prices final report in May, the June release of Dr Craig Emerson's review of the Australian Food and Grocery Code, and a subsequent Government commitment to adopt its recommendations.

This was shortly followed by the announcement of the Coalition's policy on supermarkets.

All of this is before the Australian Competition and Consumer Commission (ACCC) has released the interim report of its inquiry into supermarkets (due by late August), preceding a final report by next February.

Amid the political jostling and lengthy review process, many vegetable growers are understandably sceptical about what if any material improvements will ultimately flow through to their businesses.

However, with the big grocery retailers remaining under pressure to provide consumers with relief at the checkout until at least the election, commitments

to adopt a range of measures proposed by AUSVEG during the various inquiries have potential to restore at least some balance to the grower-retailer dynamic.

Here we look at some key developments to date and consider what may be to come.

## Senate Select Committee Report

With the Senate Select Committee Inquiry into Supermarket Pricing having concluded in May, its lasting legacy remains to be seen.

Given the scope of the inquiry, and the breadth and volume of submissions to it, its recommendations covered a lot of ground – from consumer, competition and merger issues to the treatment of supermarket suppliers and employees.

Consensus on some issues was not reached by the Select Committee, with support for some of the final report's recommendations diverging along party political lines. Nevertheless, a number of measures proposed by AUSVEG were embraced. These include making the Australian Food and Grocery Code mandatory, introducing meaningful penalties for code breaches, and establishing a genuinely independent and confidential complaints and arbitration system.

That the Government has either dismissed outright some of the final report's recommendations (divestiture) or covered these in its responses to other reviews

(a mandatory Food and Grocery Code) suggest this particular inquiry may have run its course for now.

However, regardless, of the lasting regulatory and legislative impact of the Senate Select Committee final report – there is little question that the inquiry process played a key role in drawing significant public and political attention to the challenges confronting grower suppliers to retailers. These were laid bare in stark detail, not only by AUSVEG, but a range of horticultural peak bodies and individual farmers in submissions and appearances before the inquiry.

## The Emerson Review of the Food and Grocery Code

The Final Report of the Emerson Review of the Australian Food and Grocery Code – governing grocery retailers' dealings with their suppliers – will likely have greater implications for growers, particularly given the Government's commitment to implement all of its recommendations.

While there has been some discussion within industry about the significance and usefulness of the review, given the Code already covers many of the key issues for suppliers to the big supermarkets, a prevailing view from the vegetable, potato and onion industry is that the Code's major flaw is the way it has operated to date.

That is, while the intent of the existing Code is sound, a lack of safe mechanisms

Above. Dr Craig Emerson presented on his review at Hort Connections 2024. Image courtesy Andrew Beveridge.

to report bad behaviour by retailers and resolve disputes, as well as ineffective penalties to deter bad behaviour, have limited its effectiveness as a recourse mechanism for supermarket suppliers.

Dr Emerson’s review has recommended timely and robust mechanisms to address such issues, and this is one reason it has been welcomed by AUSVEG. Additional recommendations in the Emerson review could also assist in making the Code a more effective tool to protect suppliers and provide more balance to the retailer/supplier relationship.

In its submissions, AUSVEG advocated for the Code to be made mandatory, the introduction of significant penalties for breaches, more independent and confidential complaint, dispute and arbitration mechanisms and an emphasis on addressing fear of commercial retribution. All of these major requests are the subject of recommendations in Dr Emerson’s review.

Although the review did embrace many AUSVEG recommendations, there are some omissions. These include our recommendations to restrict the use of rebates by retailers, establish a fresh produce consultative committee, provide more accessible retail data, and implement a Code of Behaviour for the fresh produce sector.

### A voluntary or mandatory Code

Whether shifting the Code from voluntary to mandatory will make much material difference to suppliers has also been the subject of discussion in the industry, given the four biggest supermarkets are all already voluntary signatories.

In supporting a mandatory Code, AUSVEG considered several benefits including that such a move may act as an insurance policy against retailers seeking to opt out in future, particularly in the face of the heavy penalties for breaches recommended by the Emerson review.

**Importantly, should other retailers become eligible under the parameters of the new Code (which is potentially likely), they will automatically be bound by it.**

### Industry-specific recommendations

The Emerson review also addressed several industry-specific issues.

AUSVEG, in particular, sought a tiered system for complaint and dispute resolution which included an ACCC portal for growers to anonymously report Code breaches that would not necessarily justify legal action, but which take the form of questionable behaviour. That questionable behaviour, which is often dismissed as a ‘cost of doing business’, could include late cancellation of orders or forced unscheduled promotions and the like.

The intent of such a system is that if a number of similar complaints are logged through the portal, the ACCC could potentially launch an investigation into a particular Distribution Centre, buyer/category manager, or a broader pattern of retailer behaviour.

**AUSVEG has also welcomed the focus on the practices of, and incentives for, buyers and category managers, and the onus of responsibility on senior managers to ensure that employee behaviour towards suppliers aligns with the intent of the Code.**

Dr Emerson in his summary of the report highlighted that the fresh produce industry is especially vulnerable, owing to its perishability and that numerous stakeholders (including AUSVEG) raised concerns about pricing, forecasting and quality requirements. Dr Emerson has recommended that Code protections be strengthened to deal specifically with issues relating to fresh produce. This includes obligations on supermarkets for grocery supply agreements to specify the basis for determining prices, for supermarket volume forecasts to be conducted with due care, and for quality standards to be reasonable.

Further, supermarkets will be required to provide suppliers a simple guide to any exceptions that are included in any new supply agreement, with the onus on the supermarket to prove those exceptions are fair and reasonable. This should provide suppliers with greater clarity around what is permitted under the Code and what is an exception. As it is recognised that many

suppliers may not have a thorough understanding of the Code, this measure may help prevent suppliers agreeing to terms that are not reasonable.

Greater burden of proof on retailers around ‘good faith’ and ‘reasonableness’ could also open up more balanced discussions around supermarkets enforcing requirements without consultation or consideration of the impact on growers’ businesses. This could potentially relate to food safety requirements, sustainability requirements, workforce requirements, or changes to product packaging or specifications.

While the effectiveness of the Emerson review’s recommendations will ultimately be determined in their implementation, there is potential that new Code provisions could also provide a platform to question whether retail prices are reasonable, and by extension, a much-needed mechanism for growers to appeal prices below the cost of production.

### Implementation and flow on implications

While the broader intent and specific measures outlined in the Emerson review are welcome, their effectiveness in improving the situation for supermarket suppliers will depend on the effective development, implementation and enforcement of required regulatory and legislative changes.

Until these recommendations are operationalised, some questions will remain unanswered, such as whether a strengthened Code could also be a mechanism to argue for better competition for growers in relation to freight, or the supply of crates.

The overall success of the review will depend on how the report is translated into effective legislation and regulation.





### What is missing?

Although many of AUSVEG’s key asks have been addressed in the Emerson report, others have not. Below are some other key areas that would improve the supplier/supermarket relationship, and importantly improve the viability of grower businesses.

### Rebates

The purpose and intent of rebates is one of the most opaque areas in supplier/retailer relationships and the area that seems to raise grower ire the most. Feedback from the industry has been very clear – increase transparency by eliminating rebates, and offer a nett price and set trading terms.

### Compensation

AUSVEG also advocated that if a supermarket is found in contempt of the Code that not only should they incur fines/penalties, but the grower/supplier should be paid compensation. Whilst compensation may be an outcome of mediation or arbitration, it may not necessarily be the case for alternative dispute resolution processes.

### Fresh produce consultative committee

AUSVEG also advocated for the establishment of a consultative committee or reference group to provide feedback and guidance to the Code Supervisor.

### Technical Appeals

AUSVEG advocated for suppliers to have access to independent assessors when they feel that produce has been rejected through questionable interpretation of specifications.

### Accessible retail data

The asymmetrical data flow between suppliers and retailers has been to the detriment of suppliers and gives negotiating power to the retailers. Although suppliers can purchase some data it is expensive, especially to smaller suppliers. If there is to be a true partnership between suppliers and supermarkets, there should be provisions in the Code to force supermarkets to provide a level of data to suppliers.

Further, retailers should use data to responsibly price fresh produce, particularly around price elasticity.

### Code of Behaviour

As raised in our submissions, AUSVEG would like to see the introduction of a ‘code of behaviour’ to ensure that retailers act in the best interest of the fresh produce sector and the consumer through more prudent use of specials and marketing tactics.

[A full list of AUSVEG’s recommendations can be found in our original submission and submission to the interim report.](#)

### Coalition response

Shortly after the Government response to the Emerson review, the Federal Opposition announced an alternative policy response, which includes the introduction of tougher penalties for contraventions of the Code, as well the establishment of a Supermarket Commissioner to act as an impartial, confidential conduit for farmers and supplier complaints.

The policy announcement also included plans to introduce divestiture powers as a deterrent, and last resort measure to address identified severe abuses of market power by retailers.

AUSVEG acknowledges the threat of divestiture may play a role in deterring some more questionable retailer behaviour, and that the policy includes a range of checks, balances and thresholds that would have to be met prior to such action being taken. However, throughout its engagement with the various inquiries and reviews into retailer practices during 2024, AUSVEG has also emphasised the need to proceed cautiously and avoid interventions which may artificially distort

free market dynamics, and inadvertently further disadvantage vegetable growers and consumers.

[We welcome the invitation to engage with the Coalition on further developing their supermarket policy.](#)

### What’s next?

While the intent of the review to strengthen the Code and address the power imbalance that disadvantages suppliers of fresh produce to big retailers is to be applauded, we note there is some way to go before these recommendations are operational.

AUSVEG awaits further details on measures and timings. We also emphasise the importance of Government and regulators continuing to consult with industry, to ensure the changes result in material differences to the bottom lines of struggling vegetable farming businesses.

The ACCC inquiry into supermarkets is also continuing, which will hopefully address some of the outlying issues not contained in the Food and Grocery Code, such as improved collective bargaining arrangements, unfair trading practices, mergers and acquisitions.

Without that material improvement in the supplier/retailer relationship, we will see more and more growers go out of business, as evidenced already by the number of businesses in administration or for sale.

The industry must have in place workable measures that contribute to the long-term health of a vegetable sector that is key to the health of Australians, and Australia’s food security.

In the current heightened environment where retailers will remain under significant pressure to keep prices down, those measures are needed more than ever.



## Recommendations of the Emerson Review

### Recommendation 1

The Food and Grocery Code of Conduct should be made mandatory.

### Recommendation 2

All supermarkets, including online supermarkets, that meet an annual Australian revenue threshold of \$5 billion should be subject to the mandatory Code.

### Recommendation 3

The Code should place greater emphasis on addressing the fear of retribution by:

- Including protection against retribution in the purpose of the Code;
- Ensuring that retribution captured under the obligation to act in good faith includes action taken against suppliers for exercising their rights under the Code;
- Requiring that any incentive schemes and payments that apply to a supermarket's buying teams and category managers are consistent with the purpose of the Code; and
- Requiring supermarkets to have systems in place for their senior managers to monitor the commercial decisions made by their buying teams and category managers in respect of a supplier who has pursued a complaint through mediation or arbitration.

### Recommendation 4

An anonymous complaints mechanism should be established to enable suppliers and any other market participants to raise issues directly with the ACCC.

### Recommendation 5

The Code should provide parties with avenues for mediation and arbitration to resolve disputes.

- Supermarkets must appoint a suitably qualified Code Mediator who is engaged by supermarkets (replacing their Code Arbiters), and who would be available to

assist with resolving disputes, where requested by a supplier.

- Avenues for independent mediation and arbitration should also be available.
- Parties can agree on an independent mediator or arbitrator. A list of suitably qualified mediators and arbitrators should be compiled by the Treasury or the Australian Small Business and Family Enterprise Ombudsman (ASBFEO).

### Recommendation 6

A Code Supervisor should produce annual reports on disputes and on the results of the confidential supplier surveys, be able to identify systemic issues with the Code and be available to suppliers to provide information on options to resolve disputes and review the processes of Code Mediators.

### Recommendation 7

To ensure exceptions allowed for in grocery supply agreements are reasonable and transparent:

- All exceptions should be subject to a reasonableness requirement that considers the benefits, costs and risks to the supplier and the supermarket, and protects against exceptions that are not in a supplier's interest, with the supermarket bearing the onus of proof that any exception is reasonable; and
- For all new grocery supply agreements, supermarkets should be required to provide suppliers a simple guide to any exceptions that are included in the agreement.

### Recommendation 8

To address issues relating to fresh produce, the Code should require that:

- Grocery supply agreements must include the basis for determining prices;
- All forecasts of required volumes are conducted with due care; and
- Fresh produce standards and specifications must be reasonable.



### Recommendation 9

Maximum penalties for more harmful breaches of the Code should be the greatest of \$10 million, 3 times the benefit gained from the contravening conduct or, where the benefit cannot be determined, 10 percent of turnover in the preceding 12 months. Maximum penalties for other breaches should be 3,200 penalty units (currently \$1,001,600).

### Recommendation 10

The penalty amount for infringement notices for contraventions of the Code should be 600 penalty units (currently \$187,800), an increase from 50 penalty units (currently \$15,650) that otherwise applies for industry codes.

### Recommendation 11

The ACCC, Code Mediators and the Code Supervisor should engage in education and outreach activities to ensure that suppliers are empowered to take advantage of their rights under the Code.



SCAN TO VIEW FULL REPORT

**Food and Grocery  
Code of Conduct  
Review 2023–24**  
Final Report  
Treasury.gov.au

## End Food Waste recognised for actions to reduce food waste at the farm gate



The winner of the Butler Market Gardens Environmental & Sustainability award, at Hort Connections 2024, was awarded to End Food Waste Australia, the Australian Banana Growers' Council and Melons Australia. AUSVEG spoke to Melissa Smith of End Food Waste Australia about the goal to reduce food waste at the farmgate.



Food waste in Australia is defined as a product that is intended for but doesn't make it to human consumption. At the farm level, food waste is when a crop is mature and ready for harvest but for many reasons does not make it to the consumer.

Food waste and loss at the farm gate means for the grower, not getting a sale on vegetables while still incurring costly inputs such as fertilisers, water, energy and labour. No growers want their produce to go to waste; ways to minimise wasted produce has positives for growers, makes financial sense, and is good for the environment.

Above. Melissa Smith, Horticulture Lead and Technical Account Manager, End Food Waste Australia.

"A good example is a crop that gets ploughed in because of weather or price or other factors," says Melissa Smith, Horticulture Lead and Technical Account Manager, from End Food Waste Australia.

"If that crop was grown for human consumption and then it leaves the human food supply chain (including for pet food) – that is considered food waste under the federal definition.

**"Crops grown that were never intended for human consumption – like a cover crop – are not considered food waste."**

End Food Waste Australia was created to meet Australia's commitment to halving food waste by 2030. Federally funded, the organisation is leading collaborative food waste action through partnerships and programs such as the Australian Food Pact



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and Sector Action Plans and world-leading research and development through the End Food Waste Cooperative Research Centre.

“Food waste in Australia has a huge financial impact, costing us \$36.6 billion a year, while at the same time 1.3 million children live in severely food insecure households each year. It amounts to 7.6 million tonnes – enough to fill the MCG five times, it is a massive mismatch.

“Of that waste, more than 50 percent is from fruit and vegetables. The biggest point of waste is in the home at about 30 percent, the next point is primary production – the farm gate – at 22 percent.”

While a significant consequence is that the food does not reach the consumer, or generate income for the grower, it also generates methane emissions as it decomposes.

Added to that are the wasted inputs to grow food that never gets eaten. Globally, lost and wasted food accounts for about 10 percent of all greenhouse gas emissions, more than the global aviation industry, creating a huge carbon footprint.

Melissa said that diverting food from landfill is one of the first goals that comes to mind, but growing food to meet need and getting it to those who will consume it – including through alternative markets for second and third grade produce and food donation, will reduce other emission generation points, such as transport, refrigeration, energy and inputs such as fertiliser.

End Food Waste Australia has constructed a plan to reduce food waste from horticulture, called the Horticulture Sector Action Plan, with additional funding from Hort Innovation’s banana and melon levies. Initial research was funded by the Queensland Department of Environment, Science and Innovation and End Food Waste Australia CRC. Research was undertaken by CQ University to scope food waste across the whole of horticulture with deep dives into the melon and banana industries to determine sector hotspots, root causes and commonalities. Working with stakeholders including growers, industry organisations, wholesalers, retailers and advisory groups, a strategy has been developed to give horticulture guidance on points where food waste can be prevented or repurposed as well as enabling the system as a whole.

The Banana and Melon Food Waste Action Plans are dedicated to sustainable practices that actively help Australia reduce the fruit and vegetables wasted annually.

These plans outline priority actions to prevent food waste occurring initially, repurpose waste to new resources, increase food donation and enable policy and other initiatives to streamline reduction activities.

“Horticulture is such a diverse sector, with a range of production systems. What happens in a mango farm up north, will not be the same as broccoli production in Tasmania,” say Melissa Smith.

“The biggest challenge for growers across the country is environmental – the weather and pests and diseases, which will come as no surprise to any grower.

“We did find that commonalities existed across different production systems such as transport and cold chain.

“Over production is also a problem. When our amazing farmers get great weather, we get a lot of product. I’d love this to be seen as a plentiful bounty, not a headache.

“The question then is how we cope with that bounty so that it doesn’t go to waste. No grower wants to see that produce wasted. It would be far better if more people were able to experience this wonderful fresh produce, at a good price to give repeat buyers and a better return to growers – which results in less food waste.”

The aim of the strategy is to reduce food waste overall in a manner that works for everyone, not just at the farm gate, with the risk of pushing the problem further along the supply chain. Streamlining donations to food recovery charities, finding value-add options and growing to realistic contracts have all been highlighted as options.

Understanding the hotspots on farm will give growers a baseline of where and how food waste occurs.

“With that knowledge growers can determine the cost benefits of altering harvest techniques or doing a second pass. Perhaps better education for pickers and packers is needed. We know that as soon as growers begin to measure, food waste starts to reduce. Involving staff in the process means that there is more pride in what they are doing, and the business is more likely to retain staff.”





Social license can also be a positive for growers, and End Food Waste Australia is having discussions with FreshCare to devise a voluntary certification scheme to indicate that the grower is reducing food waste, may give opportunities in more markets.

“We know growers are very busy people, with a lot of demand on their time. This plan is to provide guidance on incorporating new ways of thinking into everyday business operations.

“I have never seen industry as interested as it is now on reducing farm waste. Initiatives like Nutri-V vegetable powders is a great example of repurposing what might have been food waste.

“The action plan includes taking those baseline measurements, exploring whole crop purchasing arrangements, reviewing product specifications, improving logistics to get fresh produce to food rescue charities, investing in and growing value - added opportunities, and Australia’s upcycled food markets such as freeze - dried fruits, vegetable powders and stockfeed.

“Reducing food waste is more than just reducing emissions – it’s about utilising the food we produce, but also about maximising how we use farming inputs to give a better outcome for growers.

“I think we all have a role to play in reducing food waste and it’s time to do it.”

**FIND OUT MORE**

Go to [endfoodwaste.com.au/horticulture](http://endfoodwaste.com.au/horticulture)

This project is partially funded by Hort Innovation using industry levies under the Banana Industry and Melon Industry Waste Management programs.

Project: BA22002, VM22002



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# Horticulture's consumer data revolution unveiled

In a hallmark move, Hort Innovation launched at Hort Connections 2024 the latest, most comprehensive Australian fruit, vegetable and nut consumer data available through a new platform - Hort IQ.

Through Hort IQ, growers will be able to gain a comprehensive understanding of market dynamics, purchasing trends, and consumer perceptions across fruits, vegetables, and nuts.

Hort Innovation chief executive officer Brett Fifield said the launch of Hort IQ heralds a new era for the horticulture industry, unlocking the next level of consumer understanding through access to data and insights.

"Understanding how consumers act, think and feel about horticultural produce is an essential step in accelerating local and global demand for Australian horticultural produce," Mr Fifield said.

"The launch of this easy-to-use, self-serve platform provides Australian growers with an unprecedented ability to observe consumer trends, equipping them with the insights needed to help grow their businesses."

Felecia White, Head of Consumer Insights and Capability at Hort Innovation gave delegates at Hort Connections 2024 deeper insight into what Hort IQ can provide including retail purchasing trends, consumer needs and shopping behaviour and international demand that is presented as a 'one stop shop'.

"Hort IQ is a culmination of research and data to give levy payers and members information on demand, which can be used to better understand your markets," said Ms White.

**"Members can access data via specific commodities to consumer trends, as well as research reports and webinars through a secure sign-in."**

Australian Macadamias marketing manager Jacqui Price said Hort IQ will give growers the consumer data and insights they need to help stay profitable.

"Access to in-depth insights on consumers helps growers to make smarter decisions. By understanding consumer preferences and buying trends, we can better meet their needs and deliver fresh, high-quality produce that resonates with what people are looking for at the grocery store." Ms Price said.

Underpinning the platform is a portfolio of data projects that track what Australians think, feel, and do in relation to fresh produce through research partnerships with Fiftyfive5 and Nielsen IQ.

Fiftyfive5 director Cori Hodge said the platform is rich with valuable and actionable insights for the sector.

**"Over 10,000 consumers have been surveyed since the start of our research, and the insights allow us to answer important questions for the horticulture sector," Mr Hodge said.**

"How does consumer behaviour change over time? How do these changing expectations inform future demand for horticulture produce? What perceptions of horticultural produce drive purchase behaviour? What are the barriers and opportunities for future growth?"

Felecia White presenting insights at Hort Connections 2024.



**MORE INFORMATION**

Access to Hort IQ is available to eligible people engaged in growing, marketing, selling and development of Australian horticulture. Check your eligibility by registering at [hortiq.com.au](http://hortiq.com.au)

This project is funded by Hort Innovation using multi-industry strategic levies and contributions from the Australian Government.



## Hort Innovation sets ambitious \$500 million goal for Frontiers R&D



The new *Frontiers* program will complement the existing levy-funded portfolio and will attract new investors and transformative innovation streams to Australian horticulture with the aim to seize the big opportunities and develop solutions for growers.

Hort Innovation chief executive officer Brett Fifield said the new co-investment approach is designed to meet the needs of a rapidly evolving horticulture industry that is growing at the fastest rate of all Australian agriculture sectors.

“Through *Frontiers*, Hort Innovation is not only setting an ambitious target, but we are also being very clear about where investments will deliver the biggest impact - which is where growers need our *Frontiers* investments the most,” Mr Fifield said.

“We are looking at the big picture to find the big opportunities and have developed this new program with partners, innovators, industry representatives and some of Australia’s most forward-thinking farmers.”

Announced at Hort Connections 2024 in Melbourne, Jesse Reader Head of Investment, Growth and Commercial at Hort Innovation said that the external program is aimed to drive innovation and opportunities to the sector.

“With vegetable consumption down, the flow on effect is the reduced ability to fund opportunity within your own business or with other partners,” he said.

“The *Frontiers* program aims to change the business as usual to give industry a program approach that is more flexible.”

Five fresh investment themes have emerged in-line with the Hort Innovation Strategy 2024-2026 and these will drive the future *Frontiers* investment agenda.

### These are:

- Healthy Living
- Adaptation and Resilience
- Market Growth and Security
- Disruptive Technologies
- Capability Building

Macadamia growers, MacField Farms, managing director Henrik Christiansen, South Yaamba, Queensland, said a change in investment approach is needed.

“We need to do something different; industry is changing and the ways we approach investment into the longevity and profitability of Australian horticulture needs to evolve as well”.

Bulla Park Mushrooms chief executive officer Georgia Beattie, Diggers Rest, Victoria, said the new approach has an unapologetic focus on commercial outcomes and impact for Australian growers.

“*Frontiers* now provides an internationally competitive co-investment model featuring a dedicated avenue for grower innovators to propel their ideas forward, partnerships with local and global venture funds and private equity firms, and options for start-ups and early adopters with viable solutions to industry’s challenges.”

Mr Fifield said investment partners will be able to participate across four dynamic investment pathways which will be rolled out over the next twelve months – each designed to propel the industry forward fast and at scale.

### The four investment pathways are:

- 1. Innovation Partnerships:** Delivered through proven procurement approaches, this ongoing stream beckons strategic collaborations, inviting stakeholders from all corners of the sector to join forces to advance industry innovation.
- 2. Australian-grown Innovation:** Dedicated to growers and the supply chain, this stream nurtures grassroots ingenuity, empowering innovators to take their ideas from concept to reality through a competitive Expression of Interest process.
- 3. Incubate and Accelerate:** Poised to serve as a launchpad for startup enterprises seeking to scale within the horticulture domain. Through rigorous selection and support mechanisms, budding entrepreneurs, researchers, and students will be equipped to thrive in the competitive landscape.
- 4. Hort Innovation Venture Fund:** Set to channel resources into high-growth early-stage startups, this stream will propel innovative products and services from inception to market readiness.

See page 56 for some of the *Frontiers* programs that are underway.

### FIND OUT MORE

Contact Jesse Reader at [jesse.reader@horticulture.com.au](mailto:jesse.reader@horticulture.com.au) or visit the *Frontiers* program [horticulture.com.au/hort-innovation/our-work/frontiers](https://horticulture.com.au/hort-innovation/our-work/frontiers)

Hort Innovation  
**Frontiers**

# northern territory

## Unique climate creates opportunities & challenges for NT vegetable growing

With two distinct seasons, the Northern Territory has one principal growing window that is ideally placed to meet the needs of the southern states' winter.

The wet season extends from November to April, characterised by cyclones and heavy rain events that make vegetable growing challenging. The peak growing season is in the dry season, therefore, in what would be the autumn to winter seasons in temperate climates.

The majority of the vegetables grown in the Northern Territory are in the greater Darwin region comprising Asian vegetables such as okra, snake beans and Asian melons. Further inland around Katherine, pumpkin and asparagus are grown while central Australia is pumpkin and garlic. Most farms are family-based operations.

The economic value of vegetables in the region is in the order of \$80 million annually, with principal markets in the Brisbane, Sydney and Melbourne wholesale markets.

While vegetable production slows down in the southern states as winter temperatures drop, the Territory's tropical weather system means temperatures are still at 25-35°C during the dry season, according to Mariah Maughan, VegNET Regional Development Officer for the Northern Territory.

"It gives our growers an advantage to be able to grow vegetables that require a warmer climate, when it is very cold in

other parts of Australia. So growing okra, snake beans and Asian melons in the dry season does give us a market advantage," said Mariah.

"The Northern Territory is definitely used to having extreme weather. During the wet season, we are looking at quite dramatic weather events. In the coastal areas that can look like cyclones, but in general it can look like heavy rainfall, so we are well prepared for these events."

Growers know paddocks will flood during the wet season and roads and railways may wash out, and Mariah said the industry adapts to that and focuses production on the dry season.

"We mainly work with the seasons and we work with the weather conditions that we're given," she says. "And so therefore we're not looking to be, say, trucking high volumes of vegetables when we are experiencing those harsh weather conditions."

As the wet season begins, it becomes more humid with higher temperatures and increasing rain events, which in turn increases pest and disease pressure. Fusarium is one of the main challenges in snake bean and root knot nematodes for okra.



Mariah Maughan is the VegNET Regional Development Officer for the Northern Territory.

Transport costs also need to be factored in to reach the markets of Sydney, Brisbane and Melbourne. Asian leafy vegetables such as bok choy, pak choy and kang kong do not transport as well as snake beans and okra. Growers need to carefully assess market opportunities with regard to the crops grown.

"Like many parts of Australia, moving to more sustainable soil practices and pest management practices will achieve more profitable outcomes in the long term. Like all around Australia, pests are a big issue, so looking at how we can manage them in a way that's more sustainable is really important."



### VegNET in the Northern Territory

Mariah sees her role as assisting growers with on-farm issues and to improve productivity and profitability. By providing workshops, industry tours, extension material and one-on-one support Mariah can provide assistance based on what growers need.

“The best way to understand what growers need assistance with is to really listen and understand what the main issues are, and the best way to get that assistance,” she said.

“Protected cropping, market opportunities and diversification, soil health and pest management have been strong issues and topics of interest for growers.”

“We have had feedback from a lot of growers who sell to wholesale markets in Sydney and Melbourne – understanding who the buyers are and how the markets work would be beneficial. In November we are looking at a six-day tour going to the Brisbane, Sydney and Melbourne markets, taking approximately 10 vegetable growers in order to see those market opportunities and meet market buyers.

“I think some of the larger farms are able to do this quite easily, especially the corporate businesses, but in the Northern Territory a lot of the vegetable farms are smaller family farms so a tour would provide that opportunity.”

Pest management and farm trials form another component of the VegNET extension program. In this instance, pests extend beyond insects to include larger animals. Many snake bean growers also grow mangoes, which attract birds creating a considerable percentage of damage.

A trial to be undertaken during 2024 will introduce a bird pest control laser to see if the damage to snake beans and mangoes can be reduced. If the trial is successful, growers will have opportunities to visit the trial site and understand how the system may be applied to their own farms.

In the Katherine region, wallabies are posing the biggest pest challenge.

“Our greater focus at the start was just specifically IPM, because some of our biggest pests - the trifecta would be thrips, mites and aphids. But we've actually opened that topic up to pest management in general,” said Mariah.



“In the last year we've found we still need to be focusing on IPM and those smaller pests, which are definitely still an issue on our farms, especially in regard to what chemicals to use and what other biological controls we can use around for those pests. However, we are also now focusing on the larger pests impacting production as well.”

### Potential for growth under protected cropping

Protected cropping in the Northern Territory is based on shade houses for crops such as cucumber and Asian vegetables, which has been successful for a number of years. More recently, innovative growers are transitioning to hydroponic systems, particularly for Lebanese cucumber.

With further research to define market potential and growing best practices, Mariah believes that hydroponic systems under shade houses have the potential for further vegetable production.

Other opportunities in the vegetable sector may be the establishment of processing facilities for value-add products, and to extend shelf life.

“We have a diverse culture and with that a diverse vegetable industry here in the

Northern Territory, so as an industry we can embrace that and promote what we grow to other regions of Australia, particularly during the colder climates down south,” said Mariah.

“There are definitely challenges to growing in a tropical climate, but the potential for growth and reward is possible.”

Above. Mariah Maughan, VegNET RDO giving assistance installing soil moisture monitoring systems.

#### FIND OUT MORE

Please contact Mariah Maughan on 0417 618 468 or email [ido@ntfarmers.org.au](mailto:ido@ntfarmers.org.au).

VegNET 3.0 is a strategic levy investment under the Hort Innovation Vegetable and Onion Funds. This project has been funded by Hort Innovation using the vegetable and onion research and development levies and contributions from the Australian Government.

Project: VG21000



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# Understanding the Average Quantity System

The Average Quantity System (AQS) is a system in Australia that regulates the amount of product in pre-packaged goods. It's designed to be fair for both consumers and manufacturers.

## Here's a quick break down of how it works:

- Manufacturers can fill packages with an average amount, rather than having to ensure every single package meets a minimum weight (like under the minimum weight system).
- This reduces waste for manufacturers.
- There are still measurement rules to ensure consumers get what they pay for:
  - The average amount in a batch of packages must be equal to or greater than the amount stated on the label (this is defined as 'nominal quantity').
  - A small number of packages can have slightly less than the labelled amount, but not more than a certain limit (defined as 'tolerable deficiency').
  - No package can have less than the labelled amount (twice the prescribed tolerable deficiency).

Overall, the AQS provides a 97.5% assurance that consumers are getting the correct quantity within prescribed tolerances, whilst also allowing manufacturers to operate more efficiently.



Download NMI's comprehensive AQS guide online. [industry.gov.au](http://industry.gov.au)



## For manufacturers, migrating to AQS packaging in Australia involves a few key steps:

- 1. Understanding the Regulations:** Familiarise yourself with the specific AQS regulations set by the NMI (Weights & Measures). You can find details on their website: [industry.gov.au/publications/guide-average-quantity-system-australia](http://industry.gov.au/publications/guide-average-quantity-system-australia) or by searching for 'NMI AQS'.
- 2. Equipment and Process Review:** Evaluate your current packaging equipment and processes. AQS requires accurate filling and reliable measurement systems. You might need to invest in upgrades or new equipment to ensure consistent average weight across packages.
- 3. Sampling and Testing Procedures:** Develop a sampling and testing plan to monitor your AQS compliance. This involves regularly taking samples of filled packages and statistically analysing the average weight against the declared amount. The most effective/efficient way to do this is to get an AQS compatible inline checkweigher.
- 4. Labelling Updates:** Update your packaging labels to reflect the AQS system. Labels should clearly state the average amount of the product, following the NMI guidelines. This basically involves adding an 'e' (stands for 'estimated') symbol next to the net weight value.
- 5. Record Keeping:** Maintain detailed records of your AQS compliance checks and sampling data. This demonstrates your adherence to regulations during potential audits by NMI inspectors. Once more, most modern inline checkweighers can collect and report on 100% of your weight data and create the required batch reports either to USB or SQL database.



## Here are some additional tips for a smooth transition:

- **Seek Guidance:** Consider consulting with inline system/checkweigher experts or accreditation bodies to ensure your AQS implementation meets all requirements.
- **Invest in Training:** Train your staff on the new AQS procedures, including proper sampling techniques and data recording.
- **Start Small:** If you have a large product range, consider implementing AQS on a pilot basis with a few products first before scaling up.
- **Checkweigher Selection:** On most modern checkweighers, it is possible to run both e-weights/AQS products and traditional minimum weight products. If you intend to do this, check with your checkweighing equipment supplier.

By following these steps and best practices, manufacturers can successfully migrate to AQS packaging in Australia and achieve compliance while optimising their production processes.

## FOR MORE INFORMATION

Contact Julian Horsley at A&D Australasia Pty Ltd [andinspection.com.au](http://andinspection.com.au)

Left. Julian Horsley from A&D Australasia has assisted many manufacturers in the transition from minimum weight packing to average weight packing. *Courtesy Andrew Beveridge.*

Left. Checkweigher systems can support weight compliance for AQS and non-AQS manufacturing.



## Farming with family for prosperity

Farming is not an easy job, but working alongside family makes it worthwhile for Chris Pham.

Farming in the Northern Territory is not without challenges, but for Chris Pham it is rewarding despite the hard work.

Many of the farms in the Northern Territory are family operations, and NexGenProduce is no exception, started by Chris' family in the 1990s. As Vietnamese migrants, the first crops were what they knew – Asian vegetables and herbs as a small market garden.

The first farm was small, only 20 acres. In 2002 the family moved to a larger property of 83 acres, and in recent years bought a second holding to bring them to around 100 acres of farming land. The principal crops now are snake beans, okra, Asian melons and green mangoes.

Grown during the Northern Territory dry season, the vegetables service the winter vegetable needs for markets in Melbourne and Sydney. Each day, around 900kg of okra is hand-picked and stored in coolrooms awaiting shipment.

Chris Pham on the family farm, NexGenProduce.

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"We pick every day during the season, and the okra is picked up twice a week and loaded into a refrigerated B-double truck for the drive to Melbourne and Sydney," said Chris.

"We go straight into coolrooms as it is picked. With average day temperatures over 30°C, we can't leave it outside, which also means we can maximise the freshness of the okra and snake beans for the four-day journey to Melbourne or Sydney."

**For growers in the Northern Territory selling in the Melbourne and Sydney markets, transport costs represent the single biggest input – as much as 50 percent of the cost of growing.**

With a small domestic market in Darwin, and little export, growers are reliant on interstate wholesale markets to sell product.

Chris points out that many of the family-based growers produce similar vegetable crops, so in a good growing season there is a glut in the market, driving prices down, while costs such as transport remain comparatively high.

Soil on Chris' farm at Marrakai, southeast of Darwin, is described as 'coffee rock', a gravelly surface soil with richer red soils below. The region floods during the wet season in low-lying areas, and most vegetable growers are on higher ground. The gravelly nature of the topsoil means that it is free draining and requires regular inputs of nutrients.

"The soil here is not the best, but it works for Asian vegetables. Whatever inputs you put on, the vegetables and mangoes take it straight on," said Chris.

"We do soil tests every year, and check leaf and sap measurements to keep an eye on it. I am working with an agronomist at Muirs to make sure we get the numbers right and get a benchmark. There is very little data for Asian vegetables, but for snake beans I think we pretty much have it right."

The perception that the Northern Territory is plentiful with water is not strictly correct. The wet season sees an abundance of tropical rain, but the dry season can pose problems.

According to Chris, farmers obtain water from bores that draw from aquifers which are replenished during the wet season. In recent years, however, the increase in water usage from across homes and industry means that usage outweighs replenishment, and the government is taking proactive measures to be 'water smart'.

To improve soil health, many farmers are now using cover crops, typically forage sorghum and a legume such as cowpea. The pest pressure trifecta of aphids, mites and thrips is a concern, as are birds. Chris covers the snake beans with netting when the mangoes are in season to reduce the damage caused by cockatoos.

"There is a lot more integrated pest management used by farmers, but it needs more traction between farms to be effective," he said.

"Since the cucumber mosaic virus went through more than 10 years ago, I've certainly seen an increase in awareness of the need to have biosecurity on farm. A lot more farms are now using clean seed, installing biosecurity signs on the gate, and have dedicated parking pads, so it definitely has improved."

### The family is the farm

Chris is one of six children and returned to the family farm to transition his parents into retirement after a stint working in finance in Melbourne for seven years.

"I came back to the farm to give my children the kind of lifestyle that I enjoyed growing up, and to be closer to my parents. Kids learn so much more on a farm than they do in the suburbs," he admits.

An opportunity with children's education brand George the Farmer to do a promotion on Asian vegetable production gave Chris and the family an opportunity to share how enjoyable life on a farm can be. A video filmed on their property gained a lot of exposure, showing how snake beans are grown, harvested and eaten.

**"Now that my parents have retired, we can move onto the next phase. The industry has a lot of potential with growers trying different varieties, not just Asian vegetables," Chris said.**

"Hydroponics and protected cropping will be part of that equation and offers less pest and disease pressure, while still giving good quality products to meet customers demand for cleaner foods.

"Growing healthy vegetables on a farm with my kids has been a lot of hard work, and a lot of fun."

Above L-R. Okra flower. Snake bean flower. Snake beans.

# AI and DNA come together to identify nematodes

As technology improves, the ability to more accurately identify pests such as pathogenic nematodes is crucial to minimising potential crop losses.

Nematodes are often described as micro-worms and there are tens of thousands known to exist. Many are beneficial to soil health, but pathogenic nematodes such as Guava root knot nematode (GRKN) and cyst nematodes are serious pests in vegetable crops.

Identification of nematodes has been ongoing for decades, but with advancements in technology it is becoming easier to identify previously unknown nematodes, and confirm existing identifications.

With the discovery of GRKN in the Northern Territory in 2022 and later in Queensland in 2023, the impetus to determine whether the nematode is a new incursion, or one that has been on our shores far longer, will influence the management practice for the pest.

Guava root knot nematode is a devastating plant parasite causing significant crop losses on a global scale. This nematode has a broad host range spanning 30 plant families, including many important food crops. Notably, guava root knot nematode is a



Dr Daniel Huston is part of the CSIRO team investigating identification systems for root knot nematodes.



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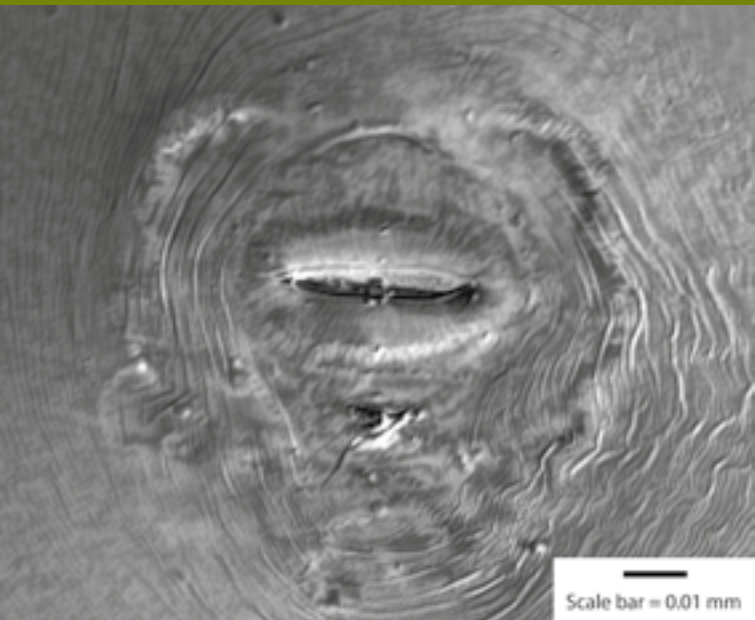
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ph. 0466 244 786  
paul.mazzoletti@huber.com  
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resistance-breaking species, causing severe damage to crops with genetic resistance to other root-knot nematode species.

Consequently, this nematode is a significant biosecurity risk for multiple crops in Australia and is rated in the high to extreme risk categories on the biosecurity plans for multiple industries, including onions, potatoes, sweetpotatoes, and other vegetables. The wide host range and resistance-breaking characteristics of GRKN facilitates rapid spread, and this species is very difficult to control. Preventing establishment of this species in production areas where it was previously not present is thus critically important.

The project *Industry preparedness for exotic root knot nematode* (MT22012), undertaken by CSIRO's National Research Collections Australia, aims to use the latest advancements in molecular screening to provide a better understanding of the historic distribution of root-knot nematodes occurring in Australia and develop an identification tool for these nematodes that will be more cost effective than methods presently available.

"It is possible that Guava root knot nematode has been around for a while and had only been identified recently with the use of molecular diagnosis techniques," said Dr Daniel Huston, Research Scientist with the Australian National Insect Collection (ANIC-CSIRO).

**"In the past, identification was often based on what plant and the location where it was found to give a name to the nematode."**

Dr Huston explained that by looking through historic specimens, the project aims to determine whether GRKN is truly a recent arrival or if it's actually been present in Australia for some time.

"Having this information before the nematode was first detected could have given us an idea of whether eradication was feasible or not," he said.

"But we didn't know we needed that information at the time! The NT government has moved to management, but understanding the timing of arrival of GRKN will still be useful for future management plans, and the methods will be useful for future incursions."

**The project therefore needs to develop a means of identifying nematodes, and review historical samples to diagnose the species that may have been incorrectly identified.**

Root knot nematodes have intricate, fingerprint-like patterns on the female body, but at half a millimetre in diameter, identification can be subject to human interpretive error.

Dr Huston and colleagues at CSIRO are developing an AI approach to identify nematodes via high resolution images taken with a light microscope to capture the unique fingerprint each species presents.

"Each nematode image is constructed from a stack of images compiled together to give the best possible resolution. From there, AI software will be given the images and 'taught' how to recognise different nematode species," said Dr Huston.

"From there, we can potentially identify any root knot nematode around the world as we expand our image database to more species, providing a quick way to identify these species and screen historic specimens from collections."

Another issue which makes working with historic specimens difficult is that many of them have been preserved in formalin, a formaldehyde solution.

Formalin causes DNA to fragment, making it extremely difficult to analyse, however a recent methodology developed by CSIRO to extract DNA from formalin preserved samples will give Dr Huston a means of cross checking the fingerprint images with molecular identification of nematodes.

"With GRKN, we anticipate that the two-pronged approach will enable us to correctly identify the nematode in current and historical samples so that we confidently say whether it is a new incursion, or if it has been in Australia for some time," he said.

**"These identification systems can potentially be extended to other pest species so that we can pre-screen specimen collections for historic pest distributions to inform how we deal with an incursion more quickly to reduce the impact on Australian crops."**

Above. The female root knot nematode has a distinctive 'fingerprint' that may identify its species.

The *Industry preparedness for exotic root knot nematode* project has been funded by Hort Innovation using the Hort Innovation Potato - Fresh, Potato - Processing, Sweetpotato and Vegetable research and development levies and contributions from the Australian Government. Hort Innovation is the grower-owned, not for profit research and development corporation for Australian Horticulture.

Project: MT22012

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# northern territory

## Pests



Aphid

### Aphid

*Melon Aphis gossypii*

#### DESCRIPTION

**Eggs:** Usually reproduces live offspring without mating. Eggs are yellow then turn black and can be laid in cold conditions.

**Nymph:** Tan to grey or green, often with a dark head, thorax and wing pads, remaining in this state for about seven days.

**Adult:** Light to dark green, at 1-2mm long and wingless. The winged form is green to black and slightly smaller than the wingless form.

#### DAMAGE

Feeding activity causes leaves to curl, potentially killing the leaf or tip. Aphids secrete a sticky sugary honeydew substance that affects plant vigour and fruit quality. Melon aphid is the main vector of mosaic viruses.

#### OCCURRENCE

All year round on crops and weeds. Due to quick sexual maturity, many generations can be produced each year.

### Cucumber moth

*Diaphania indica*

#### DESCRIPTION

**Eggs:** Oval shape about 1mm long, white in colour. Laid in small groups under the leaves.

**Larva:** Light green, about 20mm long, with characteristic two white stripes on the back.

**Pupa:** Dark brown, about 12mm long, 3mm wide and pointed at both ends. Cucumber moth forms silky cocoons under folded leaves.



Cucumber moth

**Adult:** White wings with brown edges and a tuft of brown hair on the abdomen. Usually 20mm long, with a 25mm wingspan.

#### DAMAGE

Larvae feed on leaves between the veins, then roll the leaves with their silk to feed from the inside and pupate. Larvae can also attack flowers and fruits.

#### OCCURRENCE

Tropical and sub-tropical areas, adults are active at night.

### Fruit fly – Cucumber

*Zeugodacus Cucumis*

#### DESCRIPTION

**Eggs:** White with a banana shape at about 1mm long. Eggs are laid in clusters under the fruit skin.

**Larva:** Cream-coloured maggots, 7mm long at maturity. At maturity, the larva leaves the fruit to pupate in the soil.

**Pupa:** Brown and barrel-shaped.

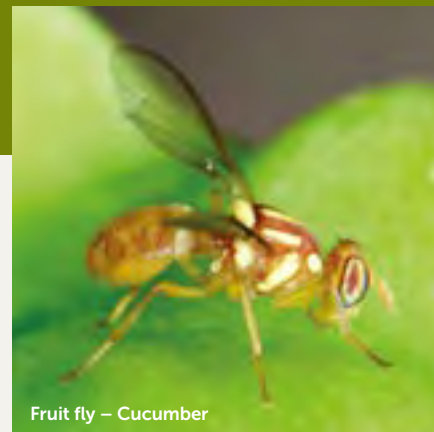
**Adult:** Wasp-like, reddish-brown and yellow with three longitudinal yellow stripes on the dorsal side of the thorax and transverse stripe on the back. A dark medial line is also on the abdomen.

#### DAMAGE

Damage is due to egg-laying (oviposition) causing callosity (thickened areas) when the fruit is at an early growth stage, as well as feeding on ripe fruit. It can expose the area to secondary infections and rotting.

#### CONDITIONS

Fruit fly occur in mature and ripe fruit.



Fruit fly – Cucumber

### Root-knot nematodes and Guava root-knot nematode

*Meloidogyne spp.* and *Meloidogyne enterolobii*

#### DESCRIPTION

Nematodes are miniscule (0.3-5mm) and live in the soil. Adult females are almost spherical. Nematodes spend most of their lifecycle in the roots of the host plant, with a short time span in the rhizosphere to find new hosts.

#### DAMAGE

The juveniles stimulate the overgrowth of some cells in the roots, forming galls (root-knots). This reduces root activity for water and nutrient uptake and exposes the plant to secondary infections and stunted growth, and affects yield and quality.

Guava root-knot nematode (GRKN) has a broad range of hosts, higher infection rates and more severe root galling, compared to other nematode species.

#### CONDITIONS

Root-knot nematodes occur in sandy soils and warm weather. GRKN has been detected in Queensland and the Northern Territory and poses a serious biosecurity risk.



Guava root-knot nematode

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# Pests

# northern territory

Courtesy: S. Subramaniam, DAF



### Melon thrip

*Thrips palmi*

#### DESCRIPTION

**Nymph:** Cream to yellowish around 1mm long, wingless.

**Adult:** Orange to yellow and slightly longer than 1mm, with two narrow feather like wings.

#### DAMAGE

Thrips feed on leaf tissue, sucking the cell contents. The surface of the leaf develops a silvery appearance. Leaves may crinkle and die, tips may be stunted, discoloured and deformed. Melon thrips are an important vector of tospoviruses.

#### OCCURRENCE

Melon thrips affect many vegetables, including eggplant, capsicum, chilli and cucurbits. Identification is important to ensure correct chemical usage. The thrips can be spread long distances on infested seedlings and plant material.



### Fall armyworm

*Spodoptera frugiperda*

An increasingly problematic pest, Fall armyworm is found in maize, and detected in a range of crops.

#### DESCRIPTION

**Eggs:** Large clustered masses of up to 200 eggs, usually on the underside of the leaf, covered in a layer of hairs.

**Caterpillar:** Light green to brown with a dark head, becoming darker with maturity. Identified by a Y-shape on the head, and four dark spots on the last body segment.

**Adult:** Nocturnal, speckled brown moth 3-4cm, wings held flat across the body.

#### DAMAGE

Caterpillars chew on leaves and stems, leaving ragged holes. Resistant to many insecticides.

#### CONDITIONS

Prefers tropical to sub-tropical climates. Can occur year-round in northern regions, and late summer to autumn in the south. Strong flyers and can travel large distances.

**For more information go to**  
[daf.engagementhub.com.au/fallarmyworm](http://daf.engagementhub.com.au/fallarmyworm)



### Spider mites

Family: *Tetranychidae*

Spider mites are given their name as they spin protective silk webs. There are more than 1,000 species – the two-spotted mite *Tetranychus urticae*, vegetable spider mite *Tetranychus neocaledonicus*, oriental red mite *Eutetranychus orientalis* and avocado brown mite *Oligonychus punicae* are the primary major economic spider mite pests in the Northern Territory.

#### DESCRIPTION

**Nymph:** Immature mites resemble the adults but are smaller, with three pairs of legs at larval stage, and four pairs of legs at pre-mature and adult stage.

**Adult:** The females are larger than the males at 0.3-0.5mm in length. Often red, brown, green or yellow in colour.

#### DAMAGE

Spider mites pierce the leaves to suck the fluid from plant cells. It causes yellow spots on the leaves. Foliage can be yellowing in heavy infestations and may cause leaf drop. Eggs are laid on the underside of the leaves. In the tropics, development from egg to adult can take about one week, increasing plant damage in a short period of time.

#### OCCURRENCE

Two-spotted mites is one of the most serious pests in the dry season in NT. It has been recorded on snake beans, eggplant and cucurbits.





# Beneficial Insects

# northern territory



### Ground beetle

*Carabidae spp.*

#### DESCRIPTION

**Larva:** Segmented grub with relatively large head and obvious jaws.

**Adult:** Flattened black beetle between 8-12mm long, with large eyes and ridged wing covers. Ground beetles are fast runners and rarely fly.

#### BENEFIT

Both larvae and adult beetles prey on insects such as caterpillars, slugs, snails and other pests. Larvae often shelter in burrows to wait for prey, while adults forage in soil litter or close to the ground.



### Assassin bug

*Pristhesancus plagipennis*

#### DESCRIPTION

**Nymph:** Colour varies from orange to red and brown, wingless.

**Adult:** Similar to the nymph in colour with transparent wings and a pronounced rostrum. Typically 10-30mm in length.

#### BENEFIT

Adults and nymphs are both aggressive predators, particularly of soft-bodied caterpillars.



### Ladybird

There are a number of predatory ladybirds, and both adults and larvae feed on prey:

**Coccinella:** Aphids, small invertebrates.

**Harmonia:** Aphids, leafhoppers, psyllids.

**Symnus:** Aphids, spider mites and insect eggs.

#### DESCRIPTION

**Eggs:** Red, yellow or white and oval shaped.

**Adult:** Various colours with patterns or spots, usually oval, typically 1-10mm in length. *Coccinella* is orange with black spots; *Harmonia* is yellow/orange with black spots and *Symnus* is brown with a black pattern.



### Hoverfly *Syrphidea spp.*

Hoverflies usually appear in large numbers during spring and summer and are beneficial as pollinators and predators.

#### DESCRIPTION

**Larva:** Pale green to yellow, often with a dorsal strip, slug-like maggot up to 10mm long.

**Adult:** Similar in colouring to a wasp (black and yellow), however only one pair of wings.

#### BENEFIT

Hoverflies are beneficial as both pollinators and predators of soft-bodied insects, particularly aphids.

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# Diseases

# northern territory



## Anthracnose

*Colletotrichum orbiculare*

Anthracnose affects cucumber, melon and watermelon through infected seed and crop debris.

### SYMPTOMS

Small, circular, water-soaked lesions on the leaves that become yellow in melon and cucumber; dark brown to black in watermelon. The lesions eventually turn brown and may develop on stems, and are unrestricted by veins. Lesions on fruit will be sunken, where the fungus produces its fruiting bodies. These bodies produce salmon-coloured conidia, which is characteristic of the disease.

### CONDITIONS

This fungus can be seed-borne and carry over on crop residue. It can be spread via water droplets, and favours warm, humid weather.



## Cucumber green mottle mosaic virus

(CGMMV) – *Tobamovirus*

The tobamovirus CGMMV was first found in Australia during 2014 on watermelon crops in the Northern Territory. It is now established in Australia with sporadic outbreaks in several states, particularly in greenhouse-grown cucumber crops.

### SYMPTOMS

Cucumber, watermelon and pumpkin are the primary crops to be affected where plants may show leaf mottling and a mosaic pattern. Leaves may be yellowing, distorted or blistered. Cucumbers can wilt without lower leaf death and mottling on younger leaves. Watermelon fruit may be spotted or streaked. Watermelon fruit flesh will be spongy – external symptoms may not be present.

### CONDITIONS

CGMMV can affect all cucurbits and is carried in seeds, which has been proven to be an effective pathway around the world. Spread is via contact between plants. The virus concentration is highest in fine leaf hairs, such that a gentle brush contact is enough to spread the virus. It can also be spread through water and nutrient solutions. The virus can survive in crop debris, equipment, greenhouse structures and packaging equipment for up to two years.



## Downy mildew

*Pseudoperonospora cubensis*

Downy mildew can occur in a range of cucurbits, but principally affects cucumbers and rockmelons.

### SYMPTOMS

Small, circular, water-soaked lesions on the leaves that become yellow in melon and cucumber; dark brown to black in watermelon. The lesions eventually turn brown and may develop on stems, and are unrestricted by veins. Lesions on fruit will be sunken, where the fungus produces its fruiting bodies. These bodies produce salmon-coloured conidia, which is characteristic of the disease.

### CONDITIONS

This fungus can be seed-borne and carry over on crop residue. It can be spread via water droplets, and favours warm, humid weather.

## REFERENCES

- 1 *Field Guide to Pests, Beneficials, Diseases and Disorders of Vegetables in northern Australia*. Department of Primary Industry and Fisheries, 2014.
- 2 *Virus diseases of cucurbits*, Denis Persley, Department of Agriculture and Fisheries. This project has been funded by Hort Innovation using vegetable industry levies and contributions from the Australian Government with co-investment from the Queensland Department of Agriculture and Fisheries; Victorian Department of Economic Development, Jobs, Transport and Resources; The Northern Territory Department of Primary Industry and Resources; the Western Australia Department of Primary Industries and Regional Development and the University of Tasmania (VG16086).
- 3 *Pests, diseases, and disorders of cucurbits: A field identification guide*. Umberto Calvo and Dr Jenny Ekman, Applied Horticultural Research, 2024. This project has been funded by Hort Innovation, using the vegetable research development levy and contributions from the Australian Government. *Updating and republishing valuable vegetable industry resources* (VG12087).
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This project has been funded by Hort Innovation, using the vegetable research development levy and contributions from the Australian Government. *Updating and republishing valuable vegetable industry resources*.

Project: VG12087

**Hort Innovation** VEGETABLE FUND

# northern territory



## Diseases

### Fusarium crown and foot rot

*Fusarium solani* f.sp. *cucurbitae* and *Fusarium oxysporum*

*Fusarium* includes many species spp *solani* affecting most cucurbits, while spp *oxysporum* is more prevalent in snake beans, watermelon and basil.

### *Fusarium solani* f.sp. *cucurbitae*

#### SYMPTOMS

*Fusarium* base rot (or foot rot) will cause sudden wilting. In seedlings, the leaves are pale and wilted. The base of the plant will be orange-red to brown. As the disorder advances the roots will turn brown. *Fusarium* base rot will cause soft tissue at the base of the plant, leaving the stringy fibrous tissues which often turn darker in colour.

#### CONDITIONS

The condition is associated with plant stress at fruit set, if water needs are not met. It can survive in soil without hosts for one to two years.

### *Fusarium oxysporum* f.sp. *tracheiphilum*

*Fusarium* wilt in snake beans is a serious fungal disease in the Darwin area.

#### SYMPTOMS

Infected plants wilt and collapse within one to three days. Infected plants have a reddish-brown colour in the water conducting tissues toward the centre of the stem.

#### CONDITIONS

The fungus is soilborne, infecting plants through the roots, particularly if there has been machine damage or nematode infestation. It can also affect the seed. Warm weather and lack of crop rotation will favour the fungus.

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# A century of innovation in plant breeding



Rijk Zwaan is a plant breeding and seed production company focused on healthy, flavourful vegetables. This year, Rijk Zwaan is proud to celebrate its 100th anniversary.

The journey began in 1924 when Mr. Rijk Zwaan opened the doors to his Seed Cultivation and Seed Shop in Rotterdam, The Netherlands at a time when plant breeding was in its infancy.

He would walk through a trial of cabbage in the ground and with his cane, point out which varieties had the best colour, shape, or held up better against a pest. Stand-out plants would be used to create the next generations – a slow process involving years of labour.

While plant breeding techniques have advanced incredibly in the last 100 years, this process remains the same.

**Plant breeding has a rich history, built on a foundation of innovation.**

While plants evolve naturally in the wild, domesticated vegetable crops are influenced by plant breeders. By selecting and combining beneficial plant traits, such as yield, disease resistance, size, taste and texture, plant breeders develop varieties that benefit the whole supply chain.

It takes time for a seed to grow and produce its own seed; between seven

and 17 plant-generations to become genetically stable; then testing and seed production are reliant on the seasons.

**On average, it takes 10 years to develop a new vegetable variety.**

Rijk Zwaan's ambition to enhance the quality of vegetables while providing growers with reliable, high-quality seed is now shared by 4,000 employees worldwide, who continue to uphold their founder's pioneering nature.

Over the last 100 years, the company has introduced varieties that transform how vegetables are grown and consumed. Today, more than 1,500 Rijk Zwaan varieties are served at mealtimes around the world.

While technology has evolved, an unwavering focus on developing excellent vegetable varieties and supplying high-quality seeds, means Rijk Zwaan contributes to the sustainability of the horticultural industry and long-term global food security.

Read more about the Rijk Zwaan centenary at: [rijkszwaan.com/100years](http://rijkszwaan.com/100years)

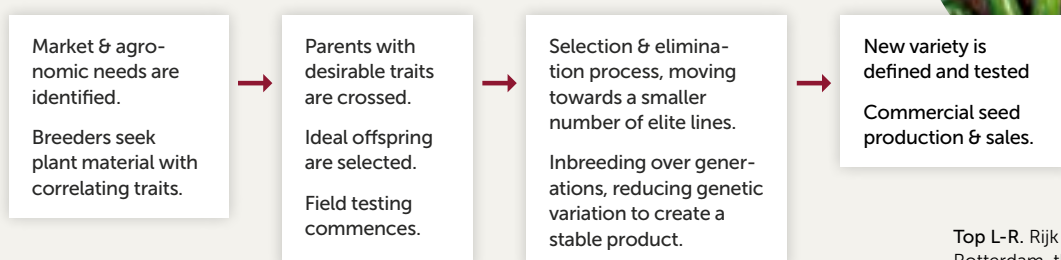
## EVOLUTION OF THE PERFECT CUCUMBER

A look back at milestones from the last 100 years of cucumber breeding highlights the influence of breeders on the foods we enjoy today.

- 1925** Produces seeds for cucumber growers
- 1937** First cucumber variety
- 1959** Non-bitter cucumber varieties developed
- 1960** Releases hybrid cucumber varieties
- 1998** Cucumber Mottle Virus (CMV) resistant varieties
- 2000** Protection against Powdery Mildew (PM)
- 2005** Snack cucumber varieties developed
- 2006** Blue Leaf trait improves sustainable production
- 2010** Cucumber Green Mottle Mosaic Virus (CGMMV) resistant varieties
- 2018** Fusarium resistant varieties introduced
- 2020** Resistance to fight Tomato Leaf Curl New Delhi Virus (ToLCNDV)



## EVOLUTION OF PLANT SEED DEVELOPMENT



Top L-R. Rijk Zwaan's Seed Cultivation & Seed Shop, Rotterdam, the Netherlands. Mr. Rijk Zwaan, 1924.



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# Benefits of Ultrasol<sup>®</sup>ine K Plus in fertigation in vegetables



Application of Ultrasol<sup>®</sup>ine K Plus (14-0-38) as source of nitrate, potassium and iodine in the nutrient solution of crops, ensures a readily available source of the iodine. Iodine is a beneficial nutrient that is important for tomato and sweet pepper fruit development, especially under stress-full conditions such as heat.

## Ultrasol<sup>®</sup>ine K Plus

Fertigation of fruit and vegetable crops enables crop production in arid areas where heat stress is a dominant cause of yield loss. In eight trials in open-field tomato and pepper, grown under heat stress conditions regularly above 30°C, Ultrasol<sup>®</sup>ine K Plus increased fruit yield in crops by 11% (range: 6-17%).

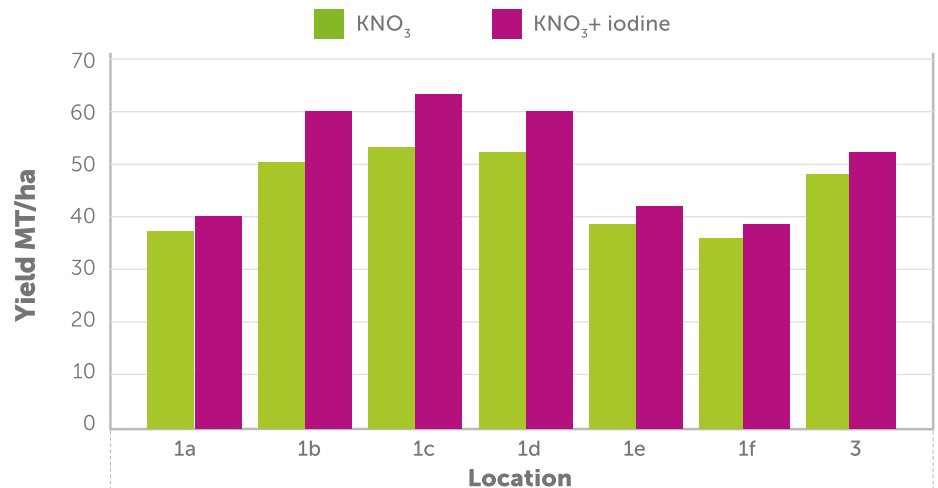


Figure 1. Total season marketable yield in fruits of tomato or sweet pepper from 6 trials in open field tomato (1 a-f) and 1 trial in sweet pepper (3).

Hora and Holwerda, 2023, <https://doi.org/10.17660/ActaHortic.2023.1372.33>

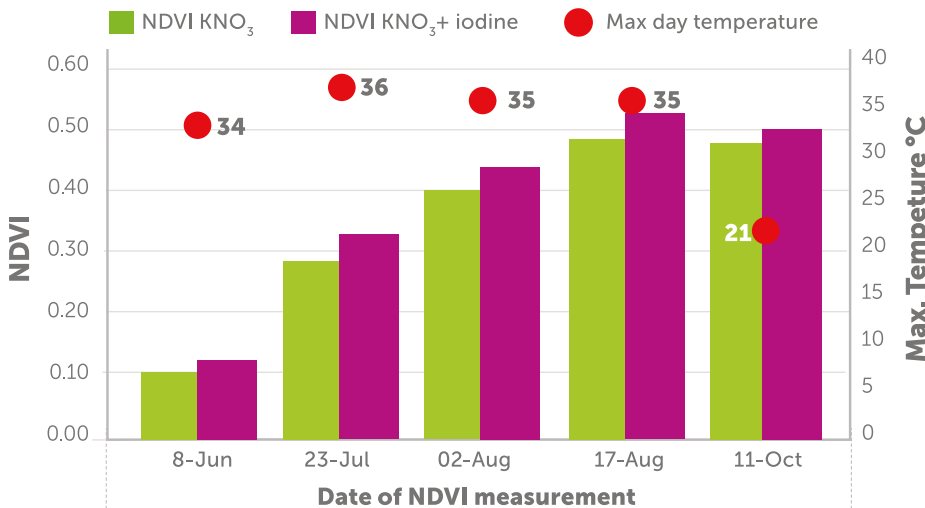


Figure 2. NDVI (Normalized Difference Vegetation Index) of two plots of sweet pepper provided with KNO<sub>3</sub> or KNO<sub>3</sub>+ I and maximum day temperatures on the day of observation.

In open field grown sweet pepper, the crop condition in two 10 ha fields, was monitored by NDVI. On each of 4 observation dates, following canopy closure after the end of June, the NDVI in the plot where Ultrasol<sup>®</sup>ine K Plus was applied was higher compared to the control plot, despite maximal day temperatures above 30°C during the fruit development.

These observations illustrate a role for iodine in the stress resilience in plants, based on the ability of plants to covalently bind iodine on heat-shock proteins and peroxidases\*, which are important to alleviate damage from heat stress.

\*Kiferle et al., 2021, <https://www.frontiersin.org/article/10.3389/fpls.2021.616868>



Ask Elders for more information on the optimal application amounts and timing of Ultrasol<sup>®</sup>ine K Plus, for your farm.

# Unlocking productivity and efficiency on farm with hyperlocal weather



Growers could soon have tailored local weather forecasts directly at their fingertips through a ground-breaking program that leverages the cutting-edge capabilities of artificial intelligence and machine learning, combined with traditional weather forecasting techniques.

Farmers talk about the weather – its impact on farm, when to plant, when to irrigate, when to protect crops, and if it will be a good season.

Understanding short term weather forecasts on a day-to-day basis and on a longer term gives farmers another tool to use on farm to maximise productivity.

Presenting at the Annual Vegetable Industry Seminar (AVIS) at Hort Connections 2024, well-respected meteorologist, Jane Bunn, explained how weather patterns affect local conditions and what that means on farm.

Ms Bunn's company Jane's Weather, in collaboration with Hort Innovation, has developed a program aimed at significantly enhancing the precision, quality and usability of weather-related information. The \$1.3m initiative, delivered through Hort Innovation and led by Jane's Weather, is tailored to meet the specific needs of individual growers, considering their

farming block, unique terrain and operational requirements.

Hort Innovation chief executive Brett Fifield said the project heralds a new era in weather forecasting.

**"Horticulture growers face the challenge of making crucial farming decisions based on generic weather forecasts that may not accurately reflect their specific location," he said.**

"Recognising this gap, this innovative project seeks to provide local weather predictions, empowering growers with the ability to make more informed decisions regarding frost management, spraying, irrigation, and pest and disease control, among other critical agricultural activities.

Traditional weather models don't have high levels of local accuracy for most

farms due to their distance from official weather stations, according to Ms Bunn.

"By applying machine learning and artificial intelligence to the data from current weather prediction models and local farm weather stations, we can significantly reduce forecasting error," she said.

"This approach delivers more accuracy, more often, by learning from observations directly from the site, delivering superior results and therefore, superior business outcomes for our clients."

Jane explained to delegates at Hort Connections that the program gave forecasts that are specific to on-farm, including storm risk, rain and snow, wind gusts, evapotranspiration and spraying conditions.



Jane Bunn, presenting at the Annual Vegetable Industry Seminar (AVIS) at Hort Connections 2024. Image courtesy Andrew Beveridge.

“Machine learning and artificial intelligence are the missing ingredient in solving the problem of what the weather will do next and will give growers the power of being even more accurate, more often.”

“If it is showing that evapotranspiration is high for the next few days, then it may influence how and when irrigation is done. The data for growing degree days will indicate how much growth potential there is for your property, which in turn may influence the actions a farmer takes for the next phase of plant growth,” said Jane.

Jane explained that the development of rain is dependent on two factors – moisture and low pressure systems. The influence of sea surface temperatures in the Indian Ocean west of Australia, and the Pacific Ocean to the east, determines how much or how little rain regions of Australia may receive.

“The sea surface temperature is important globally for the weather, as it will determine how much moisture we have,” she said.

“Warmer sea surface temperatures will hold more moisture than cold, and in combination with low pressure systems, we get rain.

“To predict what the rainfall outlook might be, the sea surface temperature in the Pacific and Indian Oceans is monitored. When the temperature is higher than average over northwest Western Australia up to Indonesia, we will have the potential for more rain. If it is cooler, there is less moisture and results in drier conditions for much of Australia.”

Across the Indian Ocean, monsoon season causes sea surface temperature fluctuations. Once into Autumn patterns are more easily followed. It is usually low pressure over the tropics.

Variations over the Pacific Ocean are driven by the Southern Oscillation Index, which determines the probability of El Niño, while the Indian Ocean Dipole is related to La Niña. To be in La Niña, a period of eight weeks in a positive dipole (warmer) is needed. In 2024, Australia had seven weeks.

The collaboration between Jane’s Weather and Hort Innovation will involve identifying and selecting a cohort of farming enterprises to build and test the functionality of the platform. This targeted approach ensures that the developed solutions are practical and meet the real-world needs of growers.

Mulgowie Fresh Agronomy Manager Andrew Johanson said the technology has significant potential.

“Having access to accurate, site-specific weather information will enable growers to make timely decisions that can positively impact our crop yield and quality. This is a major advancement for the horticulture industry, and it is exciting to be a part of it.”

### JANE BUNN

Founder and CEO/Meteorologist and Weather Presenter, Jane’s Weather/Seven Network

Jane Bunn is a highly credentialed meteorologist with an infectious enthusiasm for the weather. Outside her work as Channel 7 Melbourne’s resident weather forecaster and presenter, Jane founded Jane’s Weather, an advanced weather forecasting system to help Australian farmers boost agricultural output. Jane’s Weather advances yield with agricultural specific guidance on frost, spraying conditions, evapotranspiration, growing degree days and more.

As a weather consultant, Jane provides advice to farming communities and organisations in the agricultural sector.

AVIS was funded by Hort Innovation using the vegetable research and development levy and contributions from the Australian Government. It is held each year to showcase emerging products and innovations in horticulture, as well as focus on key areas for business and personal development of vegetable industry members. Hort Innovation is the grower-owned, not for profit research and development corporation for Australian Horticulture.

Project: VG20000

**Hort Innovation** VEGETABLE FUND



## Soil Wealth ICP panel navigates the road to resilience

The key success factors for growers to plan ahead, understand their risks and improve their resilience were highlighted in a Soil Wealth ICP panel discussion at the Annual Vegetable Industry Seminar (AVIS) on 3 June, ahead of Hort Connections 2024 in Melbourne.

The key success factors for growers to plan ahead, understand their risks and improve their resilience were highlighted in a Soil Wealth ICP panel discussion at the Annual Vegetable Industry Seminar (AVIS) on 3 June, ahead of Hort Connections 2024 in Melbourne.

The panellists included vegetable grower Adam Schreurs from Schreurs & Sons, Jo van Niekerk from Boomaroo Nurseries, and farm business management expert Dr Doris Blaesing from RMCG and the Soil Wealth ICP team. The discussion was led by Soil Wealth ICP team member Carl Larsen.

Resilience means being prepared and able to adapt when unexpected things happen. In difficult times, farm businesses need to call on resources across farm management, environmental, financial, social and personal areas of their business to plan and recover well and ensure short- and long-term business viability.

While growers are known for their resilience, recent extreme weather events,

a changing climate and strong market fluctuations have proven particularly challenging.

### Farm management resilience

Adam shared that maintaining healthy soils and building soil carbon through soil organic matter is a primary focus for Schreurs & Sons as they transition their property at Tarwin, South Gippsland from cattle grazing to celery, leek and spinach production. This is being supported through a demonstration site trial at the property as part of the Soil Wealth ICP project.

Understanding the role of carbon can help vegetable growers to remain profitable and sustainable into the future. For Adam, it has helped to maintain soil structure, particularly following heavy rainfall events, and soil moisture in dry conditions.

“Soil is the base of our growing system, and we are continually rotating our cash crops with cover crops. It keeps the soil in good condition, it keeps the organic matter in there and the soil carbon up,” Adam said.

Being as prepared as possible is key to building a resilient production system at Schreurs & Sons, and Adam achieves this by keeping an eye on weather conditions through on-farm weather stations, as well as monitoring soil moisture probes, using suitable drainage for crop beds and controlled traffic farming.

“We have underground drainage pipes, and we prepare the beds and contour all of our soil so any surface water runs off and the crops don’t drown,” Adam explained.

“Our wheel marks where the machines operate are always in the same spot so no crops are grown there. We use weights to pack down those wheel marks so we can still enter the crops and harvest in wet conditions.”

Doris drew on recent insights from delivering the Resilient Farming Tas program, which is working with individual businesses in Tasmania to prepare a Farm Business Resilience Plan.

Above L-R. Carl Larsen with the panellists Adam Schreurs, Jo van Niekerk and Dr Doris Blaesing. Images courtesy Andrew Beveridge.





“What we’re learning very quickly is that every business has different risk levels and needs to look at their own systems and risk profiles,” she said.

“While we obviously have to look at our soil, we also have to look at what’s going to happen to pests and diseases when the climate is changing.”

**Personal and social resilience**

From a supply chain perspective, Jo explained that communication is essential for Boomaroo to effectively deliver a ‘live’ product – seedlings – to growers and work around their needs amidst current challenges, such as the fallout from extreme weather events.

“I see resilience as not just what’s happening on the farm but resilience of the farmer. We have to make sure we start focusing on the sustainability of the grower, not just their farms,” Jo said.

This communication is equally important within Boomaroo’s business.

“People at the nursery are encouraged to speak up if they see a safety issue and we have regular toolbox meetings about what’s going on and the weather events that are coming so our growing team is ready. We believe in promoting our staff and upskilling as it helps us to keep that knowledge base.”

For Adam, this can extend to ‘down-skilling’ when necessary to achieve heavy workloads in a short timeframe, where it’s all hands-on deck no matter your position in the business.

Doris added: “People who have their staff involved in the discussions and understanding what’s important will generally be more resilient.”

**Environmental resilience**

At Tarwin, Schreurs & Sons has planted over 70,000 native trees to create shelter-belts around the property. It has also provided multiple other production benefits.

“We’re heavily into integrated pest management, so we’ve tried to mix up our native tree planting so they have something flowering all the time to encourage beneficial insects to be on the property constantly,” Adam explained.

“When we’re harvesting our crops, the beneficials have somewhere to go until the next crop is planted, and we don’t have to wait as long for them to build up naturally in our crop. It has reduced our use of insecticides phenomenally.

“We also get the benefits of less wind knocking down the crops. We have planted a lot of natural grasses and reeds in our drains and waterways so we don’t have to spray down weeds constantly. It also filters the water before it goes back to the dam.”

**Financial resilience**

The panel also touched on emissions which are closely linked to business profitability, as a farm with relatively high emissions is more likely to have inefficient practices in place.

Schreurs & Sons is looking to better understand its emissions profile by measuring nitrous oxide emissions from fertilisers and exploring options to take the farm completely off-grid using solar.

“Emissions are a great indicator of resilience. If you can’t measure them, you can’t manage them,” Doris explained.

“At some stage, you need to know your emissions to see whether you are making money or not. There are a lot of programs being rolled out on measuring emissions and a simple step is to ask somebody who knows how to do it.”

The Soil Wealth ICP team would like to thank Adam, Jo and Doris for their time and contributions to the panel discussion.

**More information**

- Building resilience to climate extremes fact sheet series
- Soil organic matter: Rules of thumb poster
- Estimating emissions: Why measuring emissions is important and how to do it.

The image shows two fact sheets from the Soil Wealth ICP project. The top sheet is titled 'ESTIMATING EMISSIONS' and discusses why measuring emissions is important. The bottom sheet is titled 'Building resilience to climate extremes' and provides an overview of getting ready for changing conditions. Both sheets include logos for Hort Innovation and Soil Wealth ICP.

Top L-R. Vegetable grower Adam Schreurs of Schreurs & Sons. Jo van Niekerk of Boomaroo Nurseries. Doris Blaesing of RMC/Soil Wealth ICP. Images courtesy Andrew Beveridge.

AVIS was funded by Hort Innovation using the vegetable research and development levy and contributions from the Australian Government. It is held each year to showcase emerging products and innovations in horticulture, as well as focus on key areas for business and personal development of vegetable industry members. Hort Innovation is the grower-owned, not for profit research and development corporation for Australian Horticulture.

Project: VG20000



## Connection and communication keeping Loose Leaf Lettuce Company up to date



**The Loose Leaf Lettuce Company is a fresh-cut salad grower and processor based in Gingin, Western Australia for more than 40 years.**

Maureen Dobra, her husband Barry and her son Kevan spearhead the family-run business which produces baby spinach, baby leaf lettuce, rocket, baby cos, Asian salad and chard in the sandy soils which define the Gingin region. In summer, production is outsourced to other growers in the region due to a limited water allocation for irrigation.

The business employs 70 staff including Maureen's children, their partners and her grandchildren. Produce is supplied to the Perth wholesale market as well as a range of independent wholesalers and other processors.

Maureen is an avid reader of *Australian Grower* magazine and the Weekly Update e-newsletter, produced by AUSVEG's communications team, while younger family members follow AUSVEG podcasts and social media. Maureen has developed strong industry networks, particularly with growers on the east coast of Australia, through regular attendance at field days and the Hort Connections conference, as well as grower advisory positions for levy-funded projects and Hort Innovation committees.

"I like AUSVEG's communications, they're very good, interesting and easy to read. We have put some of their recommendations into our business as well as through networking with other growers," Maureen said.

"I know that I can always call on them to give me advice, particularly when there are issues in leafy veg or immigration."

**Spotlight on leafy veg contamination**  
Ensuring fresh produce is safe to eat is the highest priority for growers.

A new levy-funded research project is helping leafy vegetable growers optimise their food safety systems by better understanding the pathways for microbial contamination. The project was heavily promoted across multiple AUSVEG communications platforms including *Australian Grower* magazine, the Weekly Update e-newsletter, AUSVEG social media, podcasts and videos.

After seeing articles on the project in the Weekly Update e-newsletter and *Australian Grower* magazine, Maureen was encouraged to get involved in the research by vegetablesWA Quality Assurance Coordinator Joel Dinsdale.

Above. Maureen Dobra in a chard field on her property in Western Australia.

While it's still early days, Maureen strongly encourages other growers to participate in the research and see a return on their levy investment.

*Identifying and managing the sources and routes of microbial contamination in leafy vegetables (VG22002)* is led by Sukhvinder Pal Singh (better known as SP) from the New South Wales Department of Primary Industries. It will work closely with leafy vegetable growers and processors to gain deeper insights into sources and routes of contamination and identify ways to disrupt the transmission of these pathogens into the supply chain.

The project will use a multi-pronged approach that involves engaging growers, benchmarking industry practices, identifying gaps in food safety management and promoting the adoption of best management practices to address any risks proactively.

"They've done some soil tests and water tests for us. It's actually been very good because it's focused on our water quality and what we can do to improve it," Maureen said.

"We've also discussed putting more trees or shrubs on our boundaries to stop sand from other properties blowing onto the farm and bringing in weeds from the seed in the sand."

Maureen is also proactively considering dam covers to prevent access by bird life, which she has discussed with her grower network on the east coast.

As the Loose Leaf Lettuce Company is certified by Freshcare Food Safety and Quality and Hazard Analysis and Critical Control Point (HACCP), quality assurance is a crucial arm of the business.

"Water contamination is critical to manage. I've read issues in the United States and obviously in Australia with melons and leafy greens, so we are trying to stay aware of the issues. Talking to SP is great," Maureen said.

While it's still early days, Maureen strongly encourages other growers to participate in the research and see a return on their levy investment.

**"The more knowledge you have, the better off you are – even if it's just about developing your networks."**

The project *Vegetable industry communications program* has been funded by Hort Innovation, using the vegetable research and development levies and contributions from the Australian Government. Hort Innovation is the grower-owned, not-for-profit research and development corporation for Australian horticulture.

Project: VG22000

**Hort Innovation** VEGETABLE FUND

**PALM**   
APPROVED EMPLOYER



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Late December to June 2025**

**Covering South East Victoria  
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## Updated pesticide resistance strategies boost climate-smart agriculture and sustainable land management practices

CropLife Australia's Resistance Management Strategies for fungicides, herbicides and insecticides have been updated and provide comprehensive and science-based approaches to manage pests, weeds and disease on Australian farms and natural landscapes.

The official 2024-25 strategies have been updated and result from extensive collaboration between expert scientific technical review committees, industry stakeholders and local and international experts and are now available online.

Chief Executive Officer of CropLife Australia, the national peak industry organisation for the plant science sector, Matthew Cossey said, "By investing in these strategies, CropLife and its members support farmers and environmental land managers with access to the most up to date and science-based solutions.

"Climate change poses one of the most significant challenges to pest management and agricultural production that farmers have faced. These challenges will only intensify in the coming decades. Shifting temperatures and weather patterns are not only leading to an increase in biotic threats but also the emergence of new ones.

"Access to the plant science industry's modern chemistry and innovative tools alongside best-practice stewardship of these tools is critical to implementing a successful Integrated Pest Management plan particularly in the face of climate change and for Australian-specific conditions.

"By having the tools and support to manage the constant threat of pests, weeds and diseases in our natural shared spaces, farmers can continue to increase crop yield and quality in changing climatic conditions.

"Importantly, these strategies complement but do not replace label requirements and product users must always adhere to label instructions.

Mr Cossey concluded, "CropLife and its members take product stewardship seriously and are committed to a whole-of-lifecycle approach by contributing millions of dollars each year to activities to support the safe and sustainable use of the plant science industry's products. By equipping product users with the tools and information to adequately plan ahead, CropLife's Resistance Management Strategies assist farmers, agronomists and environmental land managers to ensure that important crop protection products remain viable and effective tools into the future."

The annually updated Resistance Management Strategies are part of CropLife's Stewardship First initiative, offering free resources and programs to support best-practice product use. In addition to these strategies, other resources address spray drift mitigation, pollinator health, and the responsible recycling and disposal of products and packaging.

This year also marks the final year of transition for the herbicide Mode of Action classification alignment, where Australia's previous alphabetical codes have been updated to align with the international numerical code system. The numerical classification system should be fully implemented by the end of 2024.

# Minor Use Permits

ISSUED JUNE – JULY 2024

The below minor use permits were recently issued by the Australian Pesticides and Veterinary Medicines Authority (APVMA). This information is circulated as part of Hort Innovation’s Growing Innovation e-newsletter, which members and interested horticulture participants receive monthly. Sign up at [horticulture.com.au/growers/become-a-member](http://horticulture.com.au/growers/become-a-member).

Permit ID	Description	Dates	Permit holder	Jurisdiction
PER94452 Version 1	Chlorantraniliprole & thiamethoxam / Leafy vegetables / Leaf miners	11 Jun 2024 to 30 June 2026	Hort Innovation	All states & territories, except VIC
PER88066 Version 2	Emamectin / Celery / Helicoverpa, Lightbrown Apple Moth & Cluster Caterpillar	5 Aug 2019 to 30 June 2029	Hort Innovation	All states & territories, except VIC
PER14891 Version 4	Trifloxystrobin / Beetroot / Alternaria leaf spot	1 Jan 2015 to 30 June 2029	Hort Innovation	All states & territories, except VIC
PER14843 Version 4	Indoxacarb / Celery / Lucerne leaf roller	1 Oct 2014 to 30 June 2029	Hort Innovation	All states & territories, except VIC
PER14896 Version 4	Bentazone / Green Peas (processing) / Broadleaf weeds	1 Oct 2014 to 30 June 2029	Hort Innovation	TAS only
PER14842 Version 4	Copper Oxychloride, Cuprous Oxide or Cupric Hydroxide / Spring onions and Shallots / Downy Mildew	1 Oct 2014 to 31 May 2029	Hort Innovation	All states & territories, except VIC
PER13147 Version 5	Clopyralid / Cauliflower / Capeweed and Clover	21 Nov 2011 to 31 May 2029	Hort Innovation	WA only
PER14186 Version 5	Success Neo (spinetoram) / Eggplant / Melon Thrips	3 Oct 2013 to 31 May 2029	Hort Innovation	All states & territories, except VIC
PER86665 Version 3	Fipronil / Carrots / White fringed weevil and Symphylids	4 Jan 2019 to 31 Dec 2025	Hort Innovation	All states & territories, except VIC
PER14703 Version 4	Tramat 500 SC Selective Herbicide (ethofumesate) / Spinach (Spinacia oleracea only) & Silverbeet / Various Weeds	1 Aug 2014 to 31 May 2029	Hort Innovation	All states & territories, except VIC
PER94835 Version 1	Fluxapyroxad / Bulb onions / Neck rot	20 May 2024 to 31 May 2026	Hort Innovation	All states & territories
PER88018 Version 3	Chlorpyrifos / Sweet Corn / African black beetle	23 Nov 2020 to 31 May 2025	Hort Innovation	All states & territories
PER80344 Version 4	Chlorpyrifos / Potato / Black Beetle, Wingless Grasshopper, Red Legged Earth Mite	2 Jan 2015 to 31 May 2025	Hort Innovation	WA only
PER87332 Version 2	Aero Fungicide / Olives / Anthracnose	1 July 2019 to 31 May 2029	Hort Innovation	All states & territories, except VIC

All efforts have been made to provide the most current, complete and accurate information on these permits, however you should always confirm all details on the APVMA website at: [portal.apvma.gov.au/permits](http://portal.apvma.gov.au/permits). Details of the conditions of use associated with these permits can also be found on the APVMA site. You can also access the Non-Performance Reporting Form for Horticultural Pesticides at [horticulture.com.au](http://horticulture.com.au). This form should be completed when an adverse experience occurs as a result of using a permit. A 'non-performance' is an unintended or unexpected

effect on plants, plant products, animals, human beings or the environment, including injury, sensitivity reactions or lack of efficacy associated with the use of an agricultural chemical product(s) when used according to label (or permit) directions. Users are advised that while the pesticide can be applied legally under the APVMA minor use permit, there can be a significant delay until the MRL gazetted by the APVMA is adopted in the Australia New Zealand Food Standards Code. Until this occurs the MRL may not be recognised and a zero tolerance may be imposed for

residues of the pesticide resulting from its use according to the APVMA permit. Please be aware that in the absence of an MRL in the Food Standards Code, the use of the pesticide according to the permit may result in the suspension of the produce in the marketplace. Please check the FSANZ website or the [Australian Government ComLaw website: legislation.gov.au/Series/F2015L00468](http://www.australian.gov.au) to confirm if there are MRL established by the Australia New Zealand Food Standards Code.



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## Understanding how your levy works

It is Hort Innovation's job to work with industry to invest the vegetable, potato and onion R&D levies and Australian Government contributions into initiatives to help growers be as productive and profitable as possible, through the Hort Innovation Levy Funds.

Research and development (R&D) levies are payable on potatoes, vegetables and onions that are produced in Australia. These levies are collected by the Australian Government and then entrusted to Hort Innovation. It is then Hort Innovation's responsibility to work with industry to invest the levies – together with Australian Government funds into strategic R&D initiatives.

### How are levy investment decisions made?

Investments specific to Hort Innovation are guided by an industry's Strategic Investment Plan (SIP) and Annual Investment Plan (AIP).

SIPs provide an overarching roadmap for industry to follow, and AIPs detail how levy dollars will be spent each year to achieve industry goals.

### What is the Strategic Investment Plan?

The SIP is the roadmap that helps guide Hort Innovation's oversight and management of investment programs.

The SIP lays the foundation for decision making in levy investments and represents the balanced interests of the industry. The most important function of the SIP is to make sure that levy investment decisions align with industry priorities. In 2021, SIPs were refreshed to reflect the current needs of the respective industries. The refresh involved close consultation with growers, industry participants and the wider research community in each relevant sector.

The SIP details the industry's strategic goals centred around four outcome areas:

- industry supply, productivity and sustainability;
- demand creation;
- extension and capability;
- business insights.

Under each of those outcomes, there are industry specific strategies and key performance indicators that provide guidance on how industry will work towards achieving the outcomes.

Where a previous SIP is available, a performance report has been developed to demonstrate how investments delivered generated impact for growers.

The reports provide an overview of key achievements delivered through each levy investment, and how they relate to the industry's SIP outcomes and strategies.

While this performance report provides a five-year review of the vegetable SIP 2017-2021, going forward an annual performance report will be provided for the vegetable SIP 2022-2026.

### R&D LEVY RATES

Potatoes

**48cents**  
PER TONNE

Unprocessed Potatoes

Vegetables

**0.485%**

of the gross sale value at  
the first point of sale

Onions R&D AT

**\$2.90** PER TONNE

marketing at \$1.00 per tonne

**Hort Innovation** POTATO – FRESH FUND



**Hort Innovation** VEGETABLE FUND


**Hort Innovation** ONION FUND

You can find full details on the levy rate, plus information on how to lodge a return and make a payment with the Department of Agriculture, Fisheries and Forestry, on the government website at [agriculture.gov.au/agriculture-land/farm-food-drought/levies/rates#horticulture](http://agriculture.gov.au/agriculture-land/farm-food-drought/levies/rates#horticulture).

#### LEVY-FUNDED COMMUNICATIONS PROGRAMS

PotatoLink. Vegetable industry communications program (VG22000); Australian onion industry communications (VN21000); Australian potato industry communication and extension project (PT20000);

	OUTCOME 1	OUTCOME 2	OUTCOME 3	OUTCOME 4
	Extension and capability	Industry supply, productivity & sustainability	Demand creation	Business insights
	To manage knowledge, relationships, systems and processes required to communicate effectively with internal and external stakeholders	To accelerate the application of production practices that optimise returns and reduce risk to growers	To maintain and strengthen consumer demand as the foundation for sustainable expansion of production and consumption in domestic and international markets	To deliver data and insights that is foundational to achieving success in the other three outcome areas of demand creation – supply, productivity and sustainability as well as extension and capability
<p><b>POTATOES</b></p> 	<p>A change in knowledge, attitude, skills, aspiration (KASA) and practice for grower/industry profitability and sustainability through use of best practice and innovation.</p> <ul style="list-style-type: none"> <li>Growers, value chain, media and governments being well informed on industry initiatives and achievements as a vital part of regional communities and networks.</li> <li>Increased on-farm use of R&amp;D outputs which will build a more resilient industry in addition to improved networks and cross-industry collaboration.</li> <li>Proactive strategic and evidence-based decision making in businesses and for industry on investment, priorities and risk management.</li> </ul>	<p>Accelerating widespread use of existing and new R&amp;D findings and proven management practices that will help growers to reduce the costs and impacts associated with pests, weeds and diseases.</p> <ul style="list-style-type: none"> <li>Advances in productivity and biosecurity through a proactive and prepared industry.</li> <li>New knowledge and understanding of sustainable production systems for Australian potato growers including precision inputs, management of salinity, enhanced soil health and improved water and nutrient use efficiency.</li> <li>Proactively monitoring potential crop protection regulatory threats and having access to a broader suite of effective, socially acceptable and environmentally sound crop protection solutions.</li> </ul>	<p>Support product positioning with consistent quality, evidence of beneficial product nutrition attributes and responsible industry production practices.</p> <ul style="list-style-type: none"> <li>Identify and prioritise export and domestic market niches where there is demand and growth potential for competitive supply of quality Australian fresh potatoes.</li> </ul>	<p>Achieving the outcome will involve reliable baseline data and analysis to provide insights and understand current and emerging trends. Key investments will support the provision of consumer knowledge and tracking, trade data and independent reviews to enable better decision-making process at industry level and individual businesses.</p>
<p><b>VEGETABLES</b></p> 	<p>A change in knowledge, attitude, skill, aspiration and practice for grower/industry profitability and sustainability through use of best practice and innovation</p> <ul style="list-style-type: none"> <li>Maintaining and improving industry cohesiveness, with the majority of businesses and the industry supply chain actively engaged in implementation of this strategy;</li> <li>Growers, supply chain, media and governments being well-informed on industry initiatives and achievements as a vital part of regional communities and networks;</li> <li>Increased on-farm use of R&amp;D outcomes that will build a stronger, more resilient industry – in addition to improved networks and cross-industry collaboration;</li> <li>Proactive strategic and evidence-based decision making in businesses and for industry on investment, priorities and risk management.</li> </ul>	<p>New knowledge and understanding of sustainable production systems for Australian vegetable growers including enhanced soil health, improved water and nutrient use efficiency, precision inputs and labour use efficiency;</p> <ul style="list-style-type: none"> <li>Responding to environmental change and climate variability;</li> <li>Advances in biosecurity and the management of pests and diseases through a proactive and prepared industry;</li> <li>Optimising the supply chain to improve quality and traceability, as well as reduce wastage and improve sustainability of vegetable production systems;</li> <li>Improvements in protected cropping and intensive production technologies;</li> <li>Proactively monitoring potential crop protection regulatory threats and having access to a broader suite of effective, socially acceptable and environmentally sound crop protection solution.</li> </ul>	<p>Grow the value of Australian vegetable exports by supporting industry to market premium products, targeting higher value market segments;</p> <ul style="list-style-type: none"> <li>Articulate the value proposition for Australian vegetables and pursue more targeted market and channel growth opportunities;</li> <li>Develop strong relationships across the supply chain with a shared goal to grow the category;</li> <li>Enhance opportunities for value-adding and packaging;</li> <li>Improve stakeholder engagement with the foodservice sector and the education of health benefits to consumers.</li> </ul>	<p>Achieving the outcome will involve reliable baseline data and analysis to provide insights and understanding of current and emerging trends. Key investments will support the provision of consumer knowledge and tracking, access to trade data, production statistics, forecasting and independent reviews to enable better decision making process at industry level and individual businesses.</p>

	OUTCOME 1	OUTCOME 2	OUTCOME 3	OUTCOME 4
	Extension and capability	Industry supply, productivity & sustainability	Demand creation	Business insights
<p><b>ONIONS</b></p> 	<p>Increasing knowledge, attitude, skills, aspiration (KASA) and practice for grower and industry profitability and sustainability through use of best practices and innovation</p> <ul style="list-style-type: none"> <li>Maintaining and improving industry cohesiveness, with most businesses and the industry supply chain actively engaged</li> <li>Growers, value chain, media and governments being well informed on industry initiatives and achievements as a vital part of regional communities and networks</li> <li>Increased on-farm use of R&amp;D outcomes which will build a stronger, more resilient industry, in addition to improved networks and cross-industry collaboration</li> <li>Proactive strategic and evidence-based decision-making in businesses and for industry on investment, priorities and risk management.</li> </ul>	<p>Developing fit-for-purpose sustainable pest and disease management strategies</p> <ul style="list-style-type: none"> <li>Biosecurity awareness and preparedness</li> <li>Continuous improvement in soil health</li> <li>Improved input management that reduces costs while maintaining yield and quality</li> <li>Proactively monitoring potential crop protection regulatory threats and having access to a broader suite of effective, socially acceptable and environmentally sound crop protection solutions.</li> </ul>	<p>Broaden consumer awareness so that onions are more top of mind and purchased more frequently</p> <ul style="list-style-type: none"> <li>Develop strong relationships across the supply chain with a shared goal to grow the category</li> <li>Identify and prioritise domestic and international market niches (market segmentation) where there is demand and growth potential for competitive supply of quality Australian onions.</li> </ul>	<p>Achieving the outcome will involve reliable baseline data and analysis to provide insights and understand current and emerging trends. Key investments will support the provision of consumer knowledge and tracking, trade data, production statistics, and forecasting, benchmarking and independent reviews to enable better decision-making process at industry level and individual businesses.</p>

**What is the Annual Investment Plan?**

While a SIP provides an oversight of investment over the next five years, the AIP explains how levy funds are going to be invested over a 12 month period.

AIPs are developed each year by Hort Innovation, informed by the SIP and industry consultation, and then discussed with the industry SIAP for feedback and prioritisation. Investment decisions will be guided by the industry SIP and prioritised based on potential industry impact, as well as availability of levy funds.

**The AIP provides detailed information on:**

- Funding availability
- How the industry is investing against their SIP outcomes
- Details on current investments across R&D.

**Where do investment ideas come from?**

There are many avenues that investment ideas come through – such as growers, delivery partners, previous projects, research networks, industry bodies, regional extension plans, and extension personnel. Before any ideas are progressed, Hort Innovation will investigate whether investment aligns with the SIP and whether investment is needed in this area.

**How are investments prioritised?**

To gain industry insights for strategic levy investments, Hort Innovation consults with growers through the industry Strategic Investment Advisory Panel (SIAP).

Hort Innovation develops draft investment recommendations based on investment ideas that are aligned to the SIP. Each recommendation includes high-level information on the aims of the project, outcomes, deliverables and budget.

The recommendations are then taken to the relevant advisory panel for feedback and prioritisation based on potential impact and available funding. Details of projects that will be progressing are then featured in the AIP. The SIAP consists of supply-chain stakeholders from the relevant industries, most of whom are levy-paying growers. Panels also include industry representative body representation and, where applicable, a lead agency representative from within the National Horticulture Research Network. The SIAP is in place to discuss investment ideas, in order to provide advice to Hort Innovation on potential levy investments. The advice they give is guided by the industry SIP. The SIAP provides a vital link between meeting the priorities of industry and helping Hort Innovation to make decisions on how, where and when investments need to be made.

**How are investments progressed?**

After the investment has been prioritised, it's then up to Hort Innovation to get the project up and running. This involves a tender process where the best delivery partner is chosen to undertake the project. Each delivery partner needs to submit regular milestones that report on their progress and at the end of each investment, a final report is produced that is made available to industry on what the project has achieved.

**How to keep track of investments**

Investments in the Hort Innovation Fresh Potato; Onion Fund and Vegetable Fund are detailed in the Your Investments page of Hort Innovation's website. Resources that are produced by the projects – such as fact sheets and guides – are also available through the Research reports and more page. Hort Innovation also sends alerts about project updates to its members.

Paying a levy doesn't automatically make you a Hort Innovation member, but signing up is free. The levy-funded communications programs, also provides regular information on levy-funded activity.



# Muir's

GROW FORWARD



Left. The Serve-Ag team join with the Muirs brand.

Right. Agronomist Holly Croad assists onion growers with the Muirs.



## Serve-Ag enters new phase aimed at strengthening offer for Tassie farmers

Serve-Ag, one of Tasmania's long-standing and leading local agribusiness companies, is strengthening ties with parent company Muirs to further bolster its ability to provide the best service, expertise and technology to the state's growers.

As the almost 50-year-old company enters this new phase, it will transition to the new Muirs brand, creating a single national identity for the organisation.

The Muir Group purchased Serve-Ag in 2016, with General Manager for Muirs, James Muir saying it has been run as a combined part of the overall business since then, in all but name.

"With the modernised position of our retail brand to Muirs nationally, now is the right time to make this important change across the Serve-Ag network, to help us maintain sustainable growth into the future.

"This consolidation of our identity in Tasmania reflects the strong integration we already have between the businesses in all areas except name.

"It is really the final step in formalising what we've already had in place and allows us to expand our linkages under a truly national identity."

Mr Muir says the common history of both business makes it a logical progression.

"We pay significant respect to the Serve-Ag brand, which is built on a long-term approach of partnering with local growers to add value.

"Serve-Ag's founders and the Muir family have always been close. That friendship

led to the foundation of IHD (Independent Horticultural Distributors) in 1986, now known as AgLink, and made our acquisition a natural fit for both businesses.

"The local team here are known for their drive to ensure Tasmanian growers have everything they need to thrive. It's how we've cemented a leading position in the diverse Tasmanian agricultural sector.

**"The integration now into a single, Australian fourth generation family-owned agricultural identity continues to build on that relationship, setting the full business up for the future."**

Regional Business Manager for Tasmania Rob Salmon says the local team's focus remains the same.

"As Serve-Ag, we've always developed and valued our strong relationships with local and leading growers, and this won't change.

"Our goal has always been to help improve the profitability and sustainability of Tasmanian agriculture, and we're firmly focused on continuing to deliver the best agronomic advice, products and service, with access to the latest technology – just at greater scale.

"Our Tassie team members are particularly specialised in a diversity of crop segments

from a wide range of vegetables, pome and stone fruit, cherries, berries, wine grapes, forestry, pasture and animal production, along with some very high value niche crops and farming systems. So exposing this knowledge and expertise to our national teams will enhance our offering across the board.

"Likewise, Tasmanian growers will benefit from greater consolidation and access to key crop segment leads and development teams.

"It will bring the best technologies and thinking to the market, more sustainably, to best support the future of farming and growers' needs nationally."

Mr Salmon says the fundamentals remain.

"While you will see a new sign on the door and logos on our shirts, we have been one integrated business for eight years now. Our focus on the relationships between our local team members, our clients and the farming community remains paramount.

"Nationally, the breadth of agronomic experience we offer will further benefit local growers, to Grow Forward together, further positioning Muirs as a progressive leader across the Australian ag retail sector."

[muirs.co](http://muirs.co)

# Current Projects

HORT INNOVATION VEGETABLE FUND

Hort Innovation conducts a number of R&D projects funded by grower levies. Here is a list of some of the projects currently underway.

## CODE

**O** Onion **P** Potato **V** Vegetable **M** Melon

### **VO** Nuffield scholarships

VG14065

DELIVERY PARTNER: **NUFFIELD AUSTRALIA**

This project provides funding to support Nuffield Scholars in the vegetable industry, with one Hort Innovation scholarship being awarded each year of the project's life from 2016 onwards.

Nuffield Scholarships are a chance for Australians in agriculture to grow their practical knowledge and a broad variety of skills, while heading overseas to study a topic related to their industry.

The program will conduct surveillance for 13 pests that impact honeybees (mites and beetles), and pest bees that could either carry hitchhiking parasites or could themselves cause detrimental impacts to honeybees. The program activities include upgrading sentinel hive arrays, strengthening relationships with surveillance operators and more. The surveillance is designed to enable the early detection of high-priority pest incursions that can impact on honeybees, providing the best opportunity for successful pest eradication.

### **VOM** Multi-industry export program

Vegetables, Onions, and Melons

MT21009

DELIVERY PARTNER: **AUSVEG**

This investment provides international trade development support for Australian vegetable, onion, and melon growers. The project is working to develop export markets, maintain viable export pathways, develop industry capability, and achieve sustained export growth.

The program focuses on building export capability and capacity in the vegetable, onion, and melon industries, collating international market information for decision making as well as business development functions to uplift the ability of exporting growers to service a wider range of markets and channels and expand international trade opportunities in the future.

### **V** Internal fruit rot of capsicum

VG17012

DELIVERY PARTNER:

**APPLIED HORTICULTURAL RESEARCH**

This investment is investigating the causes behind internal fruit rot in capsicums and developing management techniques for growers to both prevent infection and minimise the risk of sending damaged fruit to market. This project aims to deliver capsicum growers with an integrated disease management strategy to control internal rot, as well as developing a predictive model that will help growers identify crops at risk and diagnose infection early.

### **VO** VegNET 3.0

VG21000

DELIVERY PARTNER: **AUSVEG**

This investment is tasked with keeping Australian vegetable growers informed about current R&D activities, results, and resources – supporting the adoption of industry best practice and bolstering vegetable productivity and profitability in key growing areas across the country.

The program is nationally coordinated by AUSVEG and delivered 'on-the ground' by regional development officers (RDOs) in key vegetable-growing regions who are responsible for developing and executing regional extension plans. This includes identifying each region's key priority issues and key regional resources and links - a critical step in ensuring growers receive assistance and information that meets their needs and will help them grow better crops and operate more efficient and profitable businesses.

### **V** National Fruit Fly Council

Phase 4

FF20000

DELIVERY PARTNER: **PLANT HEALTH AUSTRALIA**

The National Fruit Fly Council (NFFC) is a strategic body bringing together federal and state governments, growers, and research funders to oversee the implementation of the National Fruit Fly Strategy. The NFFC provides advice and leadership on delivering a cost-effective and sustainable approach to managing fruit flies across Australia.

The project's objectives are to provide a national strategic direction for the management of fruit fly in Australia, prioritise RD&E for fruit fly in Australia, and inform a national approach to the application of fruit fly management to meet industry needs for domestic and international trade.

### **VOP** National Bee Pest Surveillance

Program: Transition Program

MT22003

DELIVERY PARTNER: **PLANT HEALTH AUSTRALIA**

This investment is delivering a national coordinated bee-pest surveillance program to help safeguard honeybee and pollinator-dependent industries in Australia.

# Current Projects

HORT INNOVATION VEGETABLE FUND



## VOM Capturing the real and potential benefits and costs of on-farm biosecurity measures

MT22008

DELIVERY PARTNER: **RMCG**

This investment quantifies the everyday benefits of on-farm biosecurity practices so that recommendations can be made on how to incentivise vegetable and melon growers to adopt appropriate biosecurity measures.

The first phase of the research will involve a comprehensive review of the literature drawing on research and case studies from Australian and international horticultural/ agricultural industries on the costs/benefits of adopting on-farm biosecurity practices.

The second phase will capture information on the implementation of farm biosecurity in the target industries, the preparedness, knowledge, experiences and perceptions of growers, and the costs/benefits of practices through face-to-face interviews, exploration of farm management and relevant financial records for two scenarios: 'no incursion' and 'incursion.'

## V Identifying and managing the sources and routes of microbial contamination in leafy vegetables

VG22002

DELIVERY PARTNER: **NSW DEPARTMENT OF PRIMARY INDUSTRIES**

This program is assisting leafy vegetable growers improve their food safety systems by identifying and managing the sources and routes of microbial contamination.

Researchers will work closely with leafy vegetable growers and processors to gain deeper insights into sources and routes of contamination and identify ways to disrupt the transmission of these pathogens into the supply chain.

Known as 'Safe Leafy Veg,' the initiative is founded on an innovative research, development and adoption model that has already proven effective in other Australian horticulture industries, such as melons.

The program employs a multi-pronged approach that involves engaging growers, benchmarking industry practices, identifying gaps in food safety management and promoting the adoption of best management practices to address any risks proactively.

## Crop-Wise Calcium Cyanamide Fertiliser



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**FERTILISERS**

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## Current Projects

HORT INNOVATION VEGETABLE FUND



### **VM** Soil Wealth and Integrated Crop Protection Phase 3 MT22004

DELIVERY PARTNER:  
**APPLIED HORTICULTURAL RESEARCH**

The Soil Wealth and Integrated Crop Protection program assists melon and vegetable growers to improve the management of their soil and crop health, to drive their productivity, profitability, and sustainability on-farm. Building on the success of the previous investment *Soil Wealth and Integrated Crop Protection – Phase 2* (VG16078), this project focuses on:

1. Soil health, which underpins sustainable farming systems and the production of healthy crops.
2. Crop health, driven by improved soil health and crop protection measures.
3. Optimising inputs for healthy soils and crops, and profitable vegetable businesses.
4. Carbon and climate.

### **V** Management of foliar bacterial diseases in vegetables VG22001

DELIVERY PARTNER:  
**NSW DEPARTMENT OF PRIMARY INDUSTRIES**

This project is supporting vegetable growers to manage foliar bacterial diseases by providing them with ways to detect pathogens quickly and then treat them effectively. The research works collaboratively with the vegetable industry's levy-funded communication and extension programs such as VegNET to share the findings with the industry. Outputs such as factsheets, presentations at grower workshops and webinars covering different stages of the trials will be used so that growers can see how to use and apply the products and see the results in progress.

## Current Projects

FRONTIERS PROGRAM

Some of the projects currently undertaken by the Frontiers program



### **Frontiers Leadership Fund**

Churchill Fellowships  
LP16002

DELIVERY PARTNER: **CHURCHILL TRUST**

Hort Innovation has joined forces with the Churchill Trust to offer three Fellowships annually, each valued at around \$26,000, to drive innovation and transformation within Australia's horticulture industry.

The Fellowships are open to any industry participants who have an idea for a research project that can benefit the sector. Applications open in the early months of each new year, with details circulated in industry channels and available from [churchilltrust.com.au](http://churchilltrust.com.au). Churchill Fellows undertake research projects that involve visiting and gleaning insights from abroad, with their findings having the potential to provide benefit to the Australian community. The purpose of the Leadership Fund scholarships is to help cultivate new ideas for Australian horticulture.

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# Current Projects

## FRONTIERS PROGRAM

Hort Innovation  
**Frontiers**

### Emerging leaders in protected cropping

LP18000

DELIVERY PARTNER: **WESTERN SYDNEY UNIVERSITY**

This program established a Masterclass in Protected Cropping at Western Sydney University, with 285 students enrolled in at least one of four protected cropping courses since its inception in 2020.

#### Challenge

This program's objective was to fill an identified gap in training future leaders in the Australian protected cropping industry. It achieved this by developing and delivering a suite of subjects that would be offered as a one-year Masterclass in Protected Cropping, a unique and comprehensive program.

#### Response

The Masterclass included enrolment in, and articulation to, a range of graded qualifications, culminating in a six-month Graduate Certificate, a one-year Graduate Diploma, a two-year Master of Science (MSc) Greenhouse Horticulture major, and micro-credentials (1-3 subjects). Along with the associated course subjects such as Industry Project and MSc Research Project, four major core subjects were designed in collaboration with Hort Innovation and industry partners they are Greenhouse Crop Production, Plant-Climate Interactions in a Controlled Environment, Advanced Greenhouse Technology, and Greenhouse Control Systems.

The course, a result of industry collaboration, includes a combination of flexible online learning modules and intensive on-site workshops to align with the likely availability of time-pressured industry employees. Students are provided internship opportunities with some core industry partners to facilitate work-integrated learning. The industry's active role in the development of the course content ensures it meets market needs. Participants who complete this course could potentially help to meet the high demand for skills and leadership in the Australian protected cropping industry.

The course program is now self-sustaining through student enrolments and industry support through scholarships and internships. It fosters ongoing and/or new relationships with the industry and produces industry-related publications that warrant future R&D.

#### Benefit

Since the commencement of the program in the summer semester of 2020, a total of 285 students have enrolled in at least one of the four protected cropping core subjects and other related subjects, surpassing project targets of 100 participants. The project has so far educated 106 students who completed the core subjects and qualified for a Graduate Diploma in Protected Cropping, and 31 of these have completed the Master of Science (Greenhouse Horticulture major). Two students have successfully completed the graduate certificate and 140 students have successfully completed at least one Greenhouse Horticulture subject to qualify with micro-credentials in protected cropping. This success demonstrates the program's effectiveness in meeting and exceeding its targets.

The independent mid-term review organised by Hort Innovation highlighted that 'this project developed a targeted, technical course for the Australian context to upskill existing employees and promote careers in horticulture'.

The project team has received three teaching, education, and outreach awards for the excellent work done by this Hort Innovation, industry, and WSU co-funded project.

Given that the enrolments are significantly more than the targets (100), this is one of Australia's most successful horticultural courses in recent years and represents a significant opportunity for Australian horticulture in the future.

### Frontiers advanced production systems fund

Driving ag-tech adoption across Australia  
AS20007

DELIVERY PARTNER: **QUEENSLAND DEPARTMENT OF AGRICULTURE AND FISHERIES**

This investment is transforming the Queensland Department of Agriculture and Fisheries research facility at Gatton into a 'Smart Farm' that can be used to showcase technology to the horticulture sector.

The Smart Farm will provide growers with the opportunity to interact with ag-tech innovations in a real world environment and to better understand the costs and benefits of technology adoption.

Smart Farm will provide multiple sites (research and community farms) for technology providers to showcase the potential of their technology in real world environments, with industry providing feedback and direction on its development.

The investment will facilitate a series of open house events to ensure the Smart Farm benefits the broader national industry and research community.

### Fall Armyworm

Effective fall armyworm pheromone blends for improved monitoring and population estimation in Australia  
AS21000

DELIVERY PARTNER: **MACQUARIE UNIVERSITY**

This investment is investigating the geographical variation of the sex pheromone in fall armyworm populations in Australia. This information will assist in optimising pheromone blends in lures for monitoring and mass trapping and application in mating disruption.

The analysis of pheromone blends of Australian populations of fall armyworm will inform the development of regionally effective products that the horticulture industry can adopt to improve surveillance and develop an integrated pest management system involving biological control and cultural practices aimed at reducing the use of chemical pesticides.

# Current Projects

FRONTIERS PROGRAM

Hort Innovation  
**Frontiers**

## Using AI and machine learning to improve weather forecasting

AS23005

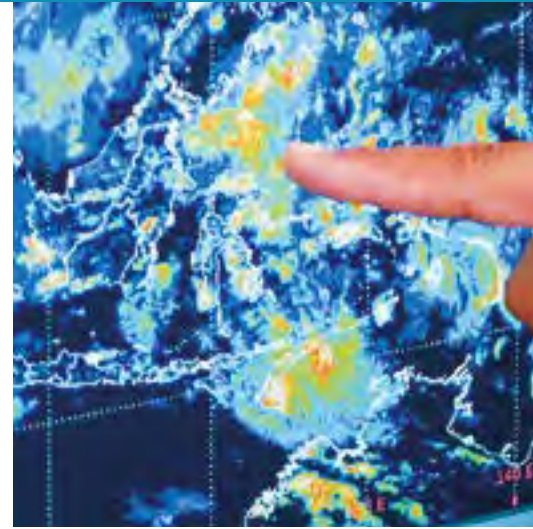
DELIVERY PARTNER: **JANE'S WEATHER**

This project is increasing the productivity and yield of Australian horticulture farming operations by improving the quality and accuracy of weather forecasting information, considering the grower's unique terrain and operational requirements.

This project will develop and trial an on-farm machine learning and artificial intelligence (AI) data-driven hyper-localised weather forecasting platform for Australian horticultural growers and provide tangible results that will directly inform the commercialisation of the Jane's Weather platform, enhancing the industry's weather forecasting capabilities.

Growers constantly grapple with complex decisions that impact their resources and day-to-day operations in the field. Unfortunately, these decisions are often based on unreliable, inaccurate, or limited-scope weather information. The existing weather data is not localised enough, and conventional forecasts lack the necessary level of detail for effective planning.

Addressing these challenges requires a paradigm shift. Integrating AI and machine learning into hyper-localised weather forecasting empowers farmers with more accurate, contextually tailored insights, enabling them to make informed decisions about frost protection, spraying practices, irrigation, growth management, and pest control.



This project will develop a transformative approach that will bring greater precision to farming operations by bridging the gap between data scarcity and the intricacies of agricultural demands.

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# R&D biosecurity update



VEGETABLES  
POTATOES  
ONIONS

## Cool vegetable research

Many of our favourite and most profitable vegetable crops grow in the cooler regions of Australia. So, it's no surprise that the Hort Frontiers funded research program *Sustainably growing horticulture value in cool climate Australia (AS20004)*, led by the Tasmanian Institute of Agriculture (TIA), features a full swag of vegetable research.

**Program lead, TIA's Dr Nigel Swarts, explains the impetus for this research program.**

"Climate variability affects everyone in horticulture. We know that this affects grower confidence to invest in and expand horticultural operations both on farm and into new production regions. On top of this are the major challenges of skyrocketing input and labour costs facing horticulture producers.

"This research program is a partnership with industry, co-designed with growers to address critical risks to production. It's about finding solutions that reduce those risks so that growers can sustainably expand cool climate vegetable production into the future whilst still being profitable."

The program spans a wide range of sectors, including vegetables, vegetable seed, pyrethrum, cherry and berry production – all key cool climate industries. However, vegetable research makes up the lion's share, with over 10 research projects currently underway and more expected in the future. The program is also helping train the next generation of researchers, supporting six new PhD projects.

**The beauty of this cool climate program is that it allows a research team to look at the whole system with crossover between disciplines such as diseases, weeds and plant nutrition research.**

### The hot potato puzzle

Potato disease research led by Professor Calum Wilson is like a giant jigsaw, with each research project adding one or more pieces to the puzzle. The whole growing environment of the potato crop is under scrutiny. Highly specialised research on how to disrupt disease infection and spread is complemented by systems research on how different potato pathogens interact in the soil to impact disease incidence and severity.

Dr Audrey Leo, head researcher with industry partner Simplot, describes how this feature of the program is central to sustainable production.

"Key diseases under study include potato powdery scab, verticillium wilt and pink rot. Two very novel concepts being explored to manage these diseases are 'germinate to exterminate' and diffuse to confuse'," she says

Above L-R. PhD candidate Peter Targett inspecting peas for collar rot.

PhD candidate Laurie Krauss with her weed nemesis, *Oxalis* sp. ©Tasmanian Country.

PhD candidate Ronika Thapa assessing potato pink rot.

The idea behind 'germinate to exterminate' is that you can trick dormant disease spores to germinate before the potato crop is planted using compounds extracted from potato roots. This aims to reduce the disease inoculum in the soil to a safe level for planting, with added benefits of reduced fungicide use and shortened plant back times.

The alternate strategy of 'diffuse to confuse' floods the soil with chemical signals that confuse the germinating spores' tracking system. This means germinated spores are less likely to locate and infect potato roots.

The research team is using a more traditional forensic detective approach to finding critical risk factors for pink rot disease. In this project they will look at which factors favour disease survival, infection and spread.

### "How cool would it be to know how old your seed potato tuber is at planting time?" asks Dr Nathan Tivendale.

Dr Tivendale says this knowledge can help growers manage their potato crops for a better result.

"Seed potato tubers have two different but related ages; chronological and physiological. The chronological age is the time from when the seed potato tuber was harvested. The physiological age is its biochemical state and affects how fast the potato will develop once it is planted. If we know the physiological age, we can adjust how we manage the crop for better uniformity, yield and quality."

This research aims to develop a fast, accurate and robust method for measuring the physiological age of potato seed tubers.

### More peas please

PhD candidate Peter Targett has taken the next step in his mission to help farmers manage collar rot by moving from vegetable agronomy to PhD research.

"Collar rot affects massive amounts of legume crops across the world and appears as black gridding of the stem," he says.

"After battling the disease alongside farmers for some years, it was a natural progression for me to move to a full-time research position in an area where I thought I could help."

The research is already changing and shaping industry understanding of the issue.

"Most prior Tasmanian research on collar rot had been solely focused on *Ascochyta*, whereas a surprising outcome from our survey was that *Fusarium* is causing very similar symptoms and appears to be just as aggressive and widespread a problem across Tasmania," says Dr Targett.

Dr Targett has now moved to an experimental phase of research where he plans to untangle some of the mysteries surrounding this disease complex.

"In the relatively wet North West Coast region, there have been inconsistently severe outbreaks of foliar *Ascochyta* blight, with some farmers experiencing total crop loss less than 5km away from reasonably good crops," he says.

"I want to see if collar rot as caused by *Ascochyta* or *Fusarium* predisposes plants to being more susceptible to these airborne spores. This knowledge should help us to best target when and where to apply control measures."

### One weed at a time

Weeds are one thing all vegetable growers have in common, and one weed in particular has TIA PhD researcher Laurie Krauss fired up.

"I first really noticed oxalis in a young pyrethrum crop. We played spot the pyrethrum because there was so much oxalis and very little pyrethrum," she says.

"It got me thinking more about this weed, how widely spread it is and if there could be a clever way to manage it."

Oxalis has many characteristics that make it a significant weed in cool climate intensive cropping systems. It regenerates from multiple underground bulbs which are difficult to control. These bulbs like to hitch a ride on machinery, which spreads it rapidly and dramatically to new areas.

Laurie wants to better understand oxalis and use this knowledge to break its defences. Understanding the physiology of the weed, including how to break bulb dormancy, is key. This knowledge will help pinpoint when oxalis is most vulnerable to herbicide and other management strategies.

### Expanding cool climate research

Dr Swarts says while the sustainable cool climate program is currently hosted primarily in Tasmania, there are excellent opportunities for other cool climate regions to come on board.

"The rest of Australia is eyeing our cool climate regions with interest as climate variability has more and more impact. We want to make sure that vegetable production in these areas is sustainable and less risky whilst remaining profitable."



*Sustainably growing horticulture value in cool climate Australia (AS20004)* is funded through Frontiers developed by Hort Innovation, with co-investment from Bejo, Potatoes NZ, Simplot, Premium Fresh, Scottish Society for Crop Research, Botanical Resources Australia, Reid Fruits, Hansen Orchards, Costa Group, Driscoll's Australia, South Pacific Seeds and Fruit Growers Tasmania and contributions from the Australian Government.

Hort Innovation  
**Frontiers**



## New crop nutrition guides released

Incitec Pivot Fertilisers (IPF) has released a suite of online guides to help growers with soil health and crop nutrition management for a range of vegetable, fruit and tree nut crops.

They include a range of crop nutrition programmes as well as a product guides which can all be viewed online and downloaded.

Knowing when to apply the right nutrients at particular growth stages is critical, and the new EASY Liquids crop nutrition guides and product guides identify which products are most applicable to crops.

### Individual crop nutrition programmes

The individual crop nutrition programmes cover avocados, field tomatoes, fresh market potatoes and potato processing crops, table grapes, temperate citrus, winegrapes, almonds, and macadamias.

The crop nutrition programmes include fertigated and foliar product options and recommendations about when they should be applied according to crop stage and application rates. While application rates will vary, the guides highlight the most appropriate timing for application of products that are most suited for crops.

IPF Liquids Sales Agronomist, Bob Moorfield, said the library of crop nutrition programmes is being expanded to cover all crops.

"Should growers and advisors wish to discuss the development of a programme for their specific needs, IPF has the expertise to assist," Bob said.

"Rates and products will always vary with the numerous variables, soil type, seasonal conditions, varieties, root stocks and other factors. However, these programmes can be used as a useful base from which to build a programme to suit the individual situation.

"We have received really positive grower feedback to these new guides. We are

passionate about making fertiliser application easy, and for us this is a small but significant step in achieving that."

### Comprehensive product guides

Complementing the crop nutrition programmes are IPF's product guides. These guides provide information about all EASY Liquids products, the nutrient content, form of nutrient and general use and rate of application information.

There is a wide range of products and combinations available in the EASY Liquids range to address crop nutritional needs, as well as options for custom blends.

For example, many vegetable crops need a highly available form of nitrogen (N) early from ammonium nitrate rather than urea. They also need calcium early in the crop when fruit is small and forming. EASY Liquids N-CAL 15-18 is a clear liquid fertiliser containing 100% water soluble calcium and nitrate nitrogen, for application through fertigation systems to horticultural crops.

Nitrate nitrogen is the preferred nitrogen source for most horticultural and high value crops. It is immediately available for plant uptake, resulting in fast and predictable growth responses. Calcium improves cell wall strength, leading to better quality, shelf life and lifting marketable crop yields. Also, increased cell wall strength helps plants tolerate disease and insect infection.

EASY Liquids N25 is a liquid nitrogen product with the readily available forms of N as nitrate and ammonium. Suited for use in horticultural vegetable and tree crops through all irrigation systems, it is ideal for use when N is required immediately and in

the colder times of the year when Urea N is less available.

Phosphorus (P) is a nutrient that is essential to the energy transfer within plants and is easily fixed in the soil, becoming unavailable to the plant. Being able to deliver a form of P that can be readily taken up by the plant in small quantities as the plant requires and not be lost to fixation is critical.

Delivering potassium (K) in the form and quantity at the correct time to enhance fruit size, quality and colour is also essential.

EASY Liquids can contribute to improved nutrient efficiency and cost benefits by delivering these essential nutrients.

All of IPF's EASY Liquids crop nutrition programmes and product guides are available online [easylíquids.com.au](http://easylíquids.com.au)

### Why use EASY Liquids?

EASY Liquids are easy to use and their accuracy is unsurpassed. Plus, they offer easy logistics with bulk deliveries direct to farm, product uniformity, consistent flow rates and accurate nutrient placement.

*IPF's expert, friendly team have the knowledge and experience you can trust. They know their science but don't talk in formulas, liking to keep the complex simple.*

### FOR MORE INFORMATION

About EASYLiquids, contact Bob Moorfield – IPF email [robert.moorfield@incitecpivot.com.au](mailto:robert.moorfield@incitecpivot.com.au) or +61 488 067 736.

# It's Stink Bug season – are you prepared?



The brown marmorated stink bug (BMSB) is a significant plant pest that affects multiple vegetable commodities, causing crop damage, affecting marketability, and reducing yield. As we approach the seasonal risk period for this nuisance 'hitchhiker,' Front Line discusses why this pest threatens Australia's vegetable industry, what to look out for and how to report the pest.

## What is it?

The brown marmorated stink bug (BMSB) (*Halyomorpha halys*) is a shield bug insect native to China, Japan, Korea and Taiwan. It was accidentally introduced to the USA and rapidly established in the 1990s and throughout parts of Europe. The pest is a seasonal hitchhiker associated with imported cargo from the northern hemisphere, but is sometimes found in the luggage of returned travellers. The southern regions of Australia are particularly at risk of potential establishment.



BMSB Adult – note white banding on legs, antennae and abdomen.

## Why should I be worried?

BMSB feeds on more than 300 plant species, including vegetable crops such as sweetcorn, capsicum and okra, as well as asparagus, green beans, eggplant, cucurbit and cruciferous species. Outbreaks can be challenging and expensive to manage, with pests not easily eliminated using pesticides. It is currently a top priority for industry, sitting at number nine on the list of National Priority Plant Pests.

Damage and yield loss caused by BMSB varies among host species. For example, they can physically injure fruiting crops like capsicum and feed on leaves, creating entry points for diseases. In sweetcorn, the bug can pierce through the husk and suck out the juice in corn kernels, leaving the kernels shrivelled and unmarketable.

In urban areas, BMSB is considered a nuisance pest. In the colder months when it goes into hibernation, it seeks shelter in artificial structures such as cracks and crevices in buildings, vehicles, all sorts of packaging, and many more. It will not cause structural damage to the building, but its high infestation numbers of hundreds or thousands are problematic. When disturbed or stepped on, it releases an unpleasant odour similar to ammonia and/or sulphur.

## What does it look like?

The brown marmorated stink bug has a brown, shield-like shape. Adult bugs are about the size of a five-cent coin - 12 to

17mm in length and 7 to 10mm in width – and are brownish, marbled or a mottled colour with a faint reddish tinge. One of the most distinctive features of BMSB is the white banding present on the antennae, sides of its abdomen and legs.

Its eggs are barrel-shaped, about 1.6mm long and light green to white. They are laid in clusters of 25 to 30 on the underside of leaves.

Young, newly hatched nymphs have dark red eyes and a yellowish abdomen mottled with black and red. There are five nymphal instars, and the nymph becomes darker with each moult. It also starts developing the characteristic black and white bands on legs and antennae.



BMSB Egg cluster and first instar nymphs. Image credit: Gary Bernon, USDA APHIS, Bugwood.org.



BMSB eggs and early instars.  
©Gary Bernon, USDA APHIS, Bugwood.org.



BMSB late instar nymph.  
©Susan Ellis, Bugwood.org.



BMSB late instar nymph.  
©Gary Bernon, USDA APHIS, Bugwood.org.

**Insect life cycle**

The BMSB undergoes incomplete metamorphosis, with young nymphs resembling adults. There is no pupal stage. Adult females lay eggs, from which first instar nymphs hatch. These nymphs go through five stages of growth, shedding their exoskeleton each time until reaching adulthood.

In warmer climates, females may lay multiple egg clusters, allowing for several BMSB generations per year. In cooler areas, there are typically 1-2 generations annually. Adult BMSBs enter winter diapause as days shorten, and dormancy is broken in spring with increasing day length and temperatures.

**What can it be confused with?**

Many native Australian stink bug species have evolved alongside Australian flora and are not considered pests. Their natural enemies control these species. However, some stink bug species are not currently present in Australia.

Identifying the brown marmorated stink bug (BMSB) can be tough. Look for white and black banding around the abdomen and distinctive banding around the legs and antennae. Note that these features are common in other stink bug species too!

**FOR MORE INFORMATION**

For information on AUSVEG biosecurity activities, please get in touch with the AUSVEG Biosecurity & Extension Team on 03 9882 0277 or email [science@ausveg.com.au](mailto:science@ausveg.com.au). The Farm Biosecurity Program is funded by the Plant Health Levy.



The native Acacia Shield Bug, which may easily be confused with invasive BMSB (*Alcaeus varicornis*)  
©Pete Woodall, iNaturalist.org.

**CSIRO and DAFF have developed and trialed a mobile device application that uses artificial intelligence to identify and distinguish BMSB and other exotic stink bugs from native Australian species. This technology aims to speed up the biosecurity inspection process for arriving international cargo.**

**How will it get there?**

This pest is a frequent hitchhiker, traveling internationally on or inside cargo like machinery, vehicles, and sea containers. Although it doesn't naturally occur in Australia, it can spread rapidly and has a wide range of hosts. It can fly up to 2km per flight.

**Seasonal surveillance – biosecurity measures**

Australia is most at risk of a BMSB incursion from goods shipped between 1 September and 30 April.

This aligns with the bugs' hibernation period in the northern hemisphere. The bugs seek shelter in cargo, which may lead to an incursion in Australia when they awaken. During this seasonal surveillance window, certain goods produced in or shipped from target high-risk countries (countries where BMSB has established) are subject to mandatory biosecurity inspections upon arrival in Australia.

**What can I do?**

**This pest must be reported immediately through the Exotic Plant Pest Hotline, which can be reached 24/7 on 1800 084 881.**

**EXOTIC PLANT PEST HOTLINE  
1800 084 881**

# Enhancing the natural potential of crops



Global fertiliser manufacturer, Yara, has entered the rapidly-growing ‘biostimulants’ market with the release of its new YaraAmplix range in Australia.

Biostimulants are products that help to improve plant resilience and nutrient use efficiency in crops, independently of their nutritional value.

Yara Australia Country Manager, Tim Erbacher, says plant stress is the greatest yield-limiting factor in all agricultural and horticultural crops.

**“It is estimated that even the best-performing crop, corn, typically expresses only 24% of its yield potential,” he says<sup>1</sup>.**

“By comparison, wheat expresses about 13% of its yield potential.<sup>1</sup>

“These massive shortfalls are due to a range of biotic and abiotic stresses.”

Biotic factors are living things within an ecosystem, such as plants, animals and bacteria.

Abiotic factors are non-living components within an ecosystem, such as water, soil, weather and climate.

The YaraAmplix range of biostimulants includes more than a dozen formulations that have been scientifically proven to improve plant health and resilience.

Specific benefits include improved nitrogen fixation, nutrient use efficiency, seed germination, root growth, photosynthesis, plant growth, flowering, fruit set, fruit development and shelf life.

Three of these products, which can be applied as foliar or fertigation treatments, will be introduced to the Australian market immediately.

Yara is also developing a number of biostimulants suitable for use in organic production systems.

Tim says the new range is complementary to Yara’s existing range of premium crop nutrition solutions.

“Quality fertilisers deliver precise blends of plant-available macro and micronutrients,” he says.

“Biostimulants help plants to make the most of a balanced crop nutrition program by improving its nutrient use efficiency and ability to cope with changing seasonal conditions and other stresses.

“Used in combination, quality crop nutrition products and biostimulants can help to increase crop yield and quality, working in harmony with nature.”

Tim says the biostimulants category is one of the fastest-growing sectors in the fertiliser market.

“Biostimulants are rapidly becoming a standard input in crop nutrition programs,” he says.

“At the moment, most of the discussion around biostimulants is focussed about what’s in them or how they are produced, but the only thing that counts is whether they actually do what they say they do.

“These products have undergone rigorous trials and crop safety tests throughout the world.

“It is this combination of ingredients, testing and world-class manufacturing processes that make YaraAmplix biostimulants both different and effective.”

Tim says the launch of the YaraAmplix range is proof of the company’s vision to ‘grow a nature-positive food future’.

“As a global leader in crop nutrition, Yara is committed to helping transform the way food is produced,” he says.

“We want to be part of an agricultural future that feeds the world without harming the planet.

“We have to maintain or increase productivity while reducing emissions.

“This is going to require the adoption of systematic, outcome-based, sustainable farming inputs and practices that work in harmony with nature.”

Yara markets a comprehensive range of crop nutrition products in Australia, including YaraMila NPK compound fertilisers, YaraLiva calcium nitrate fertilisers, YaraRega soluble NPK compound fertilisers, YaraTera soluble NPK and straight fertilisers, YaraVita foliar micronutrient fertilisers and now, YaraAmplix biostimulants.

## YaraAmplix™

### FOR MORE INFORMATION

Contact your agronomist for more information about YaraAmplix biostimulants or visit [yara.com.au](http://yara.com.au).

### ABOUT YARA

Yara grows knowledge to responsibly feed the world and protect the planet. Supporting our vision of a world without hunger and a planet respected, we pursue a strategy of sustainable value growth, promoting climate-friendly crop nutrition and zero-emission energy solutions. Yara’s ambition is focused on growing a nature positive food future that creates value for our customers, shareholders and society at large and delivers a more sustainable food value chain. To achieve our ambition, we have taken the lead in developing digital farming tools for precision farming and work closely with partners throughout the food value chain to improve the efficiency and sustainability of food production. Through our focus on clean ammonia production, we aim to enable the hydrogen economy, driving a green transition of shipping, fertilizer production and other energy intensive industries. Founded in 1905 to solve the emerging famine in Europe, Yara has established a unique position as the industry’s only global crop nutrition company. We operate an integrated business model with around 17,000 employees and operations in over 60 countries, with a proven track record of strong returns. In 2023, Yara reported revenues of USD 15.5 billion.

<sup>1</sup> Buchanan, B.B. et al. (2000). *Biochemistry and Molecular Biology of Plants*, American Society of Plant Physiologists.



## Digital defence: technology to streamline farm biosecurity

Combine management of your farm biosecurity risk, safety and operations management in a single app.

New on-farm biosecurity tools are one of the outcomes of a national partnership that links vegetable growing businesses and biosecurity expertise from state and territory biosecurity agencies, research programs and the private sector. The levy-funded *Vegetable Industry Biosecurity and Business Continuity Strategy* will develop tools and systems to ensure the vegetable industry is prepared and ready to respond to new and recently established plant pests and pathogens.

A key aspect is the evaluation of technology and data to support movement of produce and swift reinstatement of market access.

Visitors to your farm, such as contractors, researchers, agronomists and others, are one of the pathways by which pests, pathogens and weeds can be introduced onto your property via footwear, vehicles and equipment.

Using a visitor register can help you keep track of who is coming and going onto your farm.

AUSVEG has partnered with farm safety and operations software provider Onside as part of the *Vegetable Industry Biosecurity and Business Continuity Strategy* program to trial and evaluate the use of movement data collected using farm check-in technology to model, track and predict pest, disease and weed spread to inform intervention and eradication measures.

Designed to complement current on-farm biosecurity practices, Onside is a mobile application that helps farming businesses capture the details of people, machinery, equipment and farm inputs on and off their property without additional workload burden.

The technology can simultaneously communicate your farm biosecurity messages so that visitors know what is expected of them. It can be as simple as having a QR code on the farmgate biosecurity sign or using the app to check-in at the office.





**What is on the soles of your shoes?** Pests, pathogens and weeds can be unknowingly spread on contaminated footwear, vehicles and equipment. Ensuring visitors have clean footwear and vehicles are simple measures you can take to reduce the risk of introducing unwelcome pests, pathogens and weeds to your property.

### Streamline the check-in process

Check-in technology streamlines farm processes, including biosecurity practices. Using the Onside app means you can:

- Get notified in real-time if someone has arrived on your farm.
- Share your farm map and rules with visitors easily, including information about current biosecurity concerns or hazards.
- Have confidence that visitors have acknowledged farm biosecurity information provided.
- Get a digital record of the movements on and off your property.
- Review visitors' biosecurity responses and instantly find a visitor's contact details so you can quickly follow up with people if there is a biosecurity concern.
- Share anonymised movement data to your industry body.
- Know what is happening, even when you're not on the property.

### Boratto Farms

**Victorian vegetable grower Boratto Farms is an early adopter of Onside, and says traceability software has made a big difference for their on-farm biosecurity management.**

"Biosecurity has become more serious as we bring more stuff in on an import/export basis for market access and to keep the farm more secure," said Mike Fielden, CEO of Boratto Farms.

"Our thoughts around biosecurity have increased to keep the farm safe. We have gone down the digital route with Onside as it gives us data in real-time, to keep more control and grow the business and allows us to keep quantifiable records."

Boratto Farms has several production sites in the Bacchus Marsh area, and the business uses QR codes at each site's point of entry to monitor visitor movement onto and between the different farms without needing to be onsite.

"If we need to see the visitor or if we think there is a concern, we can respond instantly," says Mr Fielden.

"If we have an event, we have full traceability and transparency data on what happens on our farms.

"For visitors it means that they can check-in and out from their phone without having to go into the office. It has given them better awareness of biosecurity on the farm. For regular visitors it has given better engagement. The process is a lot simpler and easily adopted.

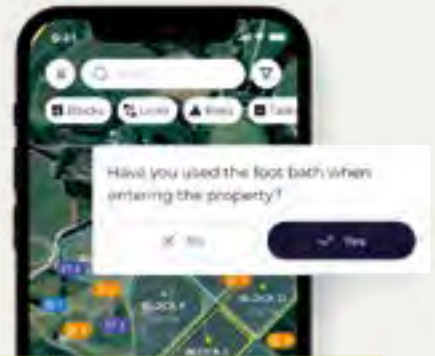
**"My advice is to take it seriously to protect your business with real quantifiable data."**

**"My advice is to take it seriously to protect your business with real quantifiable data."**





Check-in technology that allows you to communicate your farm protocols and have confidence that visitors have acknowledged farm biosecurity information provided.



### Trial Onside for free!

All Australian commercial vegetable-growing properties are invited to trial the Onside App for free. The more farms that participate in the trial, the more connections and better decision-making capability the industry will have. **The trial runs until June 2025.**



Contact the project team to get connected and try out a simple biosecurity procedure for your farm.

SCAN FOR MORE

**Check-in at the gate?** It's all possible. Farm gate signs indicate to visitors that a farm has biosecurity practices in place. The farm gate sign can also include the QR code for visitors to check-in.

### Your industry is stronger together

In addition to streamlining farm biosecurity measures for growers, the Onside trial will help the *Vegetable Industry Biosecurity and Business Continuity Strategy* project evaluate the potential for using movement data to inform emergency pest responses and speed up the return to trade for impacted farms.

By participating in the trial and connecting to the Onside app, farms will collect check-in movement data. We project will evaluate the potential for this data to identify pest and disease risks pathways and create traceability records to support the development of risk-based responses to biosecurity threats.

Using this data, emergency pest response resources can be directed to high-risk areas. Importantly, data collected in this trial will also be evaluated for use to support a risk-based return to trade for impacted farms.

A recent study conducted in New Zealand has shown that for every \$1 spent by industry to access digital traceability tools, up to \$54 can be saved on biosecurity response costs. The savings are driven by a reduction in the number of properties infected during an incursion. This is because digital traceability data helps emergency response agencies target their efforts faster to more effectively restrict the spread of the incursion, saving time, money and hardship. With more users and data, the accuracy and capability of decision-making increases.

The New Zealand study also reported that response costs for both government and industry can be reduced as the rate of adoption increases. Where 50 percent of an industry had adopted traceability technology, a 31 percent reduction in response cost was predicted.

This is significant when considering costs to both industry and government associated with recent pest arrivals to Australia, such as the response to the Varroa mite incursion, which is costing government and industry in excess of \$100m.

#### LEARN MORE

Please contact Rose Daniel, AUSVEG. [Rosalie.Daniel@ausveg.com.au](mailto:Rosalie.Daniel@ausveg.com.au) or 03 9882 0277

Onside 1800 112 334 | [getonside.com/au](http://getonside.com/au)

Video interview: Mike Fielden of Boratto Farms about Onside. [tinyurl.com/3xy5r9kp](https://tinyurl.com/3xy5r9kp)  
Vegalogue podcast: [tinyurl.com/53w2m8h2](https://tinyurl.com/53w2m8h2)

The *Vegetable Industry Biosecurity and Business Continuity Strategy* (VG22004) is funded by Hort Innovation using the vegetable industry research and development levy and contributions from the Australian Government. Hort Innovation is the grower-owned, not for profit research and development corporation for Australian Horticulture.

Project: VG22004

**Hort Innovation** VEGETABLE FUND

## Surveillance efforts to safeguard the vegetable industry

A wide variety of vegetable crops require insect pollination to produce crops, such as pumpkin, squash, zucchini, and cucumber.

Through investment in the National Bee Pest Surveillance Program (NBPSP) our local vegetable industries partner with the honey bee industry to maintain healthy honey bees in Australia.

The NBPSP is an early warning system that uses a range of surveillance methods at seaports and airports throughout Australia — the most likely entry points for exotic honey bee pests and pest bees. Surveillance at additional ports is also provided through in-kind contributions by state and territory governments.

“The program ensures Australia has an early warning system in place to protect our valuable honey bee health status,” says Dr Lucy Tran-Nguyen, Plant Health Australia’s (PHA) General Manager, Partnerships and Innovation.

The value and success of years of preparedness and surveillance for early detection came to fruition with two detections within sentinel hives as part of the NBPSP. In June 2022, *Varroa destructor* was detected in sentinel hives in Newcastle, NSW and in February 2024 a single *Varroa jacobsoni* mite was detected in sentinel hives in the Port of Brisbane, QLD. This highlights years of dedicated work by government agencies and the ongoing investment by industries and government in supporting early detection projects.

The NBPSP maintains surveillance focused on monitoring for varroa mite along with eight other exotic bee pests and pest bees. Varroa mites can transmit diseases such as deformed wing virus, which is not currently in Australia, and diagnostic testing results showed

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FIGURE 1



Varroa destructor mite on a honey bee pupa.

no evidence of this disease being present with the NSW incursion of varroa mites. Deformed wing virus can cause abnormal bee development seen in twisted wings and bloated abdomens. These conditions can impact bees' productivity and their ability to perform important roles within a colony.

"Safeguarding honey bees from high-impact biosecurity threats continues to give us the best chance of maintaining the supply of healthy pollinators for plant industries," says Dr Tran-Nguyen.

Various surveillance tactics are employed in the NBPSP. Sentinel hives, a closely monitored colony of bees, are established around Australian ports and are used as an early warning system for pests and diseases. Catchboxes are used to capture swarms, rainbow bee-eater pellets are analysed to identify the presence of exotic bee species such as Asian honey bees, while aerial pheromone ballooning is used to pick up new species of bees and nets used to sweep flowering plants to capture any foraging bees near ports.

"Methods used at each port location are fit-for-purpose, drawing on past experiences to enhance the effectiveness of surveillance activities," said Sarah Hilton, PHA's Manager, Bee Biosecurity.

The NBPSP has been coordinated by PHA for more than 10 years; more than 4,000 surveillance activities targeting exotic bee pests and exotic bees were conducted in 2023 alone, see Figure 1 for details.

Although no exotic bee pests or pest bees were detected as part of the program in 2023, there has been the recent detection of a single *Varroa jacobsoni* mite in a sentinel hive at the Port of Brisbane, as well as a new exotic incursion of Asian honey bee. Increased activities are being conducted as part of delimiting surveillance.

Bee pest surveillance in Australia has been underway for over two decades with the first sentinel hive inspections occurring in the late '90s. The latest three-year iteration of the NBPSP commenced in December 2021 and concludes in December 2024. As PHA continues to explore with partners and stakeholders what early warning surveillance activities will be undertaken in the future, the program will continue to focus on a consistent national approach for the early detection of target bee pests and diseases.

**Vegetable growers are urged to report any unusual plant or bee pests and diseases through the Exotic Plant Pest Hotline – 1800 084 881. Early reporting increases the chance of effective control and eradication.**

**EXOTIC PLANT PEST HOTLINE  
1800 084 881**

"By closely collaborating with beekeepers pollinating crops and promptly reporting any unusual symptoms or unexplained colony deaths, vegetable growers can provide vital information on the health of honey bees," said Ms Hilton.

The NBPSP is funded by Hort Innovation using research and development levies of 14 horticultural industries, with significant co-investment from states and territories and contributions from the Australian Honey Bee Industry Levies, Grain Producers Australia and the Australian Government. The NBPSP is coordinated by Plant Health Australia and delivered by states and Northern Territory government.



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# Reverse Trade Mission 2024

**The inbound trade mission aims to showcase Australia's vegetable, onion, and melon industries to international buyers from various trading partners.**

The 2024 Reverse Trade Mission ran from 28 May to 4 June, culminating at Hort Connections. This year, the program welcomed 40 international delegates representing eleven key export markets across the Middle East and Asia Pacific region, including Singapore, United Arab Emirates, Malaysia, Indonesia, Thailand, the Philippines, Hong Kong, Taiwan, Japan, South Korea, and Pacific Islands.

These markets have long been important trading partners for the Australian vegetable, onion, and melon industries. International trade development activities like the Reverse Trade Mission allow Australian grower-exporters to build business connections with international delegates, further strengthening and amplifying trade outcomes.

Above. Harvest Moon, Tasmania.  
Images courtesy Brisbane Event Photographer.

It provides the horticultural industry unique opportunities to showcase the Australian horticultural production capabilities as well as research and development (R&D) innovations that underpin Australia's ability to produce some of the freshest, highest quality vegetables to international buyers from various export markets. The connections and networks established through the Reverse Trade Mission have created a vast network of alumni and grower-exporters who can exchange trade and innovation ideas, insights, and expertise. This exchange has led to the forging of long-lasting business relationships, significantly benefiting all participants.

## Welcome Reception

The Reverse Trade Mission program commenced with a Welcome Reception hosted by AUSVEG and Global Victoria. This event set the tone for the week, providing an opportunity for delegates to network and engage in preliminary discussions about the mission's objectives.

Delegates were welcomed by AUSVEG CEO Michael Coote, Global Victoria Senior Trade Manager Food and Fibre Exports manager Ivan Veljkovic, Hort Innovation International Trade Manager Mimi Doan, and Austrade Senior Global Engagement Manager Phillip Georgios. They emphasised the importance of collaboration between the peak industry body, state governments, and research and development corporations (RDCs), with the primary objective of growing the agriculture sector. They highlighted the need for a united front to drive demand from international markets and achieve shared success in export growth.

## Exploring Victoria's agricultural hubs

The first day of farm visits began with tours of Velisha Farms, Fresh Select, and Tripod Farmers in the Werribee and Bacchus Marsh region. Velisha Farms, a family-owned business since 1949, is renowned for its innovative practices and commitment to quality as well as offering practical programs for schools in Victoria to encourage young people to pursue professions in agriculture.

Fresh Select, located in Melbourne's Werribee South region, the 'salad bowl of Victoria', is one of Australia's largest lettuce and brassica farms. The delegates enjoyed lunch at Fresh Select with dishes incorporating Nutri V vegetable powders.



Tripod Farmers, with its focus on sustainability, offers a unique perspective on modern horticulture. The delegates were welcomed with a demonstration on the latest laser weeder machinery. This cutting-edge tool uses precision lasers to target and eliminate weeds while leaving crops unharmed.

**A Day in the life of Victorian farms**

The trade mission journey started early with a visit to Bulmer Farms in Lindenow, East Gippsland, where delegates experienced firsthand the operations of a leading farm in the region. The group was greeted by the Bulmer team with a traditional Kiribati welcome dance by the workers. The visit included a detailed facility tour, a discussion on sustainable farming practices as well as a trip to the spinach field.

Following lunch at Bulmer Farms, the delegation proceeded to Dicky Bill in Maffra, known for its advanced farming methods and high-quality produce.

**Tasmania's agricultural excellence**

The Tasmanian leg of the tour started with Premium Fresh in Forth. Here, delegates were introduced to the unique agricultural conditions and practices that make Tasmania a crucial player in Australia's agriculture

sector. The tour continued to Harvest Moon, another major vegetable farm, where the delegates enjoyed lunch and engaged in discussions on market trends and future opportunities. In the afternoon delegates visited Sumich, further expanding their understanding of Tasmania's onion sector landscape.

**Diverse farming practices**

The delegation then returned to Victoria and visited Hussey and Co in Somerville, renowned for its innovative farming techniques and excellence in packaged salad products. This was followed by a tour of Peninsula Fresh Organics in Baxter, where the delegates received the opportunities to understand organic farming practices in Australia. The day concluded with a visit to Steritech Mickleham, providing insights into post-harvest treatments and biosecurity measures.

**Australian retail visits**

To provide a complete picture of the Australian supply chain, the sixth day featured a visit to the South Melbourne Market, allowing delegates to see the endpoint of the supply chain and how fresh produce is marketed and sold. This was followed by tours of Coles South

Melbourne and LaManna Supermarket, where the focus was on retail operations and consumer trends.

**AUSVEG Fresh Produce Showcase**

The final day of the program concluded with the AUSVEG Fresh Produce Showcase, a highlight event for international businesses who participated in the week-long program. Grower-exporters from the Australian horticultural industries, including vegetable, onion, potato, melon, citrus, berries, stone fruits, apple, and banana industries showcased their products to international buyers and significant business interest was generated as a result of the event.

Delivered by AUSVEG and supported by Hort Innovation, Global Victoria, and the Tasmanian Department of State Growth, this year's AUSVEG Fresh Produce Showcase expanded its footprint. The event now features a broader range of citrus varieties and highlights diverse regions across Australia renowned for producing the highest quality fresh produce.

Above L-R. Velisha Farms and Tripod Farmers. Below L-R. Fresh Select, Dicky Bill and Bulmer Farms. Images courtesy Brisbane Event Photographer.







**Key takeaways and future prospects**

The 2024 AUSVEG Reverse Trade Mission underscores Australia's commitment to being a global leader in horticulture. By fostering international relationships and showcasing the industry's excellence, the program paves the way for a sustainable and prosperous future for Australian vegetable growers.

As the world continues to seek high-quality, clean, and sustainable food sources, Australia's horticulture industry is well-positioned to meet this demand. The connections and partnerships formed during the Mission will undoubtedly contribute to the growth and success of the industry, ensuring that Australian vegetables remain a staple in markets around the globe.

The inbound trade mission received positive feedback from delegates, who appreciated the opportunity to meet growers and visit farms in key horticulture production areas of Victoria and Tasmania. Some immediate trades have commenced after the Mission with most of the delegates indicating they expect significant trade to happen as a result of their participation. The majority of the delegates would welcome the opportunity to attend similar trade development initiatives in the future.

It is crucial for Australian vegetable, onion, and melon grower-exports to continue to amplify their presence in these export markets. By expanding their reach, they not only open new avenues for trade but also contribute significantly to the prosperity of the industry as a whole. For example, increased visibility in international markets can lead to higher demand and better pricing, benefiting growers and strengthening the sector. Just as a well-nurtured plant yields a bountiful harvest, a robust export presence fosters growth and resilience in the agricultural industry. This strategic focus helps ensure the continued success and sustainability of Australian produce on the global stage.

The Reverse Trade Mission 2024 was a testament to the strength and potential of Australian agriculture, and its success will inspire future endeavours aimed at fostering international trade and cooperation in the sector.

Above L-R. Harvest Moon. Below L-R. Sumich, Tripod Farms, Fresh Produce Showcase. Images courtesy Brisbane Event Photographer.

The 2024 Reverse Trade Mission was funded through the Hort Innovation Vegetable, Onion and Melon Funds and was supported by Global Victoria and Tasmanian Department of State Growth. The Australian Trade and Investment Commission (Austrade) has also provided substantial assistance to the program.

**Hort Innovation** MELON FUND

**Hort Innovation** VEGETABLE FUND

**Hort Innovation** ONION FUND

**FIND OUT MORE**

Please contact Andrea Lin, International Trade Specialist, AUSVEG [andrea.lin@ausveg.com.au](mailto:andrea.lin@ausveg.com.au) or +61 3 9882 0277

The Multi-industry Export Program is a strategic levy investment under the Hort Innovation Vegetable, Onion and Melon funds.

Project: MT21009



# Supply chain traceability for transparency, provenance and quality

The project *Accelerate adoption of modern supply chain traceability solutions by vegetable producers*, funded under the DAFF Traceability Grants Program Round 2, investigated best practice systems to aid growers, packers and distributors of export vegetables.

Today's world is marked by increasing consumer awareness, with demands for greater transparency regarding the origins and journey of their food products, information about ingredients, production processes and supply chain practices.

Modern consumers have become more concerned and aware of the safety, quality, and ethical aspects of the food they consume. In addition, incidents of foodborne illnesses and product recalls have heightened awareness about the importance of food safety and traceability. As such, supply chain transparency, product provenance and traceability, and regulatory scrutiny has emerged as a critical imperative for food producers and businesses across industries.

AUSVEG, under the DAFF Traceability Grants Program Round 2, was awarded grant funding for the project titled *Accelerate adoption of modern supply chain traceability solutions by vegetable producers*. This initiative aimed to assess current traceability solutions available in the market and create and disseminate a business decision-making guide for exporting vegetable producers to accelerate adoption of modern supply chain traceability solutions across the vegetable industry.

The project's scope encompassed analysis of 10 key vegetable export crops – carrots, potatoes, onions, brassicas, asparagus, lettuce, celery, beans, pumpkin, and tomatoes, which collectively represent more than 90 percent of fresh vegetable exports. By delineating supply chains and evaluating risks across different channels to market, it aims to deliver current information directly to producers to make better-informed decisions.

Structured in three phases, the project mapped out the vegetable export supply chains, followed by a comprehensive risk assessment highlighting low, medium, and high-risk crops and channels. Subsequently, the focus shifted to bridging traceability gaps through the recommendation and dissemination of crop-specific traceability guides. Ultimately, the project will equip producers with indispensable tools for informed decision-making and foster the accelerated adoption of modern traceability solutions across the vegetable industry.



The report investigated the evolving landscape of the Australian vegetable export supply chain, where stakeholders demand greater visibility into the journey of products from source to consumption. It highlights the need for proactive measures to ensure seamless adherence and retain market access, and discovered critical insights into the complexities and interdependencies within the Australian vegetable export supply chain.

**It showed that each stage of the supply chain is interconnected, and disruptions in one area can impact the entire chain significantly, imposing risks for traceability, quarantine, quality, microbial, chemical and food safety.**

The most distinctive stage within the vegetable export supply chain has been identified as the sorting, grading, and packing stage, which has significant variation as growers prepare orders according to the individual requirements of customers and importing countries. This is a critical stage which helps to prevent and reduce the risks associated with food safety.

Through the risk assessment of vegetable export supply chains by channels to market, the report outlines best practices in managing different type of risks at each stage of the supply chain as it aims to enhance brand reputation and improved risk management.

Strong traceability systems enable rapid identification and containment of contaminated products, reducing the risk of widespread outbreaks and protecting public health. The report identifies challenges such as fragmented data systems, limited supplier collaboration, and lack of standardised regulatory requirements.

Growers and stakeholders within the supply chain are encouraged to embrace cutting-edge technologies such as RFID, blockchain, and IoT sensors to revolutionise the existing supply chain. By leveraging these tools, stakeholders can enhance traceability, streamline logistics, and elevate transparency, setting new benchmarks for efficiency and reliability. In the report, growers and producers are presented with actionable considerations into different type of traceability technologies to navigate the complexities of supply chain transparency.

The *Accelerate adoption of modern supply chain traceability solutions by vegetable producers* report underscores the imperative for Australian vegetable industry growers and producers to prioritise transparency as a foundation of their export supply chain

strategies. By embracing transparency, businesses can not only mitigate risks and drive operational efficiencies but also foster trust, resilience, and long-term value creation in an increasingly inter-connected global marketplace.

Exporting growers will soon to be able to access the crop-specific traceability guides online through the AUSVEG website.

**FIGURE 1. OVERVIEW OF VEGETABLE EXPORT SUPPLY CHAIN MAPPING**

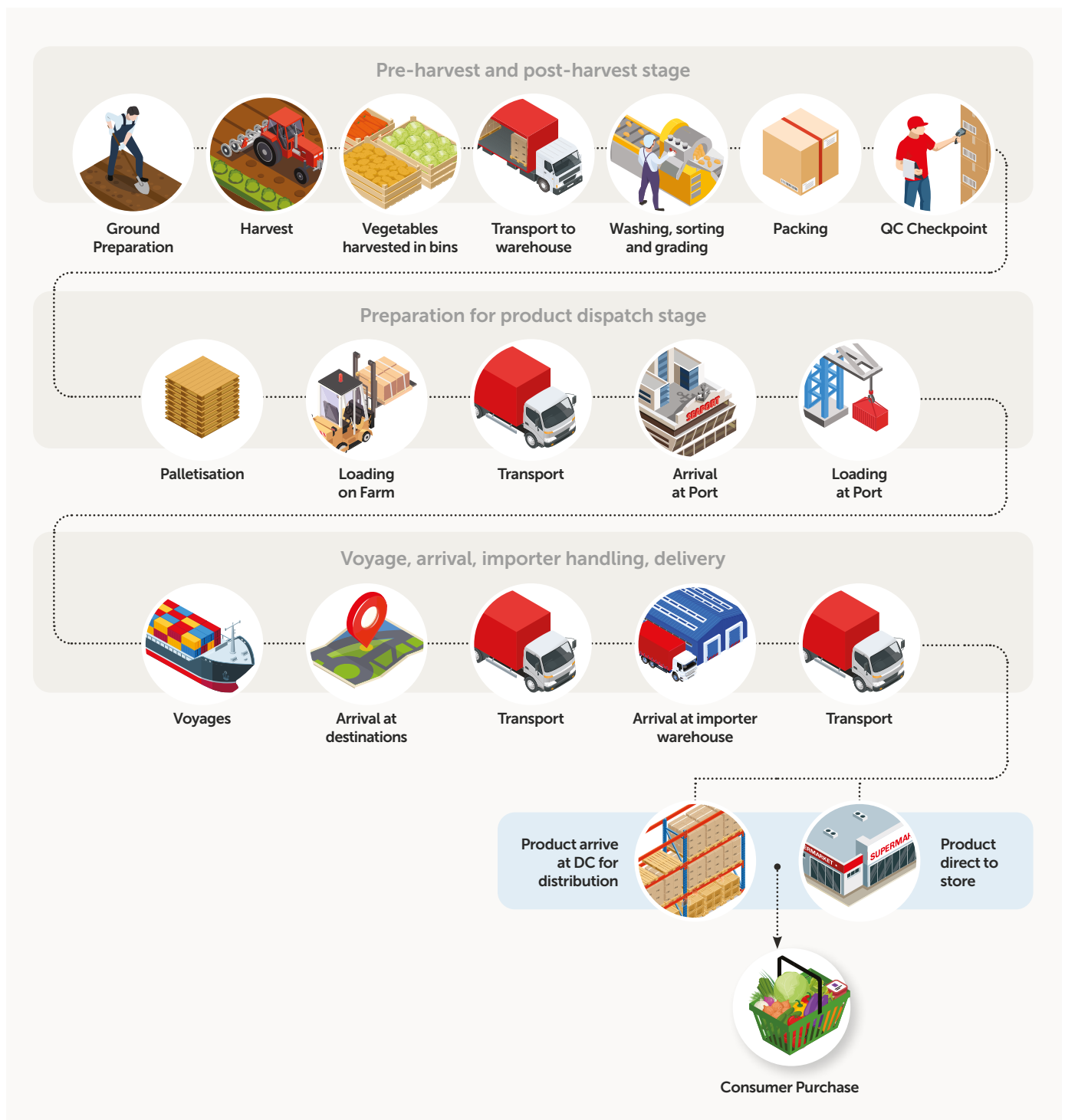
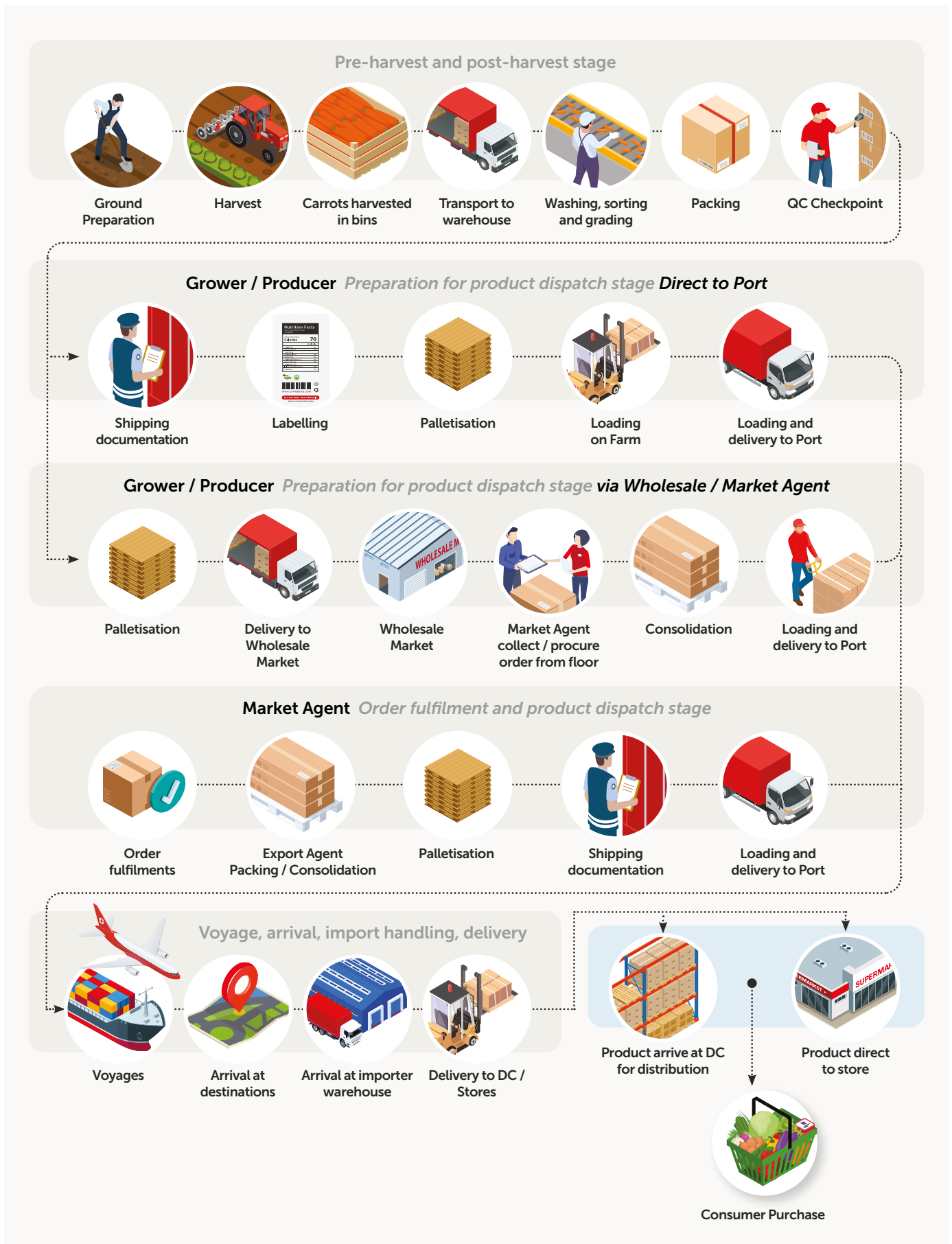


FIGURE 2. OVERVIEW OF VEGETABLE EXPORT SUPPLY CHAIN MAPPING FOR GROWER DIRECT / INDIRECT EXPORTING TO INTERNATIONAL MARKETS



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## Maximise your crop potential with GAXY

The benefits of seaweed extract have been proven by science and are widely used in sustainable farming and agriculture. But are all seaweed extracts the same? And what should you consider when choosing one that's right for your cropping operation?

Ian Cass, Marketing & Business Development Manager at UPL Australia, says that choosing a high-quality extract is vital with these kinds of products.

"When we looked at introducing our Bio-solutions range in Australia we wanted to make sure we were offering something unique in the market," he said.

"Gaxy was an obvious choice as it brought to the market Australia's most concentrated natural BioSolution, meaning lower application rates and cost savings compared to competitor kelp extracts."

Mr Cass said that one of the benefits of Gaxy is that it's formulated specifically for ease of use and tank mix compatibility, a consideration that is often overlooked.

Made from one hundred percent cold-pressed, super-concentrated *Ascophyllum nodosum* filtrate, Gaxy is sustainably hand harvested from the north Atlantic Ocean and then extracted within 24 hours using a unique, patented cold pressed, cell burst extraction process.

"This extraction process delivers a concentrated and compatible extract to maximise your crops natural growth potential," said Mr Cass.

"No heat or chemicals are used during extraction – which is important because heat treatment can affect the biological activity of the seaweed extract and additives can affect the product's compatibility."

Many seaweed extracts are made using alkaline products to speed up the extraction process. These alkaline extracted filtrates may lead to incompatibility reactions when tank mixed with other crop protection products and nutrients.

"Gaxy's extraction process delivers a concentrated and compatible extract that makes it easy to use in the paddock," said Mr Cass. "It has good compatibility with other biological and crop protection products compared to competitor products, giving flexibility in application."

"And because of Gaxy's high concentration," he added, "growers can also realise cost efficiency from a significantly lower application rate than competitor products."

Two applications of Gaxy are recommended for leafy and other vegetables at 2–400ml/Ha.

For horticultural fruit and vegetables, one or two applications of Gaxy at 250–300ml/Ha are recommended.

"In a situation where you wish to apply to two hectares of fruiting vegetables; tomato, capsicum or cucurbit for example, a grower would need up to one litre of Gaxy compared to 18, 24 or 60 litres of three common seaweed extracts used in commercial farming (at recommended use rates)."

"When you combine that with the fact that Gaxy is highly compatible in common tank mixes, the operational benefits to your enterprise make it a compelling option."

An added benefit of Gaxy's high concentration is that it comes in one and five litre containers, reducing the number of 20 litre drums to handle and store on-farm.

"For anyone looking for a high-quality organic input to maximise their crop potential, while at the same time delivering cost savings and operational benefits, Gaxy delivers on both fronts" said Mr Cass.

"I encourage growers to consider trying Gaxy this season to compare the benefits for themselves."

**FOR MORE INFORMATION**  
Visit [upl-ltd.com/au](http://upl-ltd.com/au)

# onion fund update

This project has been funded by Hort Innovation using the onion research and development levy and funds from the Australian Government. For more information on the fund and strategic levy investment visit [horticulture.com.au](http://horticulture.com.au)

**Hort  
Innovation** **ONION  
FUND**



## US onions expert brings expertise to Australian onion industry

The onion levy fund supported the visit of USA researcher Dr Daniel (Dan) Drost to visit Australia to share his expertise on nutrition and weed management in onion crops.

Dr Drost's discussions and presentation during Hort Connections focused on four core topics of crop management:

1. Insect threats and control strategies
2. Weeds and crop interactions
3. Nutrition connections
4. Water management

Dr Dan Drost is Professor Emeritus of Horticulture and former Extension Vegetable Specialist in the Department of Plants, Soils and Climate at Utah State University.

Dan and his family moved to Utah in 1992 after he was appointed the Vegetable Specialist for Utah State University. Since then he has helped Utah's vegetable industry remain competitive and sustainable. Dr Drost' responsibilities include efforts in extension, research and teaching that addresses plant growth and crop production issues that impact Utah's commercial vegetable farms. He worked extensively with Utah's onion industry to combat onion thrips, iris yellow spot virus, and improve their irrigation management. He was part of several national onion research programs that addressed common problems for all onion growers. He has shared these findings with onion producers in England, Germany, New Zealand, and across all important onion growing regions in the United States.

The spectrum of conversation and presentation during Dr Drost's visit covered off on subjects that form the programming of the onions communications and extension program. Identification of the key focus areas are the result of a needs analysis consultation by the project team led by Zarmeen Hassan from AUSVEG and endorsed by the regional grower groups constituted by growers and agronomists.

Dr Drost also shared his perspective from a global stage and highlighted issues that he sees the global industry facing. In his opinion, some of the bigger concerns facing the US and world onion producers continue to be labour, climate uncertainty, increasing production costs, and harvest consistency.

Dr Drost said that labour will always be an issue so finding ways to stabilise production from year to year can help growers better manage their existing labour. Climate uncertainty (colder/hotter/wetter/drier) can lead to plant stress that impacts leaf number and size which directly impacts bulb development. How growers manage the crop throughout the season can have a significant influence on harvest consistency and quality. Importantly, with a good understanding of plant physiology, farm management practices (fertiliser, water, pest management) are optimised and this





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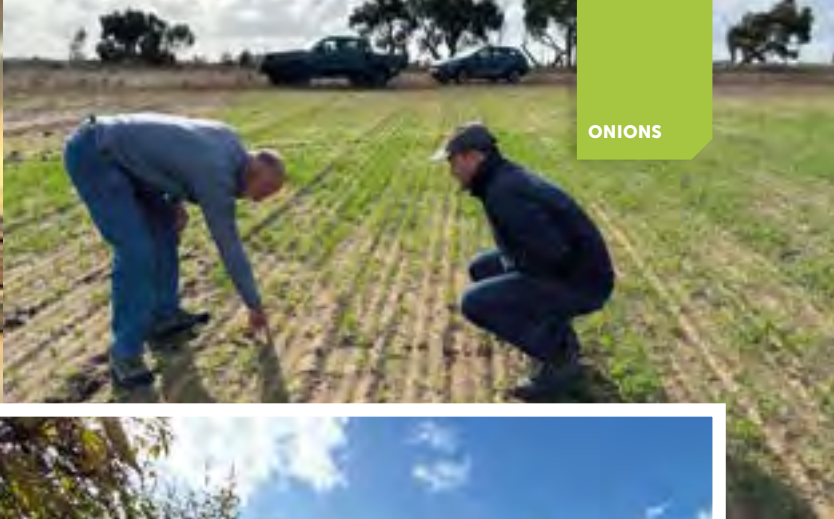
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Dr Daniel Drost, joined the Onion Tour for farm visits to South Australia and Tasmania.



ONIONS



helps keep costs in check. When costs are contained and growth optimised, a superior product is grown that provides for economic sustainability.

Sharing his US experience, Dr Drost highlighted that onion (*Allium cepa L.*) is the third most-consumed vegetable in the US. The crop is grown on 130,000 acres across the country, with an average yield of 547cwt/ac, or 1.35t/ha, and has a farmgate value of nearly \$US1.5b per year. Per capita consumption in the US is about 9kg per year. Furthermore, 20 percent of the world's onion seed (valued at more than US\$100m/year) is produced in the US.

Onion crops are damaged by a spectrum of pests and pathogens. Onion thrips are the most serious pest and these feed on onion leaves significantly reducing onion bulb yield and quality (30-50 percent). Thrips rapidly develop resistance to insecticides and spread plant pathogens like iris yellow spot virus (IYSV) that further reduce bulb yield/quality and seed production. Furthermore, a variety of fungal and bacterial pathogens (most serious: Stemphylium leaf blight (SLB), purple blotch (PB), downy mildew (DM), black mould, Botrytis leaf blight (BLB)/blast and neck rot, Fusarium basal rot (FBR), pink root, white rot, powdery mildew, sour skin, slippery skin, centre rot, leaf streak, soft rots, and Enterobacter bulb decay, cause additional onion yield losses in field and storage facilities.

Each disease can cause crop losses of 25-100 percent. Growers in some of the historical production regions in the US have abandoned onion farming because of losses caused by these organisms. Stakeholders in the US have identified thrips, IYSV, and many of these fungal and bacterial pathogens as significant threats to the sustainability of the onion industry. Allium researchers from across the U.S. formally organised the National Allium Researchers Conference (1985) to discuss and address recurring problems

facing onions and other allium crops. These meetings helped address recurring issues impacting onions.

As part of the onion project Dr Drost joined delegates on grower visits for one-on-one engagement with South Australian and Tasmanian onion growers. This really was an opportunity to bring growers and research together on farm, where they were able to show the nutrition and weed challenges on farm and have discussion, advice and expertise from Dr Drost.

A grower group meeting was arranged with agronomists and growers at Forthside at the Tasmanian Institute of Agriculture where he discussed how minor adjustments in production strategies can support management of issues.

**The presentation and grower visits focused on how landscape diversity, minor changes in production strategies, and unique farm innovations lead to better understanding of common problems and pioneering solutions that are easily adopted by growers in Australia and world-wide.**

As part of the monitoring and evaluation of the program, this inbound study tour was perceived as a valuable event for the onion growers that participated and will be followed by an outgoing tour for the growers during the next 12 months.

The project *Onion international study tours* is funded by Hort Innovation using the onion research and development levy and contributions from the Australian Government.  
Project: VN22000

**Hort Innovation** **ONION FUND**

# Holistic approach to onion management based on observation and research



Pests, diseases and weeds are as much a threat to the US onion industry as they are in Australia. Dr Daniel Drost shared his knowledge and experience of dealing with these threats that has real world applications to Australian onion production systems.

US onion production is in the order of US\$1.5b a year, across seven main regions

Above. Dr Daniel Drost, joined the Onion Tour for farm visits to South Australia and Tasmania.

around the country. Onion growers typically aim for larger bulb sizes to meet the processed onion market specifications.

While each region may have localised pressures, commonalities such as onion thrip and weed management warranted national collaboration between a number of researchers including Washington State University and Utah State University.

Onion thrip (*Thrips tabaci*) has been identified as a high priority pest in the US, and a vector for iris yellow spot virus. Onion thrip can cause significant impacts to production yield and quality.

Research across a number of farm systems throughout the year, showed that thrip

counts per plant were variable and that red onion varieties tended to be more heavily impacted.

“The initial research showed that some farms could have low numbers in the summer in one year, and high numbers the following year,” said Dr Daniel Drost of Utah State University.

“It was important that we learned the thrip lifecycles to better determine how to combat the problem.

“Each adult is highly reproductive, and all adults in the field are female and capable of laying eggs, so the populations can explode very quickly. Given that the chemistry half-life is relatively short, the net effect is very

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## Meet Dr Daniel Drost

Dr Dan Drost is Professor Emeritus of Horticulture and former Extension Vegetable Specialist in the Department of Plants, Soils and Climate at Utah State University. Dan grew up on a small diverse farm in western Michigan where he learned the meaning of hard work and how to trouble shoot problems. He received a BS degree in Agricultural Education (1979) and MS in Horticulture (1982) from Michigan State University. After teaching in the Horticulture Department at Massey University, New Zealand for several years (1983-87), he completed his education at Cornell University, receiving his PhD in Vegetable Physiology (1991).

Dan and his family moved to Utah in 1992 after he was appointed the Vegetable Specialist for Utah State University.

Dr Drost' responsibilities include efforts in extension, research and teaching that addresses plant growth and crop production issues that impact Utah's commercial vegetable farms. His extension/research interests extend to a variety of crop production issues common to Utah farms. He worked extensively with Utah's onion industry to combat onion thrips, iris yellow spot virus, and improve their irrigation management. He was part of several national onion research programs that addressed common problems for all onion growers.

Dan was a key speaker for the Onion event at Hort Connections 2024.

little protection, creating a futile cycle of spray and monitor, spray and monitor."

The management plan evolved to reduce thrip populations, not eradication using integrated cultural practices.

Dr Drost says that growers are best placed to trial and observe the changes that are made on farm, under their own farming system. A reduction in nitrogen application by a number of innovative growers showed that it reduced thrip populations without adversely affecting the onion yield or quality.

In order to grow and reproduce, onion thrips require protein and nitrogen from the plants. With lower levels of nitrogen applied to the crop, the protein levels are reduced, restricting the number of eggs that can be laid. The flow on effect was that those farmers were able to reduce the number of chemistry applications from the average of seven to eight per season, to just one or two. The level of iris yellow spot virus had also noticeably dropped.

### Integrated management for rotations and weeds

"Lowering nitrogen application however, is not a silver bullet solution," said Dr Drost.

"Crop rotations, host plants and weeds also need to be considered in order to keep the onion thrip numbers down during the winter, so they are manageable in the early stages of onion growth.

"In the US typical crop rotations are lucerne, wheat and corn to provide silage for the dairy industry. However, if lucerne is growing adjacent to onions, there is opportunity for onion thrips to move with each lucerne cut forming a green bridge between crops. The same for wheat when it starts to dry out – thrips will look for another host."

Dr Drost said that growers need to be cognisant of what commodities are cropped adjacent to onion fields, as well as the rotation for disease management in-field. Dr Drost's team found large numbers of adults in corn, but not eggs - it is likely that the coarseness of the leaves is the deterrent.

Weeds such as mallows, flixweed and dandelion can also be hosts. Using pre-emergent chemistries prior to the first true leaf, and post-emergent chemistries after the first two true leaves are developed will minimise the 'weed hotel for thrips' and

lower the risk of iris yellow spot virus.

Dr Drost said it was also important to manage weeds on the crop perimeters, as onion thrips are good fliers and can move to the onion plant once it has emerged.

### Holistic 'farmscape' for improved onion quality

One of the key messages from Dr Drost was that while many of the issues facing onion growers have commonalities across the world, each farm has its own 'farmscape'. By understanding the local nuances of climate, weather and other factors local to the farm, the grower can fine tune production inputs such as water in response to local conditions.

Traditionally in the US, onion production was based on furrows whereby water was driven from one side of the field to the other, relying on the ground to be sloped.

With increasing pressure for usage, water security particularly in the western US, is driving many onion growers to be cognisant of how water is used, its wastage and timing to give the desired production outcomes with less. Growers are now switching to drip systems, reducing the amount of water needed for the same production outcomes.

### "When you grow an onion crop, the commonalities are greater than the differences around the world.

"The research that we do, that information can be shared, but the nuances of the farm – the farmscape - are better understood by the farmer. The climate and weather might be different from farm to farm, so our role is to listen to your local issues and see what we can do to find a solution.

"Ultimately a farm is a business, so we need to understand the common issues, but also the local factors that affect onion crop variability.

"It has been a real pleasure to visit Australia and see that onion growers here face much the same challenges in the US and around the world, but also to learn from each other."

The project *Risk and crisis management planning for the onion industry*, and *Onion international study tours* are funded by Hort Innovation using the onion industry research and development levy and contributions from the Australian Government.

Projects: VN20001, VN22000

**Hort Innovation** **ONION FUND**



## What started as a farm-sit has given Bowhill Produce a family legacy for growing onions and carrots

Bowhill Produce principally grows onions and carrots on the banks of the Murray River in the Murray Bridge region. Through trial and error, and learning from their peers, the Smith family have built a farm enterprise for future generations.

James Smith of Bowhill Produce is a third-generation onion and carrot grower, which began with humble beginnings when his grandfather managed a neighbour's onion farm for a month, getting under his skin enough to buy his own farm.

Located on the banks of the Murray River in the Murray Bridge, SA region, Bowhill Produce started as just a few acres. Under James' father Kevin's management, the farm is now 2,000 acres with around 250 acres under onions and carrots per year and a further 3,500 acreage for broadacre crops such as canola, lentils, wheat, barley and ryecorn.

Brown onions form the majority of the varieties grown along with red and white varieties. The brown and red onions are sold into the domestic wholesale market, while the white onions are mainly exported to the Middle East and Europe. The farm also works with onion seed companies to conduct trials to improve onion varieties.

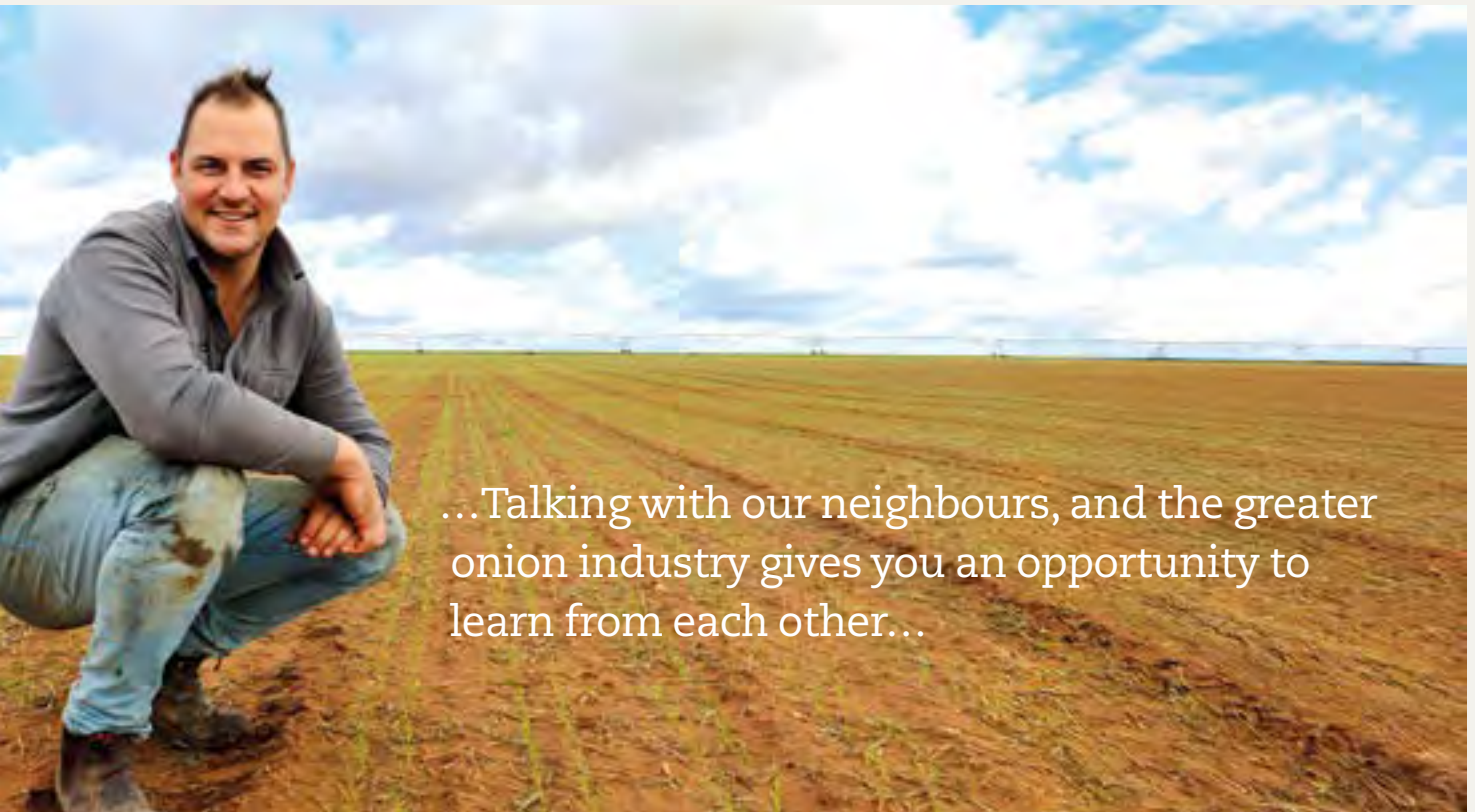
"We plant the brown onion varieties from May with successive plantings all the way through to mid-September," said James.

"The early plantings of brown onions do not have a long storage and need to be sold quickly. The later in the season we plant, generally the longer shelf life they have. Some are stored in the open air shed, and some in cold storage.

"We have been exporting white onions for at least 30 years. The price of freight since COVID has definitely increased, along with rate changes to Europe from geopolitical issues. It is a lot more complicated to export, but we have a good relationship with our buyers, so it is worth sticking with it."

The region is well known for its deep sandy loam soil and windy conditions. Cover crops form an important aspect of the farm to hold the soil in place between harvests as well as for soil health. Typically, James will plant ryecorn in the onion and carrot crops, terminating it as the plant matures. The use of ryecorn also lowers the risk of disease, particularly nematodes for carrots. Rotation is typically onions, then carrots followed by a cereal crop. Depending on the rotation of the broadacre acreage, a legume crop may be used, before one or two seasons of ryecorn that will be turned in as green manure.

One of the major issues for onions is herbicide resistance in ryegrass. To manage that risk, James says that keeping the onion fields clean and minimising broadacre crop cross-over lowers the likelihood of ryegrass coming through a wheat or barley crop and keeps the seedbank down.



... Talking with our neighbours, and the greater onion industry gives you an opportunity to learn from each other...

Irrigation is sourced from the Murray River which can bring its own set of challenges. Most growers in the region pump directly from the river. In times of flood as in 2023, the pumps were at risk of becoming fully submerged, but once the flood levels receded, mud in the pumps and pivots became a problem. As part of quality assurance, the water is tested regularly to ensure it is clean.

#### Evolving and learning

When James' grandfather managed the farm, onions were harvested by hand and loaded into small crates.

With any business the aim is to improve efficiency, so now the onions and carrots are machine harvested and loaded into tonne bulk bins. Other improvements have included large modern self-propelled spraying equipment that lowers the use of water and chemicals, and improve the rate of spraying to take advantage of spray windows to gain the maximum benefit. Automation of irrigation has also given time back to James, such that it can be operated and monitored remotely from a mobile device.

As the business has grown, the pressure on the packing shed means that improving efficiencies in packing, grading and storage will be next and will give greater scope for production increases in both onions and carrots in the future.

James has spent time away from the farm, and has returned to take over management from his father. The experience off-farm he says, has given him self-improvement that has enabled him to improve the quality of the produce grown on the farm.

**"I always strive for improvement and want to come up with better ways of doing things," said James.**

"We definitely have some challenges such as the chemistries available to manage ryegrass. Increases in fertiliser, fuel, and other costs have also added pressure to ensuring we are efficient.

"Seeing what onion varieties might work, or how to manage downy mildew can be farm specific, but other growers are willing to share their knowledge.

"Facing those challenges and finding better ways is why I like what I do. Talking with our neighbours, and the greater onion industry gives you an opportunity to learn from each other, to see what works, and what doesn't. Doing it together is definitely a better way forward.

**"For young growers, I would say don't be scared to ask questions of people in the industry or take advantage of organisations such as AUSVEG who bring people from all over the world to talk with growers and conduct farm tours. See how other people do things and bring those ideas back to your farm."**

This project is a strategic levy investment in the Hort Innovation Onion Fund.

Project: VN22000

**Hort Innovation** **ONION FUND**



## Benchmarking drives success for interstate expansion

From a small family market garden at Virginia, north of Adelaide, the Ly family's business has grown to become a major player in the Australian fruit and vegetable industry.

4 Ways Fresh Produce, started by Vietnamese-born brothers Duy and Tam Ly in 2001, began as a means of selling their produce through the South Australian Produce Market at Pooraka.

Initially, they sold through other merchants, but since 2001 have had their own stall at the market and operate as wholesaler, packing and selling their own fruit and vegetables as well as that produced by hundreds of growers across the country.

4 Ways Fresh Produce, which specialises in cucumbers, eggplant, zucchini, capsicums and tomatoes, also sells directly to major retailers including Coles, Woolworths, Aldi, Foodland, IGA and Costco.

Even though the business has mostly focused on wholesaling, it has expanded its growing facilities into Western Australia, and in 2022 became involved in a \$15 million joint venture at Geraldton with Indigenous Business Australia (IBA) and Yamatji Southern Regional Corporation.

The plan is for the new company, Yamatji Fresh Produce, to develop 300 greenhouses for growing cucumbers on land adjacent to

300 greenhouses already operated by 4 Ways Fresh Produce.

4 Ways Fresh Produce general manager Kingsley Songer, who has overseen the project, said expansion into WA had been 'very advantageous' for the business, which now operates a stall at the Perth Market.

"It's an ideal climate for growing cucumbers in particular, which is what we were buying there during our winter," he said.

"Summer is hot but from the end of March right through until the end of November, we can grow very good quality cucumbers, which is exactly what's happened over the eight crops that we've grown there."

Mr Songer said the joint venture was an opportunity for the business to increase production as well as providing jobs close to Geraldton for local First Nations people.

Production in the first 100 new greenhouses began in July, with continental, Lebanese and green cucumbers. The extra space also will allow for crops of tomatoes and eggplants this year, with capsicums and some other crops likely to be added in coming years.

Mr Songer said access to benchmarking data had been key to successfully obtaining funds for the joint venture through IBA, and other projects.

When WA-based farm business consultants Planfarm began offering its benchmarking and consulting services to horticulture businesses in partnership with vegetablesWA seven years ago, 4 Ways Fresh Produce was among the first vegetable growers in the state to sign up.

Mr Songer said benchmarking was essential to fully understanding things like return on investment, costs as a percentage of turnover, yield per hectare and the viability of particular crop types, as well as comparing a business's performance against others.

Above. 4 Ways Fresh Produce General Manager Kingsley Songer checks pre-packaged capsicums in the packing shed at Virginia, South Australia.



4 Ways Fresh Produce General Manager Kingsley Songer (left) and chief executive officer Duy Ly in one of the greenhouses producing cucumbers at Virginia, South Australia.

Without access to that data, growers were effectively asking investors and lenders to trust in their “gut feel”.

As an example, when 4 Ways Fresh Produce first considered establishing its own greenhouses at Geraldton a decade ago, they only had information about what had and hadn't worked in South Australia and what they were able to glean from established WA growers on which to base the decision.

“But in this venture with the IBA and Yamatji, one of the first things I sent them was the benchmarking study that we'd done on our Geraldton property for the last five years, because that showed an independent view of how we were performing against the industry,” Mr Songer said.

“It's a very powerful tool, because they get some assurance that these people actually know what they're doing. If you don't have a study like that, if you don't have that information, people have got to take you on your word.”

**Mr Songer said the benchmarking reports had shown the Geraldton operation paid for itself in a little over three years and was in the top 25 percent of WA vegetable producers in the data set.**

Yield per hectare, return per hectare and cost per hectare were better than average.

“When you get down to those levels and you see how you look against the industry, that's when you really can figure out what an extraordinary project we've actually finished up with over there,” he said.

“That to me was the real benefit we got out of doing a benchmarking study, and had we not done it, to this day we wouldn't have been any the wiser, whether we were any better or any worse than anybody else.”

Last year Planfarm was awarded a contract to extend its benchmarking to vegetable and onion growers with experienced project partners RMCG across Australia as part of a five-year initiative fully funded through Hort Innovation.

Called Level Up Hort, the program provides specialised business reviews, with a business consultant from Planfarm or RMCG, valued at up to \$10,000 per year.

Participants receive two reports – a full business analysis and a benchmarking report, both private and confidential, comparing their figures against others. Each year the participant data is de-identified, aggregated and reported on a per hectare basis or as ratios for a national report which completely anonymises growers.

The first national report released by Planfarm director of horticulture and agronomy Paul Omodei at Hort Connections in June represented 3,162ha of vegetables and onions across six states.

Its major finding was that the most profitable 25 percent of businesses recorded greater profit per hectare – also known as earnings before interest and tax – even though they spent more money per hectare of production in 2023 or 2022-2023.

**The top 25 percent generated profit of \$22,567/ha compared to \$2906/ha for the average, and a loss of \$16,827 for the least profitable 25 percent.**

Mr Songer said the one-on-one sessions were a valuable tool for getting a different perspective and identifying those parts of the business that were underperforming, regardless of whether it was making an overall profit.

“Normally, it won't be the whole business in the bottom 25 percent,” he said.

“There may be certain parts of the business that are out of kilter. People can question why they're growing tomatoes for example if the yields per hectare, costs per hectare or return per hectare are below the benchmark.”

While Mr Songer retired in July, future plans for 4 Ways Fresh Produce include adding to its three Virginia farms with more greenhouses on land nearby, as well as developing a new 48ha block leased at Carnarvon, in north west Western Australia, for production of Asian vegetables, melons and pumpkins.

#### FOR MORE INFORMATION

To enquire or enrol in the Level Up Hort program, contact project manager Steff Carstairs on 0428 712 852, email [steff@planfarm.com.au](mailto:steff@planfarm.com.au) or go to the website [leveluphort.com.au](http://leveluphort.com.au) for more information and FAQs on who to contact in your region.

Level Up Hort is funded through Hort Innovation, using vegetable and onion research and development levies together with contributions from the Australian Government.  
Project: MT22009

**Hort Innovation** **VEGETABLE FUND**  
**Hort Innovation** **ONION FUND**



# Award-winning chef helping Australian onions from unsung hero to the star of the plate

Executive chef Telina Menzies is a self-confessed onion fan.

"I use onions in everything. I absolutely love them," said Telina Menzies.

"I love the smell of onions. It's so nostalgic. A Bunnings sausage sizzle is one of my favourite things, but do you know why? It's not the smell of the sausages cooking, it's the onions!"

Since starting an apprenticeship at age 17, Telina's career has soared. Telina has won multiple awards, cooked for the Royal Family and is now Executive Chef at the Hotel Esplanade and mentors chefs cross 28 venues.

Telina has supported the Hort Innovation *Onion nutrition education program for health professionals and the food service industry* (VN20002) program, working with program delivery partner Straight To The Source to showcase Australian Onions at Fine Food Australia in 2022.

**Telina is ready to take to The Source Kitchen stage again and inspire food service professionals at the upcoming Australian Onions masterclass, at Fine Food Australia this September.**

"I want to challenge food service professionals to look at onions in different ways and think creatively," said Telina.

"We need to look at onions in a different way, because they are such a good price and such a versatile ingredient. Rather than using them as a base, we need to treat them as a star, like on a barbeque, roasting them and steaming them and using as them fillings for things like dumplings."

Above. Executive Chef, Telina Menzies

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“Support from Telina, and fellow chefs, has been invaluable,” said Straight To The Source’s Tawnya Bahr. “They have shared amazingly creative and delicious ways to hero onions, helping us deliver sessions that are impactful, highly inspirational and educational as well.”

The Hort Innovation *Onion nutrition education program for health professionals and the food service industry* (VN20002) program has helped to revitalise healthcare and food service professional interest in onions and inspire recommendation and usage.

Survey results, from the end of year three, showed two thirds of food service respondents (66 percent) included onions daily in recipes or menu items, up from 30 percent at the start of the program. While more than a third (39 percent) always included onion as a key ingredient in a meal or menu item, up from 22 percent at the start of the program.

Based on its success, the three-year program has been extended until February 2025. The extension activities include the upcoming Fine Food Australia masterclass, a food service workshop in Sydney, and an interactive exhibition at the Dietitian’s Australia conference.

The extension will also include maintaining the Australian Onions foodservice and health professional website hubs, ongoing digital communication program and reviewing the latest published health and nutrition science about onions.

Above. Fine Food Australia 2022 Australian Onion cooking demonstration participants.

“Onions can be used in everything and not just savoury dishes, but sweet ones too. You can use pastry as a vessel and use them to make something like a delicious tarte tartin.

“They can be fried, used in sauces, like a soubise, or used for their sweetness. They can be cooked low and slow in milk and salt. You’ll be amazed at the flavour you get out of the onions – they have many layers, no pun intended!”

At September’s Fine Food Australia, Telina will join the talented team from the Hotel Esplanade’s Mya Tiger and the Garden State Hotel’s Tippy Tay for the ‘Anything Goes...with Onions’ masterclass.

The amazing culinary line-up will be creating their take on a French dip sandwich, French onion toastie, Xiao-Long Bao dumplings filled with onion and onion ox dipping sauce as well as pasta made from onions.

The session showcasing brown, red, and white Australian onions will be hosted by Straight To The Source. It will also include nutrition tips from dietitian Teri Lichtenstein and farm-to-plate grower insights from John Tselekidis from Mitolo Family Farms.

This project has been funded by Hort Innovation, using the onion research and development levy and contributions from the Australian Government. Hort Innovation is the grower owned, not-for-profit research and development corporation for Australian horticulture.

Project: VN20002

**Hort Innovation** ONION FUND

## Current Projects

### HORT INNOVATION ONION FUND

#### OV National vegetable and onion benchmarking program MT22009

DELIVERY PARTNER: **PLANFARM**

This project is providing vegetable and onion growers with the ability to compare their businesses against national and regional benchmarking data. This will enable growers to track their own performance against industry averages and 'best in class' performance, providing the opportunity for positive practice change and farm business growth.

Each participating grower will directly have access to farm management consultants to discuss their performance, and industry as a whole will have access to five years of rigorous industry benchmark data.

If you are interested in being involved in the program to improve the profitability and long-term resilience of your business, go to [planfarm.com.au](http://planfarm.com.au)

#### OV Onion international study tours – inbound and outbound VN22000

DELIVERY PARTNER: **AUSVEG**

This project provides opportunities for Australian onion growers and supply chain participants to increase their awareness and knowledge of research and innovation in the global horticulture industry by delivering international industry study tours to key onion-growing regions worldwide.

The two-year program will deliver two international study tours for up to 18 onion growers and industry supply chain members that align with industry needs. The project will also bring two international researchers to Australia to visit key growing regions and attend industry events to help inject global knowledge related to technology and practices across the Australian industry without requiring every Australian grower to travel abroad.

This project will help ensure that the industry can build the capabilities of the Australian onion-growing community through increased networking, knowledge sharing and collaboration among levy-paying growers and supply chain members, which will improve the productivity, profitability and competitiveness of the industry.

Hort Innovation conducts a number of R&D projects funded by grower levies. Here is a list of some of the onion projects currently underway.

#### OV Onion industry minor use program VN16000

DELIVERY PARTNER: **HORT INNOVATION**

Through this project, levy funds and Australian Government contributions are used to submit renewals and applications for minor use permits for the onion industry as required. These submissions are prepared and submitted to the Australian Pesticides and Veterinary Medicines Authority (APVMA).

All current minor use permits for the industry are searchable at [portal.apvma.gov.au/](http://portal.apvma.gov.au/) permits. Permit updates are also circulated in Hort Innovation's *Growing Innovation* e-newsletter, which levy-paying

#### OV Optimising chemical and cultural control of onion white rot VN20007

DELIVERY PARTNER: **ARVENIS**

This investment is developing a more effective integrated disease management strategy for control of onion white rot. Onion white rot is a highly destructive fungal disease of commercial onion crops. This project seeks to improve current control methods for the disease, as well as identify new methods that can be used to combat onion white rot.

The research will incorporate:

- Development of a pre-plant soil DNA test to identify disease risk prior to planting.
- Identification and development of natural germination stimulants to reduce disease inoculum levels prior to planting.
- Optimisation of spray timing and dose rates of current fungicides.
- Identification of new fungicides and biological controls for onion white rot.

The project team will work closely with the onion industry to extend any new findings to onion growers. Regular updates will be provided to industry, as well as trial sites visits later on in the project to demonstrate the integrated onion white rot management program developed.

#### OV Accelerating the adoption of best management practices for the Australian onion industry VN21000

DELIVERY PARTNER: **AUSVEG**

This investment ensures the onion industry is equipped with the information and resources they need to adopt best management practices. Onion growers will be brought into the existing *VegNET 3.0* program for the vegetable industry to support increased awareness and adoption of R&D.

VegNET is a nationally-coordinated, regionally-delivered extension program that increases the industry's awareness of and engagement with best practices in high-priority areas. The program has regional development officers (RDOs) in ten key vegetable-growing regions around Australia.

A vital component of the program is the establishment of five regionally-based onion grower groups in Tasmania, Queensland, New South Wales, Western Australia and South Australia. The relevant RDO will work with each group to identify regionally-specific issues facing onion growers and work with them to host seasonal activities, including demonstration sites, field days, and grower walks.

A wide range of communications outputs will also be delivered to onion growers, including:

- The quarterly *Australian Grower* magazine, with 36 pages of dedicated onion content
- The *AUSVEG Weekly Update* e-newsletter, with onion content
- A range of onion-focused content such as videos, podcast, case studies, factsheets, media releases and social media.
- An annual disease alert poster.



# Current Projects

## HORT INNOVATION ONION FUND

### 📍 Epidemiology and management of fusarium basal rot in onions VN20006

DELIVERY PARTNER: **THE UNIVERSITY OF ADELAIDE**

This investment is developing an integrated pest and disease management (IPDM) strategy to reduce the impact of fusarium basal rot in onions. Infection of bulbs in the field has resulted in substantive losses in storage from this soilborne disease, however the epidemiology of the disease is not well characterised which limits capability to develop an appropriate management strategy.

In order to develop a best practice, cost-effective IPDM strategy, this project will improve understanding of the pathogen and its epidemiology, and evaluate the use of chemical, biological and chemical controls.



### 📍 Onion nutrition education program for health professionals and the food service industry VN20002

DELIVERY PARTNER: **BITE COMMUNICATIONS**

This investment is delivering evidence-based information about the health benefits of Australian onions to health and food service professionals in Australia.

On average, Australian adults consume just three grams of onion per day. In contrast, consumers in the United States and Europe consume twice as many onions as Australians. In order to close this gap, initiatives to educate health professionals and the food service industry are key as they are significant influencers of consumer food behaviour.

This project will extend previous research conducted by levy-funded project *Australian onions nutrition literature review* (VN18002) and the *Onions food service farm tour and education pilot* (VN18000) by communicating the nutritional benefits of onions to health professionals, food service professionals and industry stakeholders.

### 📍 Understanding and managing the impacts of climate change on Australian onion production VN23001

DELIVERY PARTNER: **THINKSTEP-ANZ**

This project will improve onion growers' understanding of the potential environmental impacts of the industry on a total and per kilogram basis and produce critical external communications based on the findings.

#### Challenge

Consumers and retailers are demanding increased transparency on sustainability, with some consumers willing to pay a premium for sustainability claims. Growers and supply chain partners are increasingly driven by sustainability-related accountability and assurance programmes extending to environmental and social issues.

While most growers would understand the types of environmental impacts, an industry approach is required so that impacts are measured appropriately and consistently.

#### Response

The project team is:

- Working with Australian onion growers to benchmark the environmental performance of onion production. With these benchmarks, including carbon emissions and water usage, growers can compare performance to the industry average and track improvements over time.
- Identifying the areas of greatest return/feasibility for practice change and the value of progressing alternative approaches.
- Providing insights to improve input management while maintaining yield and quality in a changing climate.
- Developing case studies to provide adaptation and risk mitigation options.
- Providing recommendations for industry to address gaps in knowledge and future R&D requirements (actions, mitigations or future R&D investments) to reduce future climate change risks.

#### Benefit

The findings from this project will directly benefit individual onion growers and the industry as a whole by providing a comprehensive understanding of the industry's environmental impact. These findings will also guide future strategic industry investments and support the long-term sustainability of Australian onion producers, enabling them to cater to key domestic and expanded export markets.

## Onion growers master soil-borne diseases in Adelaide



In May, South Australian onion growers and agronomists gathered in Adelaide with other vegetable growers for a two-day masterclass on managing soil-borne diseases. It was delivered by several subject experts as a collaboration between the Soil Wealth ICP project and the Onion extension project.

Onions are susceptible to a range of soil-borne diseases caused by fungi and nematodes, which can significantly impact the health and yield of crops.

Some fungal diseases affecting onions include damping off, onion stunt, white rot, pink root, black mould, and fusarium rot.

Managing these diseases involves implementing cultural practices, including crop rotation, and good nutrient and soil health management, as well as conventional control methods.

This intensive masterclass, delivered by a team of plant pathologists, nematologists, soil scientists, and extension specialists, provided an opportunity to learn more about these diseases, including symptoms and pathogen life cycles. The masterclass also facilitated practical sessions aimed at problem-solving, grower-to-grower discussions and developing management plans for a range of crops and diseases.

Field demonstrations and site visits allowed participants to experience and discuss management solutions for soil-borne diseases firsthand.

### Learning from the experts

Bringing all the experts together in one place at one time was central in delivering a comprehensive masterclass and integrating the knowledge and approaches required to manage soil-borne diseases effectively.

On the first day, the spotlight was on managing soil-borne pathogens, led by plant pathologist Dr Len Tesoriero.

Dr Tesoriero delved into major pathogens like pythium, phytophthora, fusarium, and verticillium, emphasising the importance of adopting preventative control strategies. He also explained the modes of action for various biopesticides, and the intriguing concept of 'Rhizosphere competence'.

Nematologist Dr Katherine Linsell (SARDI) provided an in-depth look at the classifi-

cation, life cycle, and feeding habits of both plant parasitic and free-living nematodes. For management strategies, Dr Doris Blaesing (Soil Wealth ICP) introduced a blend of biological, cultural, and chemical approaches for integrated control.

Additionally, plant pathologist Dr Michael Rettke (SARDI) compared traditional and molecular testing methods for diagnosing soil-borne diseases and discussed the benefits of pre-plant soil DNA testing.

Dr Kelvin Montagu (Soil Wealth ICP) highlighted the use of biofumigant cover crops to control diseases, showcasing different types of cover crops for various purposes, including trap crops and non-host break crops.

Above. Anthony De Ieso of Thorndon Park Produce talking to the group.



**Where to next?**

**Further information**

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

This guide has a chapter for spring onions, leek and garlic, and has answers to common questions including:

- What should I look for?
- Where will I see symptoms?
- What are the favourable conditions for disease development?
- How is it distributed in the field?
- How does it spread?
- How do I control it? Including guidance on managing during fallow/cover crop, planting preparation, and post-plant
- What is the host range?

[soilwealth.com.au/2019/06/soil-borne-diseases-in-vegetable-crops-a-practical-guide-to-identification-and-control/](http://soilwealth.com.au/2019/06/soil-borne-diseases-in-vegetable-crops-a-practical-guide-to-identification-and-control/)

Above. Growers chatting at the masterclass.

On the second day, the focus shifted to nutrient management and its impact on disease susceptibility. The discussions centred on diseases such as bacterial soft rot, sclerotinia, rhizoctonia, and club root, with a special emphasis on the role of calcium in disease prevention.

Camilla Humphries (Soil Wealth ICP) presented the latest chemical control options and strategies to manage fungicide resistance, highlighting emerging biopesticide and biostimulant products and their applications.

**Site visit: Insights from Thorndon Park Produce**

Participants visited Thorndon Park Produce, owned and managed by the De Ieso family, who grow a variety of vegetables including spring onions.

The farm has implemented a range of strategies to improve soil health and productivity. These strategies include conducting compost trials to address salinity issues; employing integrated management practices like deep ripping and crop rotations with residues for cash crops incorporated to maintain organic matter levels; and applying biological products as well as calcium cyanamide to enhance soil structure, reduce disease, and improve soil health.

Dr Blaesing believes that the collaborative approach to the masterclass was vital in facilitating an exchange of ideas that provided onion growers with practical tools and knowledge.

“A major benefit to participants was the opportunity to discuss disease challenges with peer and experts in a cooperative environment off-farm and develop their individual control plans with a focus on prevention and integrated management,” Dr Blaesing said.

The Soil Wealth ICP focuses on improving soil and crop health across the vegetable and melon industries by addressing growers' specific interests and regional issues, sharing knowledge and elevating sustainability. The Onion Project has been funded by Hort Innovation using the onion research and development levy and contributions from the Australian Government.

**FIND OUT MORE**

For more information, please contact project leaders Dr Gordon Rogers on 02 8627 1040 or [gordon@ahr.com.au](mailto:gordon@ahr.com.au) and Dr Anne-Maree Boland on 03 9882 2670 or [anne-mareeb@rmcg.com.au](mailto:anne-mareeb@rmcg.com.au).

The Soil Wealth ICP project has been funded by Hort Innovation using the vegetable and melon research and development levies and contributions from the Australian Government.

Project: MT22004

<b>Hort Innovation</b>	<b>VEGETABLE FUND</b>
<b>Hort Innovation</b>	<b>MELON FUND</b>
<b>Hort Innovation</b>	<b>ONION FUND</b>



# potato update

**Hort  
Innovation**

**POTATO –  
FRESH FUND**

**Hort  
Innovation**

**POTATO –  
PROCESSING FUND**

This project has been funded by Hort Innovation using the potato - fresh and processing research and development levy and funds from the Australian Government. For more information on the fund and strategic levy investment visit [horticulture.com.au](http://horticulture.com.au)

# World Potato Congress 2024 Adelaide

BY GEORGIA THOMAS, WAPOTATOES



The two-day World Potato Congress held in Adelaide in June provided more than 50 presentations covering climate change impacts and sustainability, potato nutrition and consumption, promotion of the industry and potato products and how to build collaborations between countries and regions to advance the industry.

## World potato production overview – Old world versus new world

The president of the World Potato Congress, Dr Peter VanderZaag told delegates that there are currently around 20m hectares of potatoes grown, producing over 374m tons around the world with over 1.3b people consuming potatoes as a staple food.

In around 2005 figures show that developing countries started to produce more than developed countries overall. Globally the main production growth is coming from Asia and Africa, with China and India the biggest producers.

## New Zealand and the US have the highest production per hectare, with Australia coming in at sixth overall.

Global production is projected to be 482m tons by 2050, with the Australia projected to produce 1.6m tonnes.

Looking to the future, Peter stated that with global production stagnating and production and productivity increasing, there is more downward pressure on producer prices which will continue – creating a scenario for structural transformation with most efficient growers (those with lower unit cost of production) staying in business.

Peter also suggests that food-omics, metabolomics and discovering new potato phytochemicals and bioactives will generate new information about the potential of potato to contribute to healthier diets.

Finally, there needs to be development of new markets and uses of potato with innovations on both the consumption and production side. As well as innovation to address environmental and social concerns.

## Climate change commentary

Keynote speaker and World Potato Congress Ambassador Anika Molesworth spoke from the heart about the future challenges of climate change and farming. She touched on the trend of the growing population against a backdrop of less arable land and the changing relationships between plant and animal species.

Anika also reported that potato production could fall by 32 percent by 2060 due to climate change impacts if we do not act. However, amidst these challenges lies opportunities for action towards sustainable and innovative solutions in the potato sector.

Her presentation also touched on how potatoes have been found in some studies to have lower greenhouse emissions and water demands compared with other staple crops like maize, wheat and rice on

a per-calorie basis (although regional and varietal variations exist), which is great news for the industry.

Another key message gleaned from talking to potato farmers around the world is that sustainability in the potato industry needs a holistic approach that addresses environmental, social and economic challenges.

There is a suite of tactics that can be adopted to contribute to emissions reductions and improve resilience against climate change. However, it takes everyone to consider their responsibility and start to make amendments.

Anika concluded her presentation with a call to action to everyone in the audience, to ask themselves “do I have the courage to help create change?”

This question was later addressed on the Global Potato Discussion Panel where speakers stated that part of the solution must be bringing the right people to the table to communicate and engage and to be clear on key messages.

The panel encouraged the audience to work together and collaborate - be allies not competitors for funds and support. Growers must tell the stories better to the world and each other to learn and grow.

Above World Potato Congress, Peter VanderZaag, PhD, President. *Courtesy Syngenta*





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The World Potato Congress has a role to be a central place that helps bring knowledge together.

Potatoes NZ CEO, Mrs Karen Truffitt, made a poignant statement as part of her comments in the Global Potato Panel that the industry needs to stop looking at each other as competition and use the World Potato Congress to facilitate conversations.

“One voice one potato industry,” she said.

### Consumers and marketing commentary

The World Potato Congress hosted multiple sessions relevant to consumers and potato marketing. The sessions provided invaluable insights into relevant campaigns, nutrition and target market segments.



### Potatoes Forever

Director General of Comité National (France), Florence Rossillion delivered an excellent presentation about their Potatoes Forever campaign.

Consumer research showed that 68 percent of French people cited potatoes as one of the three products they could not live without. However, since the year 2000, fresh potato consumption declined from 35kg per year to 20 kg per year. Reasons for the decline include the growth of the processed potato sector, convenience when preparing fresh potatoes and the time needed to cook them, as well as the shorter shelf life compared to processed potatoes.

To address this decline, consumers were asked what they like about potatoes. The results revealed that while potatoes are loved for being locally grown, agricultural products, they were not recognised by people as modern or exotic.

The Potatoes Forever campaign was developed in partnership with Europatat to educate and inspire young families and young consumers to put potatoes back in the centre of their meal. The campaign uses website, social media, events, advertisements, in-store demonstrations and PR to achieve the following:

- Address consumers' lack of knowledge about potato production.
- Show potato producers are committed to sustainability.
- Showcase the various stages of potato production.

Find out more: [potatoesforever.eu](http://potatoesforever.eu)

### Potato nutrition

Leading Australian Dietician, Jemma O'Hanlon, gave an insightful presentation about the nutrition of potatoes. She reported that 96 percent of people were not getting enough vegetables in Australia including a staggering 1 in 20 kids not getting enough vegetables.

Jemma encouraged the audience to communicate the benefits of potatoes as they are affordable and nutritious. Potatoes play an important role in establishing healthy eating patterns. Some key points to support potato consumption are:

- We feel happy when we eat good carbs.
- B vitamins boost your mood.
- They are more filling than any other food.
- They have less carbs than pasta, rice or bread.
- 3-4 grams of protein per potato.

To grow the understanding of health and potatoes, Jemma suggests we need to talk holistically about food - not try and compete on all levels.

### Targeting Gen Z

How to promote potatoes to Gen Z was the topic of CEO of Potatoes USA Blair Richardson's presentation.

Potatoes USA are targeting the next generation of consumers by focusing on Gen Z. Their campaign highlights that potatoes are vegetables; they have protein and are fuel for your body. The aim is to grow Team Potatoes and utilise a network of Ambassador-Taters across the USA at college campuses where they host events such as fitness activities.

*What differentiates Gen Z?*

- Gen Z are digital natives.
- They are more entrepreneurial than any other generation.
- They value a work-life balance.
- They spend money more on experiences than on a home.
- Advocates - passionate and care deeply about what resonates with them.
- Get energy from sharing and interacting with peers.
- Great snacking generation - potato chips are one of their favourite snacks.
- Look to social media to discover food and recipes.
- Seek authentic global cuisine experiences.

- Enjoy comfort foods - with a twist.
- They eat out - a lot (40 percent disposable income).
- Globally they spend 180 billion USD on dining out.
- They get their content on YouTube and TikTok and a little bit of Instagram.
- 23 percent of all Gen Z who post food online - said that their food had gone cold by the time they got the best photo.
- Gen Z thinks potatoes are convenient, such as air fry frozen chips.

Gen Z love potatoes for their versatility and for being filling. However, when asked why they don't eat more potatoes, Gen Z responses showed that they felt they already ate enough, or that they felt potatoes are high in carbs or fattening.

To target this market segment Potatoes USA homed in on the following statement: "Potatoes Fuel Performance. Potatoes are a nutrient-dense vegetable that provide the energy, potassium, and vitamin C you need to perform your best and fuel your day."

In using these features of potatoes, Blair recommended that any claims made – whether it be health or sustainability, need to be evidenced. Marketers will lose the trust of Gen Z if they feel they are being lied to.

L-R. World Potato Congress, Leading Australian Dietician, Jemma O'Hanlon. Global Potato Panel. Courtesy Georgia Thomas.

**The retail landscape**

Professor David Hughes presented on the global retail landscape and trends.

The current cost of living crisis is impacting shopping habits, with the sustainability of food currently taking a back seat. Research also shows that fresh produce consumption is declining in Australia and well below recommended levels.

Against this backdrop, potato purchase quantities are up 18 percent in 2024 versus 2023 in Australia. Potatoes – fresh and processed are the classic cost-of-living crisis family meal staple.

The 2023 Driscoll's Food and Health Survey shows the most important factors consumers consider when buying food and beverages (in order of importance) are taste, price, healthiness, convenience and lastly sustainability.

**The Top 2024 Trends include:**

- Value seekers – deal conscious, but also conscious of their own social and suppliers' values.
- Home kitchen heroes – comfort food with adventurous twists and affordable indulgence.
- Health for the family – protein a priority and proven health attributes that relate to the heart, weight, gut and skin.
- Natural, clean label ingredients, as opposed to worrisome Ultra Processed Foods (UPF).

- Plant-based meats are passe, but exciting/exotic vegetarian main dishes are al la mode!
- Nurturing nature – good for the planet, soil and its plants and animals.
- Minimise the noise – transparent environmental and other claims with no greenwashing.
- Supporting customers through innovations to reduce their carbon impact, food waste and plastic.

Professor Hughes also highlighted the impact of air fryers on current shopping habits. He reported that 70 percent of USA households have and use air fryers, with 35 percent of households using them in the UK. New products targeting consumers with air fryers are not on the market including French fries that can cook in only five minutes.

To summarise Professor Hughes reminded the audience that while sustainability is currently on the back burner, it will remain important and become more important again in the future. While there is much mistrust in claims about sustainability, people do trust farmers and will want more information as time goes on. Nutri-scores are also likely to be coming into food labels and then possibly eco-scores to help people choose products.





## Looking to the future at World Potato Congress 2024

From farmers and agronomists to supply chain partners, people from across Australia and around the world gathered in Adelaide in June for the biggest event on the potato calendar.

The 12th World Potato Congress (WPC) aimed to elevate potato production through sharing knowledge, along with research and development breakthroughs, while shining a light on sustainability.

As global WPC sponsors and proud industry supporters, Syngenta took additional steps to enhance the event through sponsoring a large contingent of some of Australia's leading potato agronomists and growers as well as the coordination of four guest speakers.

"As a global ag-tech leader we pride ourselves on the quality of our research and development, which have set the standard in potato fungicides and seed treatments, here in Australia and across the globe," Syngenta Australasia Head of Commercial Sam Hole said.

"Having the best products is good but what's equally important is our work with the industry to help agronomists and farmers to achieve sustainable growth in their operations, for the long term."

**Each year Syngenta invests in ongoing education and upskilling of agronomists locally through the Syngenta Potato Partners Program, delivering in-field training on application techniques, product development updates, and presentations on disease research.**

Recognising the importance of these agronomists, Syngenta took the opportunity to thank these individuals at a dedicated networking event during the WPC.

Above. L-R. Syngenta Technical Manager, Matt Sherrif, presenting on the issue of fungicide resistance management. World Potato Congress 2024 delegates.

"Potato Partners is a program close to our hearts and it was developed right here in Australia," Mr Hole said.

"This event was another chance for us to thank our Platinum Potato Partners for their support and dedication to the Syngenta Potato Partners program, and celebrate the relationship between potato growers and the stores that support them like no other."

**Among the highlights of the 12th WPC were insightful and inspirational words from the Syngenta-sponsored guest speakers, including;**

- **Matt Sherriff**, Syngenta Technical Manager, on maintaining effective disease control and mitigating fungicide resistance in high yielding potato production systems.
- **Dr Greg Pringle**, Syngenta Market Manager, Biologicals, outlined the path for incorporating biocontrol and biostimulant products for improved commercial outcomes involving integrated pest management.
- **Agus Gomez**, Syngenta EU Product Biology Lead (Insect Control), led a virtual session on insecticide developments from within the European Union, and some of the issues growers are facing as a result of regulatory changes.
- **Bryan Hart**, Potato Crop Manager and member of the Management Executive for AS Wilcox and Sons Ltd New Zealand, discussed developing the next generation of potato growers.

### FOR MORE INFORMATION




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# Current Projects

## HORT INNOVATION POTATO FUND

Hort Innovation conducts a number of R&D projects funded by grower levies. Here is a list of some of the potato projects currently underway.

### **P** Potato industry minor use program PT16005

DELIVERY PARTNER: **HORT INNOVATION**

Through this project, levy funds and Australian Government contributions are used to submit renewals and applications for minor use permits for the potato industry as required. These submissions are prepared and submitted to the Australian Pesticides and Veterinary Medicines Authority (APVMA).

All current minor use permits for the industry are searchable at [portal.apvma.gov.au/permits](http://portal.apvma.gov.au/permits). Permit updates are also circulated in Hort Innovation's *Growing Innovation* e-newsletter, which levy-paying members receive monthly.

### **P** Australian potato industry communication and extension project PT20000

DELIVERY PARTNER:  
**APPLIED HORTICULTURAL RESEARCH**

Beginning in 2021, this investment is tasked with supporting Australian potato growers in adopting improved practices on-farm and keeping up to date with the latest industry news, information, resources and technologies.

The project delivers a nationally coordinated but locally implemented program which employs regional delivery partners who provide specialist skills and knowledge to the industry. The role of the regional delivery partners is a broad one, with all activities geared towards improving the circulation and uptake of information within the industry.

As well as extension activities, the project produces key communication channels for the potato industry, including a hard copy quarterly R&D magazine, online webinars and podcasts, social media, and a dedicated website to host industry resources.

### **PV** Industry preparedness for exotic root knot nematode *Meloidogyne enterolobii* MT22012

DELIVERY PARTNER: **CSIRO**

This research will use the latest advancements in molecular screening to provide a better understanding of root-knot nematodes occurring in Australia and develop an identification tool for these nematodes that will be more cost effective than methods presently available.

#### **Background**

The recent identification of a new species of highly virulent plant parasite, the Guava Root-Knot Nematode (*Meloidogyne enterolobii*), in Australia means that there is a great need to improve root-knot nematode identification for trade, quarantine, and pest management purposes. Critically, it is not clear if *M. enterolobii* is a recent arrival to Australia, or if the species has been present for some time but has only just been recognised. Historic specimens lodged in Australian collections may hold the key to answering this question, but the information is locked to traditional methods of interrogation.

Guava root knot nematode was reported in Australia for the first time in late 2022, from the Darwin area of the Northern Territory. Since this initial discovery, further detections have been made in Queensland. Guava root knot nematode is a devastating plant parasite causing significant crop losses on a global scale. This nematode has a broad host range spanning 30 plant families, including many important food crops. Notably, guava root knot nematode is a resistance-breaking species, causing severe damage to crops with genetic resistance to other root-knot nematode species.

Consequently, this nematode is a significant biosecurity risk for multiple crops in Australia and is rated in the high to extreme risk categories on the biosecurity plans for multiple industries, for example onions, potatoes, sweetpotatoes, and other vegetables. The wide host range and resistance-breaking characteristics of

guava root knot nematode facilitates rapid spread, and this species is very difficult to control. Preventing establishment of this species in production areas where it was previously not present is thus critically important.

#### **Methods**

Identification of root-knot nematodes via morphological methods is time intensive, requires significant specialist expertise, and the fingerprint-like patterns present on the female body which are traditionally used to diagnose species are subject to human interpretive error. Molecular identification would be more accurate and high-throughput, however, nearly all historic material was preserved using formaldehyde-based solutions, which are generally thought to inhibit DNA extraction. This research project aims to improve root-knot nematode identification through a two-prong approach.

1. National Research Collections Australia (NRCA) is developing artificial intelligence-based image recognition for pests like Brown Marmorated Stink Bug and various weeds. This research project will develop a similar tool for rapid species-level identification of root-knot nematodes using images of perineal patterns, which are a fingerprint-like pattern of lines on the outside of adult females used for identification. The research team envision the tool as being able to provide a same-day, species-specific identification based on light-microscopy images of perineal patterns requiring minimal training to prepare. The results would thus be far quicker, cheaper, and easier than other identification methods available.
2. Despite the general assumption that DNA cannot be obtained from formalin-preserved material, a method doing just that has recently been pioneered by CSIRO. This research project will use this method to screen historic formalin preserved plant material for evidence of *M. enterolobii* infestation.

## A unique location and biosecurity for certified seed potatoes



Many pests and diseases common to mainland Australia are not found on Kangaroo Island, providing an ideal location for seed potatoes.

The 2024 World Potato Congress, held in Adelaide from June 23-26, provided delegates with pre- and post-congress tours to visit SARDI, Australian farming businesses, or encounter iconic Aussie animals. One of the post-congress tours was a visit to Kangaroo Island. The Island is Australia's third largest, and its unique and mostly isolated location has created a special environment for seed potato growers.

A limited horticultural history on Kangaroo Island means it remains free of Potato Cyst Nematode (PCN) and bacterial wilt (*Ralstonia solanacearum*). The risk of transmitting viruses such as Potato Virus Y (PVY) via aphids and thrips is low, as these are viruses are 'non-persistent' meaning that the virus is only transmissible for a small period of time. The time to travel from the mainland to Kangaroo Island, would render the virus non-transmissible.

With South Australia being a major producer of fresh potatoes, Kangaroo Island's proximity makes it an excellent location to produce seed potatoes.

Peter Cooper and his family in Parndana, grow certified seed potatoes on a six-year rotation schedule, producing about 1,500 tonnes of seed potatoes annually. The farm diversified into seed potatoes from broadacre cropping and sheep about 14 years ago.

AuSPICA certifies the seed potatoes grown on Peter's farm, with field inspections occurring at row closure and harvest. Leaf tests are conducted for virus detection. Even though PCN has never been detected on Kangaroo Island, soil samples are still taken before each seed crop. The absence of the nematode provides an export advantage for Kangaroo Island growers. Many pests and diseases may survive for prolonged periods in the soil or even in the tubers themselves and are easily spread when potatoes used for propagation travel long distances. Using certified seed potatoes ensures a healthy, resilient commercial potato crop.

A Biosecurity Strategy was developed for Kangaroo Island, specifically mentioning the region's seed potato industry. The strategy is based on five principles, including 'Biosecurity is everyone's responsibility'.

To enforce this principle, Kangaroo Island has strict biosecurity requirements for visitors to Kangaroo Island. Quarantine bins are located at the ferry entrance, and visitors must dispose of any items that may threaten the unique environment. Only washed potatoes intended for consumption can be brought onto Kangaroo Island in new, unopened, clean packaging. Additionally, all offshore machinery and other equipment brought onto the Island is cleaned meticulously to prevent new pests and diseases. Visitors are encouraged to clean their vehicles, boots, and camping equipment. These items may carry contaminated soil that can introduce new soil-borne pathogens, such as PCN, or weeds onto Kangaroo Island.

Biosecurity officers stationed on the island conduct random biosecurity checks. Contaminated potatoes are prevented from entering the island.

Above. World Potato Congress delegates visit a seed potato grower on Kangaroo island. Peter Cooper is a seed potato grower on Kangaroo Island



The seed potato industry on Kangaroo Island is an excellent example of how straightforward biosecurity measures are implemented for not only individual farms but an entire industry in a specific location. The region can grow premium products, certified free of pests and diseases.

#### Protect your farm

Simple measures can be taken to protect your farm from pests and diseases. Consider the pathways and risks through which pathogens could enter your farm. Assess current mitigation strategies and what other measures can be implemented.

Six main pathways that may introduce pests and diseases onto your property are:

- Vehicles and equipment
- Staff and farm visitors
- Packaging, bins, and pallets
- Waste and weeds
- Farm inputs
- Wind

#### 'Fun' biosecurity facts about Kangaroo Island

- Nonpersistent viruses, such as PVY, are no longer present on aphids by the time they reach the island's potato crops.
- The Island is home to the Ligurian honeybee. Because of the Island's remote location, the Kangaroo Island bee colonies are protected from breeding with other honeybee races. They are now considered the purest strain of Ligurian honeybee in the world.

While rabbits were introduced to the island in the 1800s, the introduction was never successful, and the island remains free of rabbits to this day.





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L-R. Potato blight; Leaf damage of potato leaf blight.



## Australia free of type A2 potato late blight

Most potato growers will be familiar with potato late blight. This devastating disease affects potato production around the world. Yet, thanks to robust biosecurity measures, Australia has been able to keep out more aggressive strains of this disease.

### Overview of *Phytophthora infestans*

The potato disease late blight is caused by the fungal-like pathogen *Phytophthora infestans*.

Late blight is now present across the globe, destroying around 5 percent of potato crops every year. As a water-mould (oomycete), *P. infestans* spores require water to germinate and spread to other plants. As a result, the disease thrives under moderate weather conditions with cool nights, which can typically be associated with La Niña events in Australia. Crop losses of up to 100 percent are not uncommon when the disease goes unmanaged.

In many parts of Europe and North America, late blight has been wreaking havoc for potato producers. In the Netherlands, the worst outbreak in 30 years occurred during 2023, with the current 2024 season not looking promising. Growers have had to apply a large quantity of fungicides, leading to rapidly evolving fungicide resistance issues and the breakdown of genetic disease resistances within cultivars. Moreover, a new, more aggressive strain of the disease has recently been identified, leading to further disease management complications.

### Late blight types – A1 and A2

Several different strains of the disease exist around the world. For *P. infestans* there are two mating types: A1 and A2. The A2 mating type is a newer strain of the disease, originating from Mexico. But most importantly, if mating types A1 and A2 are both present in a crop, they may recombine through sexual reproduction. This will give rise to a potentially even more aggressive disease and may evolve into fungicide resistance.

Most importantly, it will allow the disease to survive for extended periods in the soil through the presence of oospores: sexual spores resulting from the recombination of mating type A1 and A2. These oospores are capable of dormancy and survival in the soil, infected plant debris and tubers, and can be spread on contaminated soil on boots and farm machinery. Since the first identification of mating type A2 in Europe, the mating type has rapidly spread between countries and even continents.

Fortunately, only mating type A1 is known to be present in Australia. More specifically, there is only one strain present, which has remained unchanged since it was first

discovered during the early 1900s. This means, that in Australia, the disease can currently be managed well by applying good farm hygiene, certified seed potatoes, the use of resistant cultivars and applications of appropriate fungicides. Overseas, new strains and recombinant *P. infestans* populations quickly developed resistance against metalaxyl, whereas the Australian strain remains sensitive to this fungicide.

### What are the symptoms of late blight?

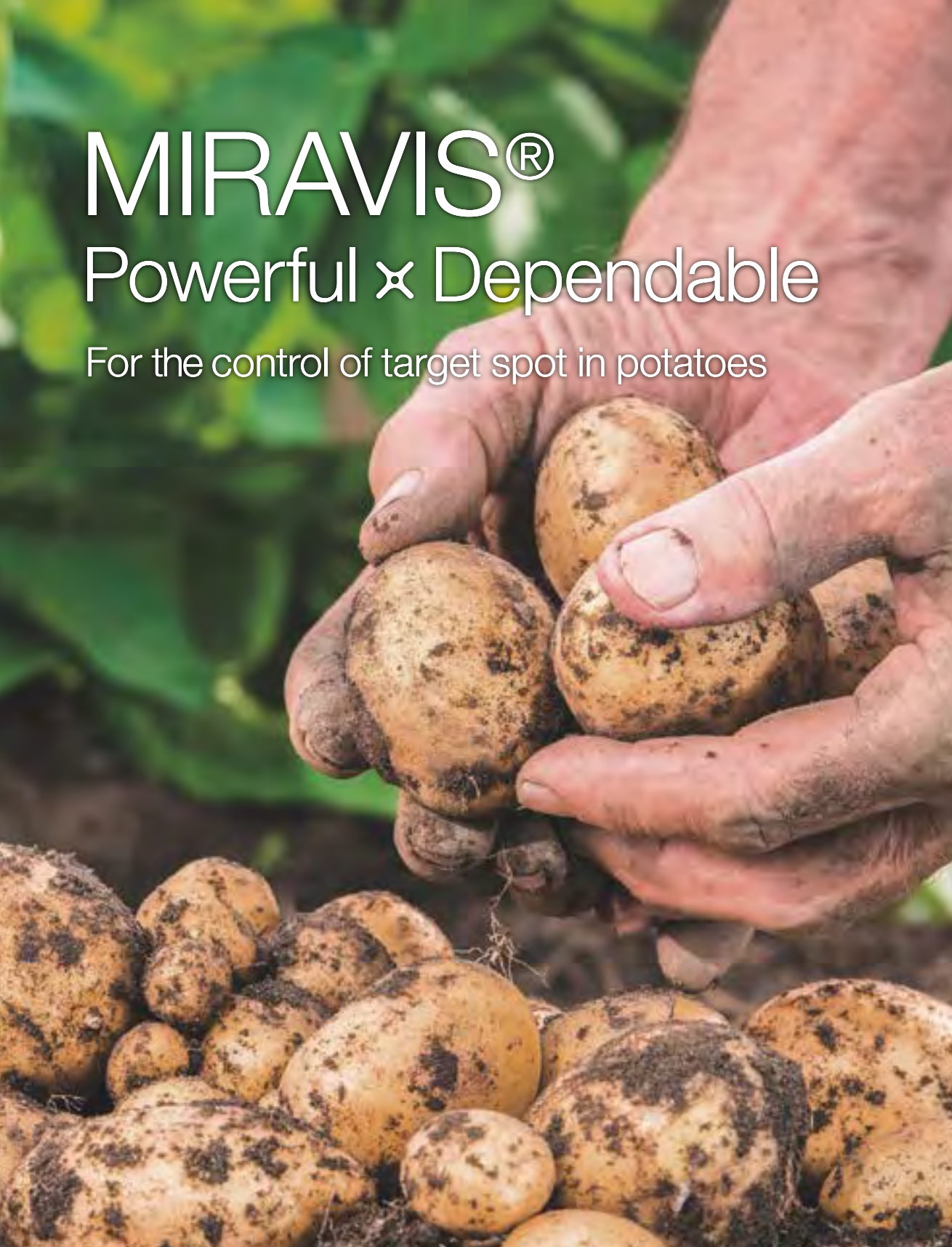
Late blight infection causes pale-grey lesions to appear on the leaf margins. These spots rapidly progress into larger necrotic lesions, which are not limited by leaf veins. Within days, the leaves turn yellow and die. *P. infestans* may also affect the stems. White fungal growth may be present on the underside of the leaves or the stem.

Affected tubers will show a tannish-brown, reddish, or purplish coloured rot, with irregularly sunken areas. Secondary bacterial infection may cause further disease and breakdown. *P. infestans* primarily affects potatoes, but other solanaceous plants, such as volunteer potatoes and tomatoes, can be an alternative host and may act as a reservoir for the disease.

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Leaf damage of potato leaf blight.



Potato plant symptoms of late blight.



Leaf damage of potato leaf blight.

### How do I recognise exotic strains of late blight?

Both endemic and exotic *P. infestans* strains cause the same disease symptoms. However, exotic strains are likely to be more aggressive; infection cycles may shorten to three to five days. Disease may also occur under different weather conditions than what would normally be expected. For example, weather conditions may be warmer, cooler or drier for exotic strains. It is also possible that exotic strains carry resistance to metalaxyl, and as such, fungicides with this active ingredient may no longer be effective.

If you suspect an exotic strain of late blight in your crop, report it to the Exotic Plant Pest Hotline.

**EXOTIC PLANT PEST HOTLINE**  
**1800 084 881**

### Biosecurity works!

While disease caused by *P. infestans* can be devastating, there are some positive aspects. It is a great example of how national biosecurity regulations, in conjunction with good on-farm biosecurity practises, have kept Australia free from exotic strains of *P. infestans* for many years.

On a national level, new potato cultivars may only be imported through tissue cultured plantlets. Tourists and returning residents are required to declare any overseas farm visits and thorough cleaning and disinfection of footwear is mandatory.

On a farm level, there are several things that you can do to keep your farm safe:

- Implement good farm biosecurity practices.
- Always use healthy, certified seed potatoes to prevent introducing pathogens through infected tubers.
- Implement farm hygiene and biosecurity practices to reduce the spread of inoculum. Remove plant waste and consider the disease may survive on volunteer potatoes or other solanaceous crops.
- Use late blight resistant cultivars.
- Apply and rotate fungicides appropriately to protect your crop.

The name *Phytophthora* is derived from the ancient Greek language and translates as 'plant destroyer'. The pathogen is infamous as the causative agent for the Irish Potato Famine (1845-1849), decimating the Irish population. An estimated one million people died because of the famine, and many more migrated to different countries.

Internal symptoms of late blight on potato tuber.



#### FOR MORE INFORMATION

Visit [PotatoLink](http://PotatoLink) at [potatolink.com.au](http://potatolink.com.au)

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FEATURE ARTICLE

## HELPING POTATOES HELP THEMSELVES

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Communications Manager

**Hort Innovation**

Level 7, 141 Walker Street  
North Sydney NSW 2060  
Australia

Email: [communications@horticulture.com.au](mailto:communications@horticulture.com.au)

Phone: 02 8295 2300

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TECHNICAL CONTENT

**Dr Jenny Ekman**

[jenny.ekman@ahr.com.au](mailto:jenny.ekman@ahr.com.au)

EDITOR

**Paulette Baumgartl**

[paulette.baumgartl@ahr.com.au](mailto:paulette.baumgartl@ahr.com.au)

ASSISTANT EDITOR

**Ryan Hall**

[ryan.hall@ahr.com.au](mailto:ryan.hall@ahr.com.au)

PROJECT COORDINATOR

**Peter O'Brien**

[peterob@potatolink.com.au](mailto:peterob@potatolink.com.au)

DESIGN

**Jihee Park**

[hello@jiheeparkcreative.com](mailto:hello@jiheeparkcreative.com)

PUBLISHER

**Applied Horticultural Research  
Pty Ltd**

[www.ahr.com.au](http://www.ahr.com.au)



Cover: Potato harvest, R. Hall





### FROM PETER O'BRIEN...



The PotatoLink team has just returned from the World Potato Congress in Adelaide, where we had the opportunity to meet many of our readers, listen to world experts on the future of the industry, better understand the various global challenges, and hear about the innovative solutions being developed to meet them.

We extend our thanks to WPC 2024 team for delivering a wonderful few days.

Look out for our Spring issue (September/October) for our coverage of some of the research and technology presented at the congress.

In this issue, Dr Jenny Ekman explores the immunity system of potato plants, and how growers can assist in boosting defences. We look at the fundamentals of irrigation management, and present the results from the PotatoLink seed storage trial.

Our 'Spotlight on Sustainability' looks at reducing emissions on farm and how to measure progress and we also have highlights from the May PotatoLink events in Tasmania.

We hope you enjoy diving into the diverse range of topics covered in this issue. Your feedback is always appreciated, so feel free to reach out with your thoughts and suggestions.

For those reading online, remember that getting a hard copy is easy. Just click the link to subscribe and have it delivered to your doorstep.

Happy reading!

*Peter O'Brien, PotatoLink Project Coordinator*

**Send your feedback to [info@potatolink.com.au](mailto:info@potatolink.com.au)**

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## IN THIS SUPPLEMENT

**Helping potatoes help themselves: Inducing plant defences**

**101: Managing irrigation**

**Can you shock a seed? Results from the PotatoLink trial**

**Spotlight on sustainability: Towards reduced emissions on Australian potato farms**

**PotatoLink on the road:**

**Understanding seed certification and improving input use efficiency**

**Mike Titley celebrated with the Medal of the Order of Australia (OAM) for contributions to agriculture**

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# HELPING POTATOES HELP THEMSELVES: INDUCING PLANT DEFENCES

Just like us, plants have evolved sophisticated mechanisms to defend themselves against pests and pathogens. One of the most intriguing strategies is 'Induced Systemic Resistance' (ISR). Specific microbes or environmental triggers can activate the plant defences, improving its ability to ward off attack or cope with stress. And we can help that happen. By Dr Jenny Ekman

When you look at a field of potatoes, what do you see? Is it a paddock of passive plants, vulnerable to the relentless hordes of fungi, bacteria, insects, and viruses that seek to attack and devour them? Or do you see plants that bristle with defences, ready and able to fight in the ongoing battle for survival?

Plants are not only living and responding to their environment, they are complex chemical factories. They turn light into fuel through photosynthesis, construct carbohydrates, produce proteins, acids, and fibre and make the flavours that make them so good to eat.

Plants also make an arsenal of defence chemicals. These chemicals can neutralise disease, deter insect feeding, and physically protect them from those who want them for lunch.

## INDUCED SYSTEMIC RESISTANCE

The realisation that plants could be 'trained' in self defence is more than a century old. Ray (1901) demonstrated that exposure to external stresses and pathogens could protect plants against other, different pests and pathogens.

This should be no real surprise. Ever since 1796, when English doctor Edward Jenner realised that milkmaids who had caught cowpox were

protected against the far more lethal smallpox, we have understood that priming the immune system can help fight off disease.

In the case of plants, the term 'induced systemic resistance' (ISR), sometimes also called systemic acquired resistance (SAR), was originally used to describe the phenomenon that plants with roots colonised by rhizobacteria were more resistant to pathogens attacking the leaves. It has also been characterised as a sort of 'plant memory', where both biological and non-biological agents could help plants develop broad, long-term resistance to a range of attackers.

However, the effect of ISR is not limited only to pests and pathogens. ISR in response to one threat can also

help plants manage other stresses, such as heat, cold, and drought.

## HOW DOES INDUCED RESISTANCE WORK?

When plants are attacked, multiple defence systems are activated. A switch within the cells winds back normal operations as the cell's internal chemical factory refocuses on defence. This change may be triggered directly by compounds released by the pathogen, or even by fragments of the broken cell walls of the plant itself.

### Oxidising the enemy

One response is to produce a burst of reactive oxygen species (ROS). These can kill the pathogen directly through oxidation. The same process

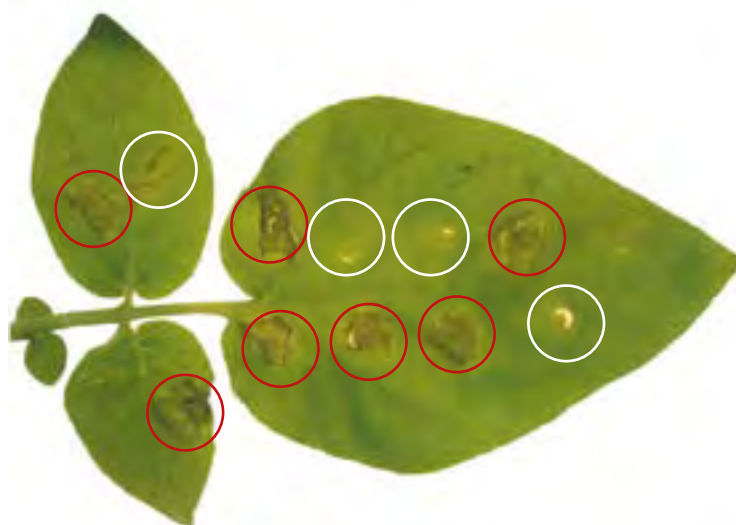


Figure 1. Induced hypersensitive responses on a potato variety resistant to late blight. Compounds extracted from the pathogen that induced the hypersensitive response are circled in red, whereas those that did not are circled in white. From Vossen et al., 2014.



occurs in many cancer treatments; ROS generated by chemotherapy or radiation are used to prevent multiplication of tumor cells.

The ROS produced in plants can also trigger a hypersensitive response (HR). Cells surrounding the infection site die, usually within 24 hours of infection. This stops the pathogen from spreading. For example, HR is a key factor in potato defences against late blight (Figure 1) and can be used to screen for resistant varieties.

If the cells don't die, the HR response may be to strengthen them, thickening the cell walls to physically prevent the pathogen from spreading.

However, just as in humans, ROS damage normal cells as well as those of the pathogen. They therefore need to be rapidly neutralised with anti-oxidants to avoid further damage.

### Phytoalexins

Plant cells can also respond to attack by producing a storm of chemical defences. Phytoalexins are toxic antimicrobial substances that directly attack the invader. Phytoalexins often accumulate in tissue that has undergone HR, forming a second line of defence against the pathogen.

The downside of phytoalexins is that (like ROS) they are not only toxic to the pathogen, but also to the plant. This means they have to be produced rapidly in response to infection, but also quickly degraded .

In potatoes, phytoalexins are not produced in the leaves, but mainly occur in the stems and tubers. The dominant type of phytoalexins are terpenoids. However, tubers can contain several different types. These include the phenolics which contribute to potato taste, colour, and texture. Phenolics tend to concentrate in the tuber skin and are often significantly higher in organic compared to conventionally grown tubers.

Some of the glycoalkaloids associated with greening are also classed as phytoalexins.

### Mobilising the whole plant

Whereas the above responses are generally focussed on the point of infection, the triggering of genes that produce 'pathogenesis related' (PR) proteins is systemic within the entire plant. PR proteins are not usually present in healthy plants but rapidly accumulate to high levels following infection.

Some PR proteins are general anti-fungal agents (PR-1). Others are enzymes that break down the two key components of fungal cell walls;  $\beta$ -1,3 glucan (PR-2) and chitin (PR-3, PR-4).

A few PR-proteins take a more defensive approach, inhibiting the digestive enzymes produced by pathogens. The mode of action of others is less well understood. However, their presence is clearly associated with plant resistance to infection.

Research has identified at least 22 different anti-fungal genes (PR-1) that are activated when potatoes are attacked by pests and pathogens. Some of these are expressed most strongly in the stems, others in the roots or the leaves .

The type of stress also affects which genes are expressed; for example, 13 PR genes activate in response to infection by late blight (*Phytophthora infestans*), whereas a different set of 15 genes respond to heat stress. Exposure to abscisic acid (ABA) or indole acetic acid (IAA) also activates PR genes (Figure 2).

### ACTIVATORS OF SYSTEMIC RESISTANCE

There is a huge range of biological and chemical signals that can trigger a defence response in plants. These may be:

- The presence of a pathogen itself
- The damage caused to plant cells by a pathogen or insect
- A non-pathogenic organism including beneficial fungi and bacteria
- Physical stress
- Non-biological (abiotic) factors including chemicals, plant hormones or volatile compounds.

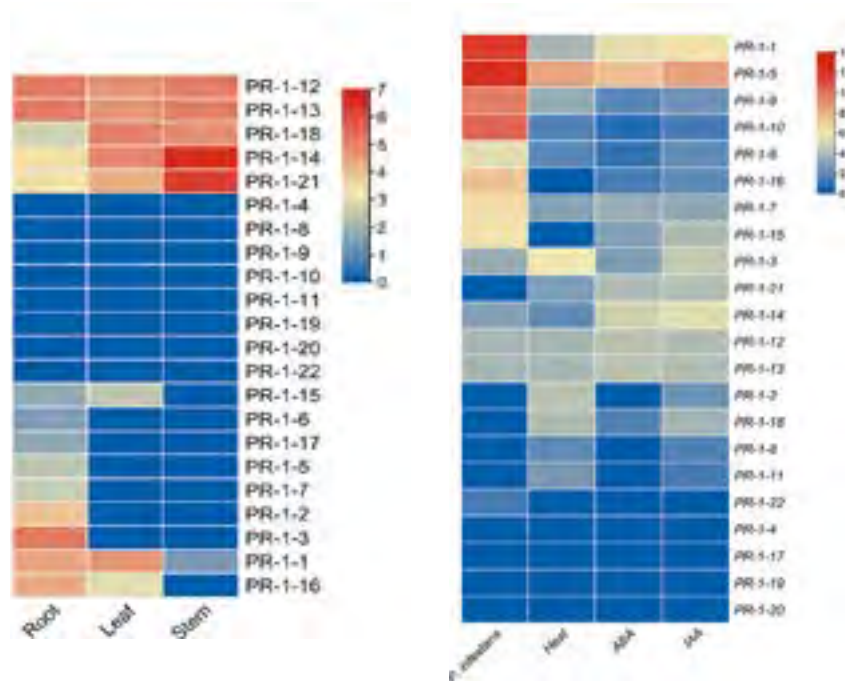


Figure 2. Production of pathogen related (PR) proteins in different parts of the potato plant (left) and increases in production of PR proteins in response to late blight infection, heat stress, abscisic acid or indole acetic acid (right). Colour indicates the increase in protein concentration compared to a non-stressed plant. From Zaynab et al, 2021.

The effects of these triggers often cross readily between pathogens, pests, and other issues facing the plant.

For example, as little as a minute's exposure to hot water (over 50°C) has been widely demonstrated to protect fruit and vegetables from the effects of cold storage. This surprising effect is due to formation of 'heat shock proteins'. Heat shock proteins stabilise cell membranes, enabling warm climate crops to withstand low temperature storage and resist development of disease.

Resistance can even be induced by neighbouring plants. There is clear evidence that plants have evolved to not only defend themselves, but also to help their neighbours. Volatile organic compounds (VOCs), produced both above and below ground, allow plants to communicate with each other. A plant attacked by insects can produce VOCs (including ethylene and jasmonates) that activate the defences of those around it.

However, as every new defence is evolved, so are the means to circumvent it. In the case of VOCs, some of these messages have been hacked. For example, whiteflies can trigger VOCs that prime neighbouring plants to defend themselves against pathogens instead of pests, a biological cost that makes them more susceptible to whitefly attack.

***So what are some of the key chemicals, living organisms, and biological products which could potentially be used to trigger ISR responses in potatoes?***

### Silicon

Silicon is the second most available element in the earth's crust, commonly in the form of monosilicic acid. Although silicon is not necessary for plant growth, recent research has revealed its important functions in helping plants cope with environmental stress as well as attack by pathogens.

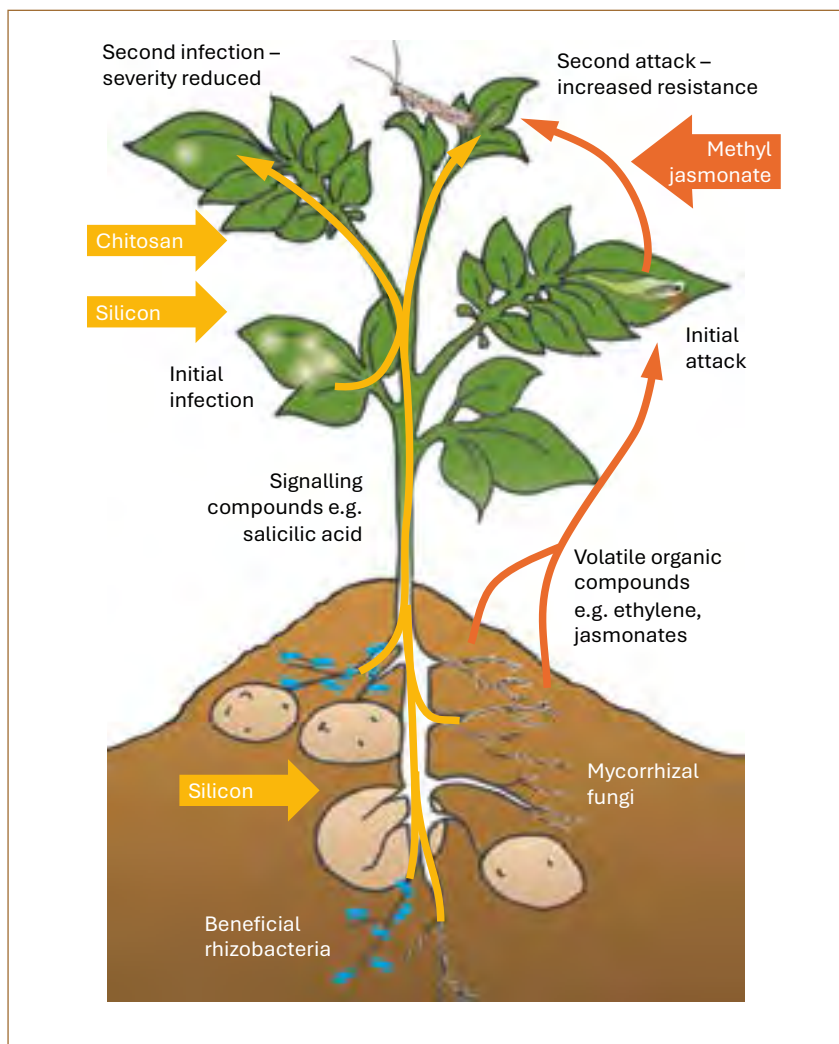


Figure 3. Sources of induced systemic resistance in plants include beneficial bacteria and fungi on the plant roots, as well as abiotic compounds such as silicon, methyl jasmonate and chitin/chitosan. While microbes can produce signalling compounds directly, abiotic compounds stimulate production by the plant. While these compounds can have a range of effects, their key function is to turn on defence genes throughout the plant.

Silicon aids plants defences through three mechanisms:

- Deposits of silicon just under the leaf surface form a physical barrier to pests and pathogens
- Silicon changes the structure of cell walls, making them more resistant to attack
- Silicon triggers ISR, increasing the activity of defensive enzymes in the plant

Potatoes do not naturally take up much silicon from soil. However, they can absorb different forms of silicon when applied as foliar sprays or through fertigation. A number of studies have examined the effect of

silicon on potato growth and yield in general, as well as in terms of resistance to pests, pathogens, and stress. For example:

- Foliar sprays of silicon based 'Optysil' improved performance of potato plants, especially under drought stress conditions. Wadas (2021) reported that the number and weight of tubers was increased in two of three seasons.
- Crusciol et al (2009) also found that silicon reduced the effects of moisture stress. Calcium and magnesium silicate were added to pots at planting. Silicon reduced stalk lodging and increased tuber yield overall, regardless of drought stress.

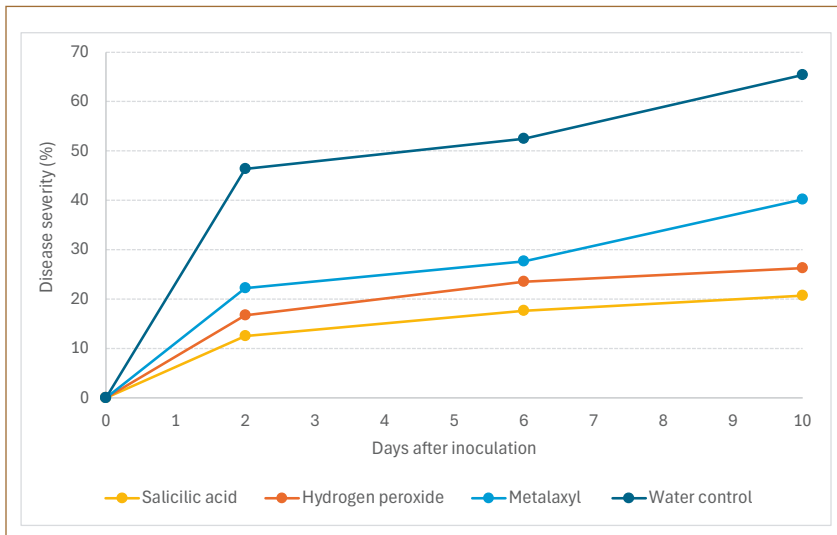


Figure 4. Disease development on leaves sprayed with 10mM salicylic acid, 10ppm hydrogen peroxide, 1% metalaxyl (fungicide) or water then inoculated with a solution of late blight. From Kumar et al., 2017.

- Sodium silicate, applied as a foliar spray before inoculation with late blight, reduced development of disease. Xue et al (2021) found that plants treated with silicon produced a burst of ethylene, along with other ISR signalling chemicals, immediately after infection.

### Salicylic acid

Salicylic acid – aspirin – is one of the most studied chemical inducers of resistance. Salicylic acid (SA) is not just good for headaches. It is also an essential plant growth regulator and signaller. SA is the primary activator of PR genes, so it is key to plant defences, especially against pathogens.

In potatoes, SA has many functions. More than 600 research papers have been written on this topic alone! SA can directly stimulate formation of tubers and colonisation of roots by beneficial bacteria and is essential for normal development.

SA is also one of the most potent triggers for ISR in potatoes. Exposure to SA has been reported to provide salt tolerance, increase water use efficiency and improve resistance to bacterial rots and viruses, including

potato virus Y (PVY). Application of SA can also potentially increase resistance to a range of fungal diseases including black scurf, late blight, early blight, and common scab. For example:

- Kumar et al (2017) tested foliar application of a wide range of inorganic chemicals as ways to improve resistance to early blight. Sprays included SA, calcium chloride, ferric chloride, IAA, hydrogen peroxide metalaxyl, and others. SA was the best at stimulating several key fungicidal enzymes, with high enzyme levels strongly associated with lower disease severity.
- Acevedo et al (2023) found that foliar sprays with SA reduced

the effects of water stress by increasing levels of antioxidants in the plant. These antioxidants protected the plant from drought-related damage, such as breakdown of chlorophyll, proteins, and carotenoids.

- Faried et al (2017) grew potatoes with moderate salt stress (50 mmol/L). Foliar sprays of 0.5 mMol/L SA boosted uptake of potassium, improved photosynthesis, and increased yield.

However, not all authors report positive effects. For example, Quintanilla and Brishammar (1998) found that although SA reduced late blight symptoms in moderately resistant varieties, it increased disease in the susceptible variety St Cecilia, largely due to phytotoxic effects from the spray application.

### Jasmonates

Unlike SA, which has many roles in the plant, jasmonates are mainly produced in response to stress. Just as SA is the key signalling chemical involved in resistance against diseases, jasmonates (JAs) are associated with resistance to insects. For example, methyl jasmonate is one of the VOCs that acts as the community alarm bell, alerting other plants to insect attack.

Chewing by insects causes JA levels to rise rapidly, triggering production of anti-feedant enzymes and oxidases and reducing the digestibility of plant tissues.

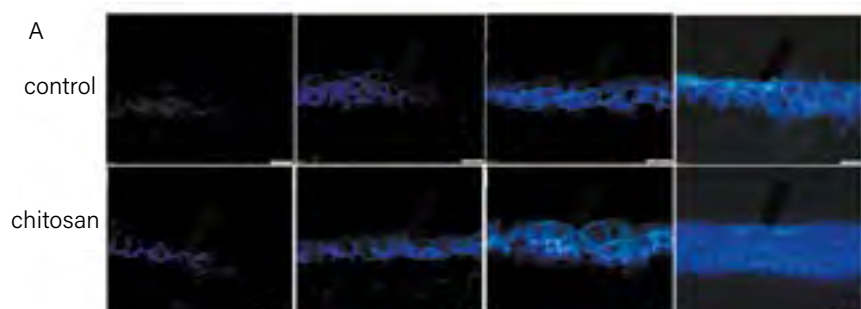


Figure 5. Development of suberin (a) and lignin (b) on wounded potato tubers. From Zhu et al., 2023.

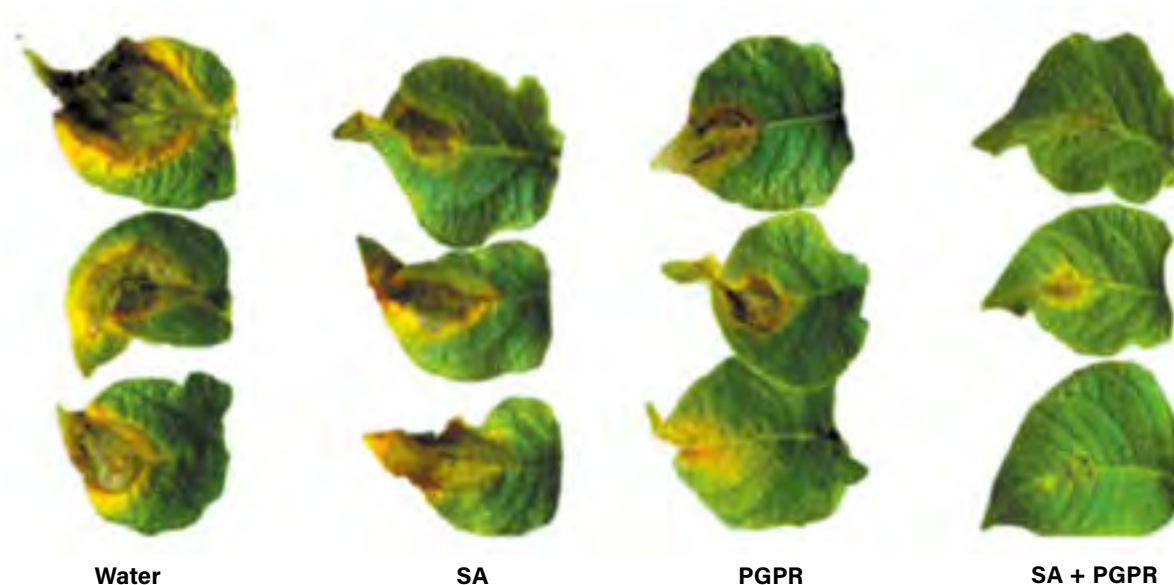


Figure 6. Effect of salicylic acid only, a PGPR (*B. subtilis*) only, or both together on the leaf lesions caused by late blight. From Sorokan et al., 2023.

However, this response is weaker, and may fail, against piercing-sucking insects such as aphids and whiteflies. The tiny wounds caused by these mouthparts do not compare to the destruction wrought by a grazing caterpillar.

Treating plants with JA can trigger ISR, overcoming this issue. Application of JA has been shown to severely disrupt aphid feeding on potato plants, reducing population expansion and colonisation. Similar effects have also been reported for potato tuber moth, with larvae failing to develop normally.

JAs may also play a role in resistance to bacterial infections.

However, the effects of JAs on both insects and bacterial pathogens are not without biological cost, potentially reducing yield. JAs can also be relatively expensive and difficult to apply. Despite significant research, there does not appear to be any commercial application of JAs.

### Chitosan

In contrast, chitin and chitosan are cheap and abundant. These natural products are biodegradable and generally regarded as safe for humans. Chitin can be sourced from prawn shells, insects, algae and, of course,

the cell walls of fungi. Although chitin is insoluble, its derivative chitosan is readily dissolved in slightly acidic water (pH below 6.5).

Both chitin and chitosan have direct antimicrobial effects on various microbes, including bacteria, fungi, viruses, and yeasts. It is thought this may be due to DNA disruption, preventing replication. They may also act by binding the minerals and nutrients on the plant surface that pathogens feed on.

Chitosan can also accelerate wound healing and reduce transpiration by closing stomata in leaves.

Most importantly, chitin and chitosan are known to trigger ISR. Responses include strengthening of cell walls, synthesis of enzymes that can break down fungal cell walls (including chitinase) and generation of oxidants, JAs, and other compounds associated with activation of PR genes. Chitosan effectively heightens the plants hypersensitive response, enabling it to respond more quickly to infection. This can help to, for example, suppress viral infections.

The effects of chitosan on wound healing is not only at the point of

contact, but also through an ISR within the plant.

This application was explored by Zhu et al (2023), who applied three foliar sprays of chitosan between flowering and harvest to test the effects on suberisation (curing) in potato tubers. Not only did pre-harvest foliar chitosan reduce weight loss in deliberately damaged tubers postharvest, it also reduced development of *Fusarium* inoculated onto the damaged surfaces. The effects were due to faster suberisation at the wound site, with differences visible as soon as three days after injury.

This exciting finding suggests that preharvest foliar sprays of chitosan could be extremely useful to seed growers, for whom rapid curing of harvested tubers is vital – something perhaps worth investigation under Australian conditions.

### Bacteria

The main bacteria involved in stimulating ISR are those that live on, and in, plant roots – the rhizobacteria. While some rhizobacteria have negative effects, most are neutral, and around 2 to 5% are beneficial. Plant growth promoting rhizobacteria

(PGPRs) can supply nitrogen, increase the uptake of soil nutrients (especially phosphorus), and produce organic materials that increase growth.

PGPRs can also help protect plants from pathogens. Their effects can be direct, some PGPRs producing antibiotics and enzymes that degrade fungal cell walls. Protection can also be indirect, through stimulation of ISR.

If the plant is under attack or stressed, the PGPRs will signal this by producing compounds that activate the plant PR genes.

A huge range of different PGPRs have been tested as ways to improve plant defence responses. Many are species of *Bacillus* and *Pseudomonas* but there are also *Corynebacteria*, *Pasteuria*, and others.

For example, Subedi et al (2020) list 18 different PGPRs that directly attack nematodes (by producing cell wall destructive enzymes, predation or antibiotics), 16 PGPRs that trigger



Figure 7. Potato plants infected with either bacterial wilt (left) or fusarium dry rot (right) plus the rhizobacteria; *Achromobacter marplatensis* (Am) and/or *Bacillus velezensis* (Bv). Treatments (a) water control (b) Am; (c) Bv; (d) Am and Bv. From Abdel-Moghies et al, 2024.

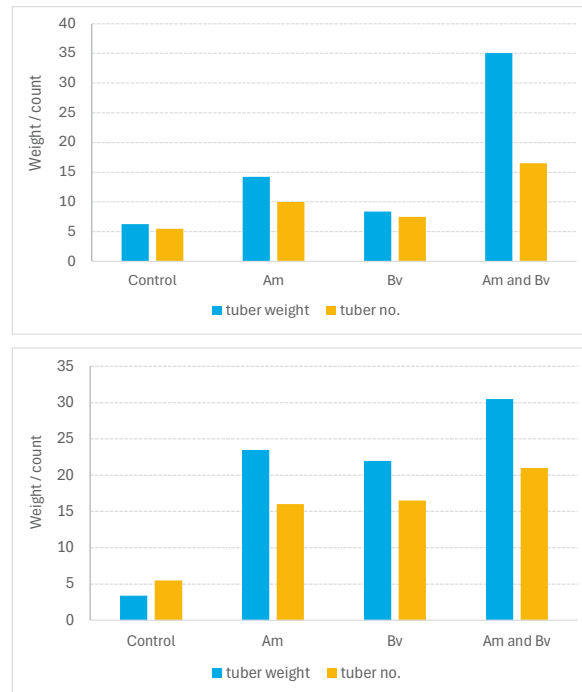


Figure 8. Total weight of tubers, and tubers per plant, from potatoes which had been infected with either Bacterial wilt (top) or Fusarium dry rot (below) as well as the rhizobacteria; *Achromobacter marplatensis* (Am) and/or *Bacillus velezensis* (Bv). Derived from Abdel-Moghies et al, 2024.



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ISR in plants as defence against nematodes, and 29 PGPRs with reported activity against nematodes but where the mode of action is unknown. They also describe 12 commercial products based on these PGPRs – and that is just for nematodes!

Both *Bacillus* and *Pseudomonas* strains are used in a range of commercial products marketed for control of certain pathogens. Examples include Serenade Prime and Serenade Opti.

Despite the huge volume of work on PGPRs in general, there is less known about benefits specific to potatoes. A few examples were found for this review, but it seems that commercially effective PGPRs for potatoes have yet to be found. Perhaps the best results may be obtained when multiple PGPRs are used together, or they are used with other products that trigger resistance. For example:

- Sorokan et al (2023) found that applying SA and *Bacillus subtilis* 26D together increased successful root colonisation by the bacteria. The effects of the combination were greater than either alone and significantly increased resistance to late blight.
- Abdel-Moghies et al (2024) investigated the effects of two different PGPRs (*Achromobacter marplatensis* and *Bacillus velezensis*) on the development of fusarium dry rot and bacterial wilt in a series of pot trials. The best effects were gained using the two strains together.

The main benefits from PGPRs are likely to occur if plants are stressed, with less benefits when conditions are good. Potatoes are extremely sensitive to even short dry periods, negative effects potentially continuing even after normal irrigation has resumed.

Batool et al (2020) found that inoculation with *Bacillus subtilis* significantly reduced the effects of

seven days of drought stress (80% or 60% normal irrigation) during tuber initiation. The PGPR increased antioxidant activity within the plants, counteracting the damaging effects of drought stress on leaf chlorophyll, respiration, and nutrient uptake.

### Fungi

Like the rhizobacteria, a huge range of different fungi inhabit the root zones of plants. Mycorrhizal fungi are especially important. Without their presence some plants cannot grow at all, and most plants will not grow as well as they could. Mycorrhizal fungi effectively increase the total root surface area, allowing plants to more efficiently exploit the water and nutrients in the surrounding soil.

Like rhizobacteria, mycorrhizal fungi can protect plants directly as well as trigger ISR to pathogen attack. For example, fungi living within the root

rhizosphere can protect plants against nematodes by direct competition for nutrients and space as well as activating the PR genes responsible for increasing plant tolerance.

Other types of fungi can also improve immune responses. These responses may be general or specific to a particular pathogen. For example, *Phytophthora cryptogea* does not cause disease on potatoes, however, even limited exposure to *P. cryptogea* on lower leaves can increase resistance throughout the plant to its unwelcome relative *P. infestans*.

By far the biggest and most important group of fungi associated with ISR is *Trichoderma*. It has been estimated that 50 to 60% of the global market for biological control agents is based around *Trichoderma*.

*Trichoderma* are both diverse and common in the environment,

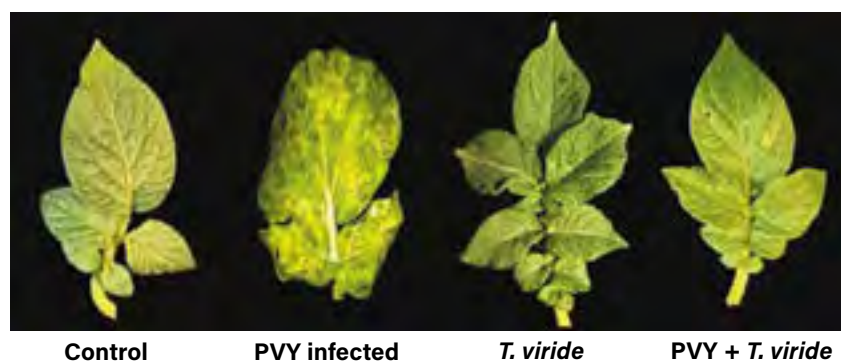


Figure 9. Effect of *T. viride* on development of symptoms of PVY infection. From Aseel et al., 2023.

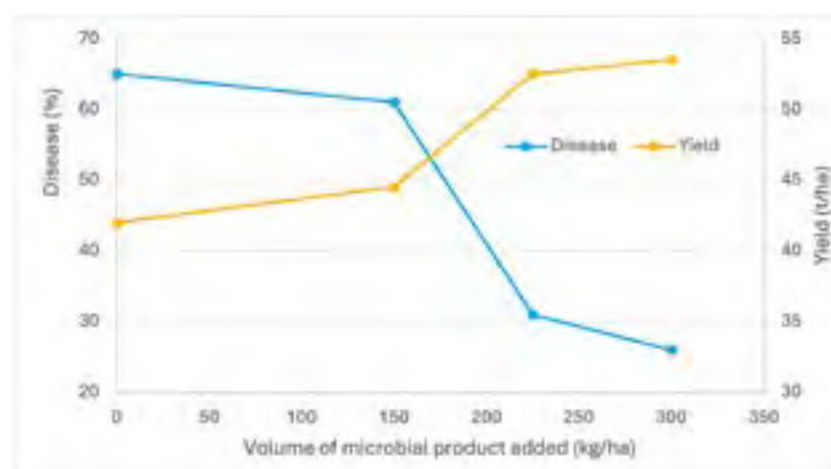


Figure 10. Effect of adding 0 (control) to 300kg/ha of a *Bacillus subtilis* + *Trichoderma harzianum* blend on the severity and incidence of common scab and effects on total yield.

especially in soil containing rotting organic materials. Most live in close associations with plants, colonising the roots where they, like rhizobacteria, provide nutritional benefits in exchange for sugars from photosynthesis.

While a number of species of *Trichoderma* can suppress disease, commercial development has focussed on six: *T. harzianum*, *T. atroviride*, *T. asperellum*, *T. longibrachiatum*, *T. viride*, and *T. virens*. Application may be directly to seed, or as liquid drenches after planting. Their modes of action include:

- **Mycoparasitism** – *Trichoderma* attaches and coils around the hyphae of a pathogenic fungus, then starts digesting it using cell wall degrading enzymes
- **Antibiosis** – Antibiotic/antifungal compounds are produced that prevent pathogen growth and replication
- **Competition** – *Trichoderma* occupies the best sites with most available resources on plant roots, thereby blocking other fungi and bacteria from establishing
- **Induction of systemic resistance** – signals to the plant, switching on PR genes using JAs, ethylene, and other compounds.

One of the reasons for the success of *Trichoderma* is that it can both protect from disease and increase yield. For example:

- Application of *T. viride* stimulated growth of potato plants, even before they were challenged with PVY. *Trichoderma* increased antioxidant activity and chlorophyll content, almost completely negating the negative effects of PVY infection (Aseel et al, 2023).
- Similar results are reported from several trials in India, where *Trichoderma* is widely used.
- Two applications of *T. harzianum* (108 spores/ml) at 15 and 45

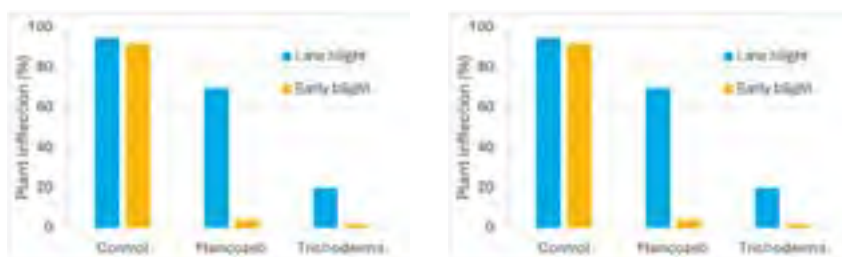


Figure 11. Percentage of plants infected (left) and yield (right) from plants attacked by either late blight or early blight. Plants were left untreated or sprayed every seven days with either mancozeb (Agrizeb 80 WP) or a suspension of *Trichoderma harzianum* (Lycomax). Derived from Mollah and Hassan, 2023.



Figure 12. Potatoes protected from late blight using a formulation of *Trichoderma* (left) or commercial mancozeb fungicide (right). From Mollah and Hassan, 2023.

days after planting increased yield (24%) and improved dry matter by 1.5% as well as reducing incidence of disease (Rakibuzzaman et al., 2021).

The effectiveness of *Trichoderma* can sometimes be increased by combining it with a bacteria (PGPR), especially if they have different modes of action. There are a number of commercial products based on such mixtures.

- Wang et al (2019) tested a product, containing *Bacillus subtilis* and *Trichoderma harzianum* (Sino Green Agri-Biotech Co., China) against common scab. While at least 225kg/ha of the material needed to be applied, disease incidence and severity was reduced by at least half and total yield increased by approximately 10t/ha.
- Mollah and Hassan (2023) compared a commercial formulation of *T. harzianum* (Lycomax) to mancozeb fungicide (Agrizeb 80 WP) for control of late blight and early blight.

- The *Trichoderma* formulation provided similar protection against early blight to the chemical control.
- Late blight proved resistant to the commercial fungicide, but was greatly inhibited by application of *Trichoderma*, reducing the infection rate from over 95% to approximately 20%.

## CONCLUSIONS

All plants are locked in battle against the pathogens, insects and nematodes that want to exploit them. However, potato plants are far from helpless, already having a wide range of tools in their arsenal.

Leveraging the natural relationships between potato plants, beneficial microbes and a range of biochemical triggers can help harness their natural defences. In effect, this is using nature, instead of fighting against it.

Stimulation of ISR may therefore be another tool in the kitbag helping to protect potato crops from the destructive effects of the environment, pests, and pathogens.

## KEY POINTS

- Plants have a range of strategies to defend themselves from attack from insects and pathogens including
  - Reactive compounds that oxidise the pathogen
  - Hypersensitive responses
  - Toxic phytoalexins
  - Defence genes that produce PR (pathogenesis related) proteins
- Some PR proteins are general anti-fungal agents, others can dissolve fungal cell walls or inhibit feeding and digestion
- Induced systemic resistance occurs when defensive genes are activated throughout the plant and can be triggered by
  - Presence of a pathogen
  - Damage caused by a pathogen or insect to the plant cells
  - Beneficial fungi and / or bacteria in the root zone
  - Physical stress
  - Abiotic (non-biological) compounds such as chemicals, plant hormones or volatiles
- Plant growth promoting rhizobacteria, such as species of *Bacillus* and *Pseudomonas*, can improve plant defences as well as increase yield, with the effects often greatest when plants are stressed
- While many mycorrhizal fungi improve plant growth, *Trichoderma* are the group most widely associated with induced systemic resistance
- Commercial biological products sometimes include both rhizobacteria and mycorrhizal fungi, as they have different modes of action
- Some of the abiotic compounds shown to help prime potato plant defences include silicon, chitosan, salicylic acid and methyl jasmonate

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# 101: MANAGING IRRIGATION

Growing crops in Australia is not for the faint-hearted, especially when it comes to managing water. The challenge lies in the fact that we often have either too little or too much water, and not always at the right time. Farmers cannot rely on gentle, frequent rain to replenish soil water levels; managing water for crops needs deliberate and considered intervention.

This intervention requires some knowledge of plant physiology – knowing what plants need and when they need it – and a good working knowledge of soil science to understand how soil retains water. Additionally, growers must be adept with new technologies. When these three aspects are combined, it becomes easier to eliminate guesswork and optimise irrigation, ensuring plants receive exactly what they need without wasting a precious drop.

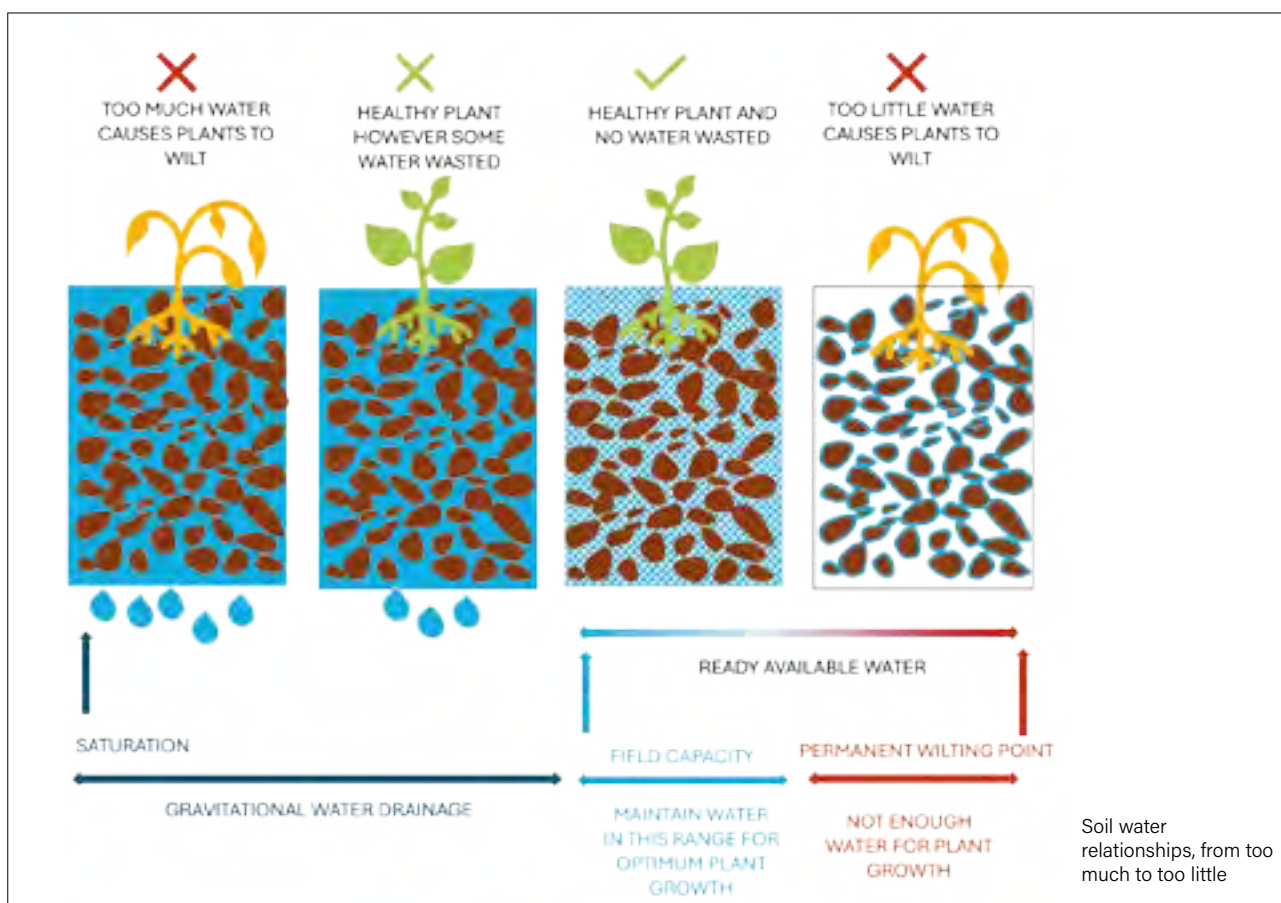
An effective irrigation strategy considers numerous factors, including water inputs and losses, plant requirements, local weather conditions, soil type, and the specific needs of crop at a given time. Consequently, irrigation strategies are highly site-specific, varying across different paddocks, seasons, and years.

## SOIL AND WATER

Different soils absorb and hold water at a specific rate, depending on their

texture and structure (referred to as **water holding capacity**). Measuring soil water is crucial to understanding soil conditions at each irrigation stage: from **saturation** (when all pores are filled with water, leading to anaerobic conditions, runoff, and ponding), to field capacity, refill point, and finally, permanent wilting point.

**Field capacity** is the maximum volume of water that soil can hold, while the **permanent wilting point** is the lower limit, where the remaining water in the soil is unavailable to



plants. After heavy rain or irrigation, water moves rapidly downward due to gravity. The rate of this movement also depends on soil structure and texture, with sandy soils draining faster than clay soils. Once drainage becomes negligible, the soil has reached field capacity. Over-irrigation beyond this point results in water 'wastage' through run off and drainage.

As plants cannot use all the water held in the soil, irrigators must calculate the **readily available water (RAW)**, which is the optimal zone for plant growth between field capacity and the refill point. RAW, measured in millimetres per meter (mm/m), indicates the depth of water held in each meter of soil depth that plants can absorb. RAW varies with soil type, crop, and rooting depth, and can be calculated for the total profile depth or just the plant's effective root zone.

The **refill point** is when plants have used all the RAW, and water needs to be replenished. Soil moisture probes can help determine the soil's water-holding capacity and the point at which the soil profile should be refilled.



Read more on the effect of soil composition and structure on water here

## EVAPORATION AND TRANSPIRATION

The 'irrigation water cycle' includes the crop's water needs, the soil's relationship with the water (e.g., how much it can hold onto), and how much water is lost. Water leaves the soil not only through drainage and run off, but also through evaporation and transpiration.

**Evaporation** occurs when liquid water is converted to water vapour and hence removed from a surface and into the air. The rate of evaporation depends on factors such as cloudiness, air temperature, and wind speed. It is measured by the addition

## CALCULATING THE RAW

To calculate RAW, there are six steps:

1. Dig a hole within the root zone of your crop, if possible, at least 30cm past the main root zone where the fibrous roots are concentrated.
2. As stone and gravel reduce the amount of water that can be held by the soil, it is worthwhile calculating the percentage of stone and gravel in the soil. Take three handfuls of soil and use a 2mm sieve to remove all stones and gravel. Place the pile of stones and gravel next to the pile of soil and visually estimate the proportions of each (e.g., 60% stone and 40% soil).
3. Identify the texture of each soil layer within the effective root zone. The amount of water held by the soil and available to the plant varies with texture (see table below as a guide from Department of Agriculture and Food, WA <https://rb.gy/wzn6a6>). For example, a loamy soil can hold more readily available water than sandy soil. Soil texture can be assessed in the field by feeling a moist soil sample between your thumb and forefinger.
4. Summarise the following information:
  - The depth of the effective root zone
  - The soil texture and percentage of stone/gravel in each layer
  - From the table below identify the RAW (Readily Available Water) value for each soil texture layer (mm/m)
  - Adjust the RAW figure(s) by the percentage of stone/gravel in the soil
  - Multiply the thickness of each soil layer by its adjusted RAW value
  - Add up the RAW values for each soil layer to obtain the total root zone RAW

### An example

A potato crop growing in a sandy loam soil containing 10% stone, with an effective root depth of 0.3m and a strategy to irrigate at 20kPa (required by most vegetables) would have the following calculations:

- From the table below, the RAW for a sandy loam soil at 20kPa = 45mm/m
- As the soil contains 10% stone, reduce the RAW by 10%
- Adjusted RAW = 45mm/m -(45mm/10) = 40.5mm/m

Hence, for a rooting depth of 0.3m, total root zone RAW = 40.5mm/m x 0.3m = 12.15

Soil texture	RAW (mm) at 20kPa
Sand	30
Loamy sand	45
Sandy loam	45
Loam	50
Sandy clay loam	40
Clay loam	30
Light clay	25

*NB. Different agencies across Australian may have derived differing values bases on their specific calibration procedure.*

*Source: Calculating Readily Available Water: <https://www.agric.wa.gov.au/citrus/calculating-readily-available-water?page=0%2C1>*

or subtraction of a known amount of water from an evaporation pan.

**Transpiration** occurs when water in plant tissues is lost to the atmosphere, predominantly through the small opening in the leaves called stomata.

**Evapotranspiration**, as the name suggests, takes into account both evaporation and transpiration.

The Bureau of Meteorology (BoM) has a number of tools to help growers calculate evapotranspiration rates in their area including subscription-based evapotranspiration forecasts via Real-time Data Services.

Registered users can access these forecasts, updated twice daily, through an FTP system, with detailed information available on BoM's website. Additionally, BoM provides free historical and seasonal data on evapotranspiration and other water balance components through the Australian Water Outlook website. This site offers comprehensive, interactive information from 1911 to present, and projections based on various climate models extending to the end of the century.



*Read more about the BOM tools [here](#), including links to relevant services*

## WATER REQUIREMENTS OF POTATO CROPS

Potatoes, typically a thirsty crop, are often grown on soils with low water-holding capacity (for example, sandy soils), which makes irrigation management difficult.

Like Goldilocks, irrigation has to be just right: too much water increases disease and reduces quality, while too little water reduces productivity, yield and nutrient uptake.

Adding to the complexity, irrigation requirements change as the potato plant grows and matures. Understanding growth stage is therefore essential to understand the

water needs of the crop. Physiological development of the potato plants is commonly divided into five stages:

**Stage 1 – Establishment:** Planting and emergence (20 to 35 days)

**Stage 2 – Stolon initiation:** Early vegetative growth and stolon development (15 to 25 days)

**Stage 3 – Tuberisation:** Tuber initiation at the end of the stolons; water demand is high (10 to 15 days)

**Stage 4 – Tuber bulking:** tubers fill and expand; water demand is high (30 to 60 days)

**Stage 5 – Maturity:** Tuber maturation and vine death (15 days or more)



*Read more on the water requirements across the growth stages [here](#)*

## TOOLS TO MANAGE SOIL MOISTURE AND WATER QUALITY

Soil moisture sensors can help optimise irrigation management, which can increase profitability by improving yield and quality, and reduce inputs. Using soil moisture monitoring tools can also reduce off-farm environmental impacts by decreasing the volume of leached nutrients.

For soil moisture sensors to be effective, they must be correctly installed, data checked and used in combination with other management information.

### Tensiometers

Tensiometers function in a similar way to plant roots by measuring the 'suction' required to extract water from the soil. A tensiometer is a sealed, water-filled tube with a porous tip at one end and a pressure gauge (measured in kPa) at the other. As the soil dries, moisture moves from the tensiometer into the soil, creating a partial vacuum inside the tube, which corresponds to the soil water potential (kPa). A fully saturated soil gives a

reading of 0 kPa, while a reading of -40 kPa or less indicates dry soil. To ensure reliable readings, the cylinder must be airtight and there must be excellent contact between the soil and the porous tip.

### Time Domain Reflectometry (TDR) Sensors

TDR sensors measure the volumetric soil moisture content. They consist of two or three parallel metal rods. The time it takes for an electromagnetic wave to travel from one rod to the other indicates the soil's moisture content. TDR sensors are a well-established technology widely used in agriculture. Portable systems have been developed, allowing data to be uploaded to a website for easy access. A variation of the TDR is the TDT (Time Domain Transmissometry) sensor, which uses a 'U'-shaped design instead of parallel rods. TDT sensors sample a larger soil volume but are less portable than TDR sensors.

### Soil Moisture Capacitance Sensors

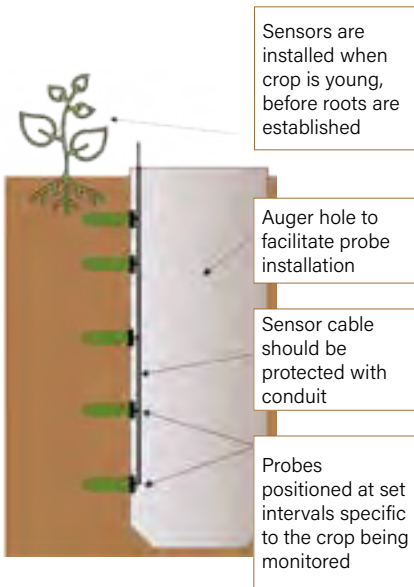
Capacitance sensors also measure volumetric soil moisture content, but they do so by measuring the charge time of a capacitor with electrodes separated by the soil. Fast charge times indicate high moisture content. There are many commercially available brands, with associated equipment for transmitting and storing data

### Installing the sensor

Specific instructions should be provided in the sensor manufacturer's installation guide, however there are some key considerations:

- Install sensors in areas representative of the crop to optimise irrigation
- Avoid placing sensors near field edges and in unusually wet or dry areas, unless managing those specific zones
- Utilise your knowledge of the paddock, along with aerial photos, satellite imagery, and soil maps to choose optimal locations

- Assess the crop and soil conditions to determine the number of sensors needed and the appropriate probe depths
- Place a sensor below the root zone to monitor deep water movement and potential nutrient leaching



Typical TDR soil moisture probe installation  
Source: Figure by Henry Hyde



Read more about soil moisture sensors [here](#)

### KEY POINTS IN SELECTING A SOIL MOISTURE SENSOR:

- Choose a sensor that is compatible with your data management system and can provide automatic readings in near real time and communicate data to the cloud
- Ensure local support is available for timely servicing; sensors are not set and forget
- Consider costs, both upfront and ongoing, for example, any subscriptions for communications
- Ensure the sensor can be buried at suitable depths for your crop
- Confirm the ease of installation and extraction when sensors are used in annual crops
- Confirm that the installation does not interfere with farm operations
- Consider the soil volume measured by the sensor; the bigger the better

electrical conductivity (EC). Higher salt concentrations increase the water's EC. EC can be measured at various locations on a farm or nursery, including water storage, irrigation lines, leachate zones, and runoff zones.

Several units of measurement for EC include  $\mu\text{S}/\text{cm}$ ,  $\text{dS}/\text{m}$ ,  $\text{S}/\text{cm}$ ,  $\text{mS}/\text{mm}$ , and  $\text{mmho}/\text{cm}$ , with  $\text{dS}/\text{m}$  being the most common as it easily converts to parts per million (ppm). The conversions are:

$$1 \text{ dS}/\text{m} = 0.1 \text{ S}/\text{m} = 1 \text{ mS}/\text{cm} = 1000 \mu\text{S}/\text{cm} = 1 \text{ mmho}/\text{cm}$$

When installing EC sensors:

- Secure sensors in water to prevent cable damage
- Use poles to suspend sensors in surface water at the desired measurement point
- Ensure sensors can be easily removed for regular cleaning and maintenance
- Ensure sensor housing allows good water flow for representative sampling
- Position sensors near the irrigation water collection point

### pH

pH measures the acidity or alkalinity of a solution on a scale from 0 to 14:

Readings above 7 are alkaline; readings below 7 are acidic. The pH of water can impact plant growth and irrigation equipment.

When installing pH sensors:

- Secure submerged sensors to prevent damage from cable suspension
- Use poles to suspend sensors in water storage applications at the desired measurement point
- Ensure sensors can be easily removed for regular cleaning and maintenance
- Allow good water flow through the sensor housing for representative sampling
- Position sensors near the irrigation water collection point

### EXPLORE THE TOPIC FURTHER

Additional resources to this topic, including fact sheets, webinars and, case studies, are available in the PotatoLink Grower Knowledge Library.

[potatolink.com.au](http://potatolink.com.au)

### Managing irrigation water quality

Irrigation water quality monitoring is important when using variable water sources or when growing sensitive crops such as potatoes. Water quality sensors include those that measure pH, electrical conductivity, and nutrient concentrations in irrigation water.

Although detailed installation procedures are provided with the sensors, there are some key considerations and basic installation steps for each sensor type.

#### Electrical conductivity

Salinity, the total quantity of dissolved salts in water, is measured by

# CASE STUDY: IRRIGATION EFFICIENCY IN POTATOES

## Flowing forward: One year of irrigation technology insights



Grower: Tim Walker, grower, agronomist (WalkerAg) and regional rep for PotatoLink (Tas).

A farming operation in Spalford, Tasmania embarked on its first year using soil moisture probes to improve irrigation management and optimise water use efficiency. The farm produces fresh market potatoes (Nicola variety) along with various vegetables and wine grapes on 50 ha. With varying soil types across their fields and navigating between the fine line of maximising yield while minimising the risk of rot in potatoes, the grower leveraged technology as a tool in their decision-making process.

### Implementation

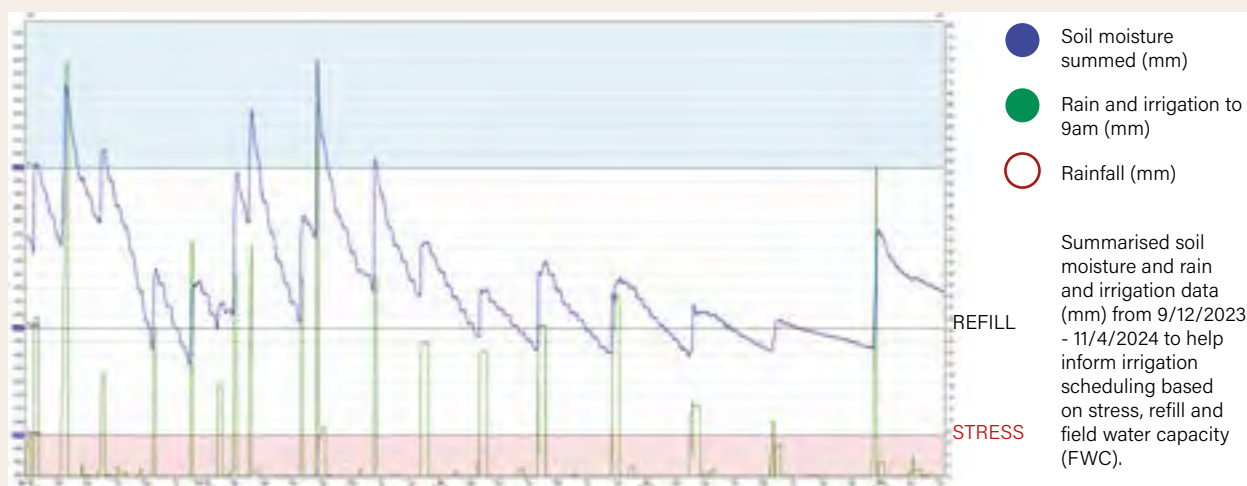
With guidance from AgLogic, the grower placed one soil moisture probe across his paddock capturing the most predominant of the four soil types. Probes were positioned approximately 10 metres away from the irrigation runs, avoiding the driest and wettest areas to obtain representative readings. The grower utilised the Wildeye app to monitor and analyse the soil moisture data collected by the probes as well as both rainfall and irrigation data.

### Challenges and solutions

One of the main challenges was the uncertainty regarding the optimal irrigation volume for potato crop growth stages and exactly how many mls of water is being applied, leading to over-irrigation or causing crop stress. However, by viewing the soil moisture data, the grower was able to see when soil moisture levels were low and conducted a field inspection (with a shovel) to confirm the readings. The data, combined with a site inspection, allowed the grower to make a more informed decision about when to irrigate.

### Results

Through careful monitoring and interpretation of the soil moisture data, the grower made informed decisions about when and how much to irrigate. The grower learned to recognise the signs of soil moisture depletion and adjust the farm's irrigation practices accordingly. The first year of using soil moisture probes was about learning how they fit into the overall management system, how to interpret the data (refill points, stress levels, soil water holding capacity), and to start thinking about how to amend irrigation scheduling accordingly. The grower is looking forward to a second year using soil moisture probes and weather station data, coupled with a shovel to make more informed and confident irrigation decisions with the aim of saving water and costs, and providing exactly what the potato crop needs for optimising yield.



# CAN YOU SHOCK A SEED?

Buying good quality seed is, arguably, the most important annual decision a grower will make. Handling and storing that seed correctly is essential to maximise returns on this valuable investment, and avoiding condensation during cooling is critical to minimise the risk of storage diseases. To achieve this, seed potatoes are usually cooled very slowly, dropping only 2°C weekly.

It has been suggested that slow cooling has another benefit too. Allowing the seed to adjust gradually to low temperature avoids a large temperature change which, as the theory goes, could stress or 'shock' the tuber. Physiological stress can certainly increase ageing, and even affect viability of the tiny dormant sproutlets.

However, from a postharvest view, the aim is usually to cool as soon and as fast as possible after harvest. Rapid cooling avoids moisture loss, reduces the risk of rots, and is more energy efficient.

## TESTING THE EFFECTS OF COOLING RATE

The Potatolink team conducted a small trial growing potatoes (cvs crisping variety 'VarX' and fresh market variety 'Sifra') from a single batch of seed that was then stored in three different facilities.

All seed was cured for a minimum of 8 days at 14°C before storage. Two lots of seed were cooled rapidly (A and B), while the third (C) experienced the slow cooling rate traditionally recommended. Approximately 215 days after harvest, seed stored in facilities A and C was transferred to store B, ready for planting in January 2024.

### Treatments:

**A. Cooled rapidly eight days** after harvest, minimal temperature fluctuations during storage

**B. Cooled rapidly 21 days** after harvest, temperature during storage fluctuated by approximately 3°C daily

**C. Cooled slowly from approximately 31 days** after harvest, minimal temperature fluctuations during storage

While all three facilities kept temperatures close to the desired minimum of 3°C during storage, delays in cooling and temperature fluctuations

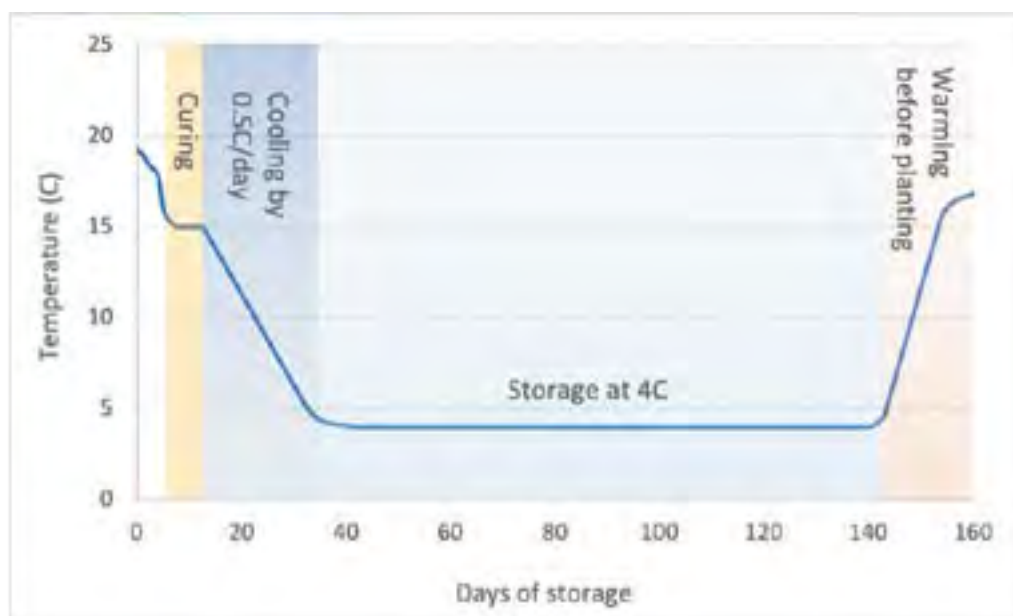


Figure 1. Recommended temperatures for seed potato curing, cooling, and storage.

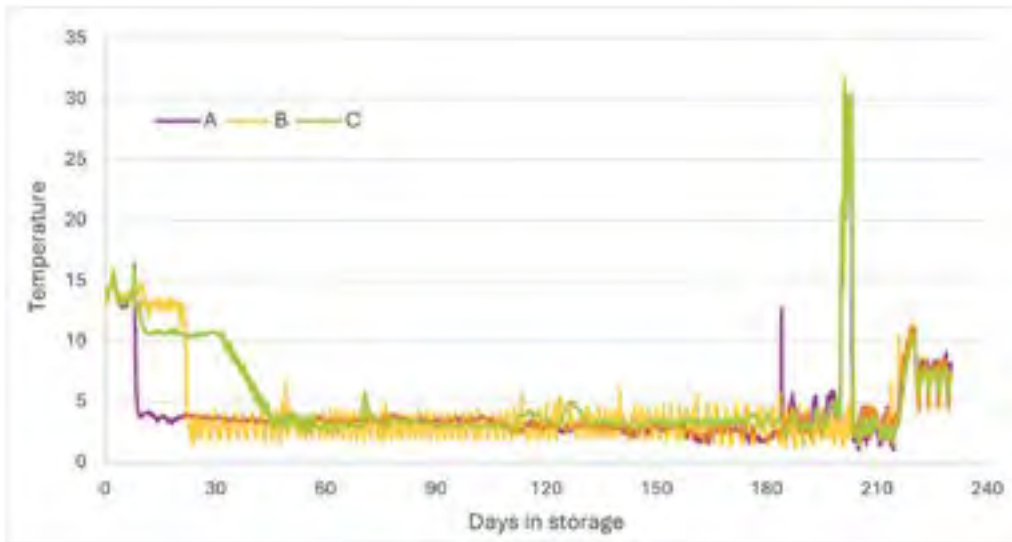


Figure 2. Temperatures of seed potatoes during storage in three different facilities (A, B and C), recorded between harvest and replanting the following season. Note that seed from storage facilities A and C was transferred to facility B after 215 days.

meant that differences emerged in total heat accumulation, expressed as degree days (DD). As 4°C is normally considered the threshold for significant biological activity in seed potatoes, degree days was calculated by:

$$DD = \text{sum (hourly temperature reading during storage - 4) / 24}$$

Negative values (where temperature was below 4°C) were not included in the total. As shown in Table 1, seed potatoes in facility C accumulated twice as many degree days in storage as those in facility A, with facility B intermediate.

Table 1. Summary of storage conditions for seed potatoes kept in three different facilities for up to 220 days before planting.

	Cooling speed	Maximum °C	Minimum °C	Average °C	Total degree days >4°C
A	Fast	3.9	2.4	3.35	200
B	Fast, delayed	5.7	1.7	3.09	266
C	Slow	5.8	2.3	3.27	400

The seed tubers were hand planted within a commercial VarX crop at a NSW farm in January 2024. The trial was laid out with three replicate rows of each of the six treatment units.

Stem number and plant height were recorded four weeks after planting. A second inspection at tuber bulking examined the number of stems, tubers, and hooks for three plants per replicate (total nine plants/treatment).



Planting the seed storage trial potatoes, January 2024

At the final harvest, two x three metre sections were hand dug from each replicate. Data was collected on plants/m, stems/plant and total yield of tubers.

Tubers of processing cultivar VarX were divided into size grades of <40, 40 to 60, 60 to 90, and >90mm diameter. Additional samples were analysed for specific gravity. Tubers from ware variety Sifra were graded into x-small (<45mm); small (45-57mm); medium (57-82mm); large (82-108mm) and x-large (>108mm).

## RESULTS

A month after planting, it appeared that the potatoes from facility A were slightly more advanced than those from facilities B and C (Figure 3). However, differences were small and did not prove statistically significant.

Seed from facility B tended to have produced fewer tubers and stems at tuber bulking than those from A and C. However, this was not statistically significant (Figure 4). Moreover, as had been observed soon after planting, differences between the varieties were bigger than the differences between treatments.

The potatoes were harvested in mid-May. By this time, all consistent differences in stems/plant, tubers/plant, and total yield had disappeared and no significant differences were found (Figure 5). There were also no differences in specific gravity for VarX tubers, with all of the storage treatments returning 1.09.

But what of tuber size and number? Surely doubling the degree days during storage will have changed the maturity of seed at planting? Given that older seed tends to produce more and smaller tubers, this is where we most expected to see a difference. However, it was not to be. No statistically significant differences were found in the percentage of small, medium or large sized tubers produced from the different seed storage treatments for either variety.



Figure 3. Sifra (left) and VarX plants grown from seed stored at three different facilities (A, B, C), picture four weeks after planting

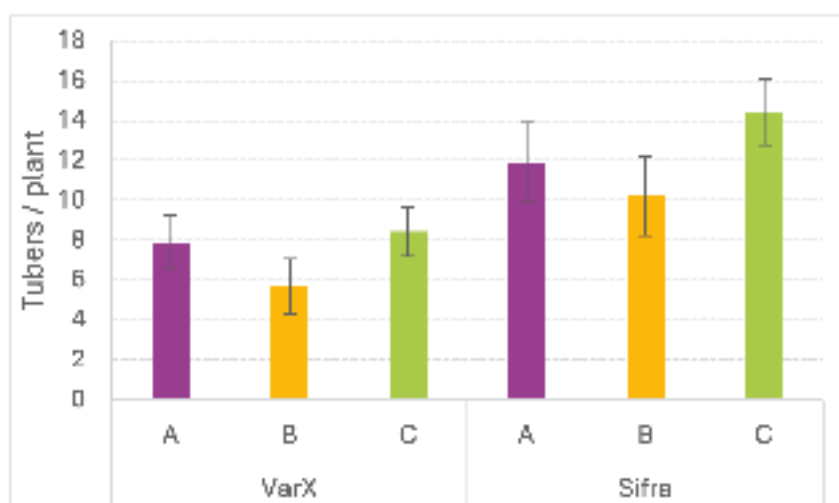


Figure 4. Average tubers per plant, recorded at tuber bulking, from VarX and Sifra potatoes grown from seed stored in three different facilities. Bars indicate the standard error of each mean (n=9)



Figure 5. The trial area one month before harvest



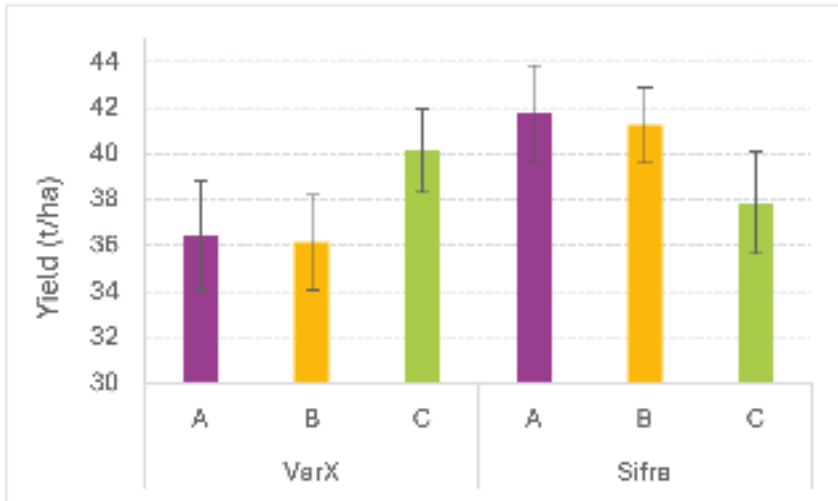
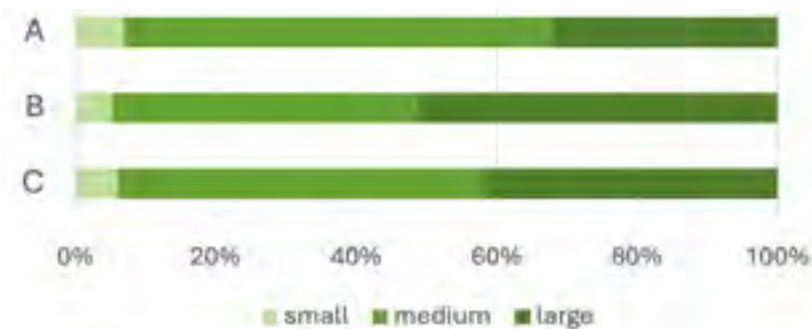


Figure 6. Total yield from VarX and Sifra potatoes grown from seed stored in three different facilities. Bars indicate standard error of each mean (n=6).

**Var X**



**Sifra**

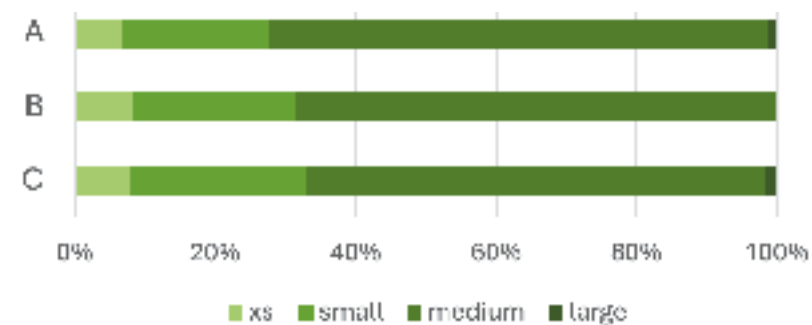


Figure 7. Percentage of tubers falling within each size range for VarX and Sifra potatoes grown from seed stored in three different facilities

**SO WHAT CAN WE CONCLUDE?**

In this small trial, rapidly cooling seed potatoes did not cause any negative impacts on growth and yield of the resulting plants. The only effect was to reduce heat accumulation of the tubers, thereby limiting seed ageing.

However, the volumes of seed used in this trial were small, so cooled quickly without significant condensation occurring. If commercial amounts of seed are to be cooled quickly, it is essential to ensure high rates of air flow around and through the bins. This should preferably be achieved using a forced air system that actively pulls air through the load.

While storage in facility C doubled the degree days over 4°C compared to facility A, both facilities kept the tubers at their lower physiological limit. The three facilities used for the trial were all well managed, achieving average temperatures of 3.1 to 3.4°C. For comparison, seed stored in a facility running at an average of 5°C would have accumulated at least 1,130 DD over this period, far more than the 200 to 400 DD observed in this trial.

In summary, in this trial, the three storage facilities used provided suitable environments for storing seed potatoes;

- *even though* DD was doubled for facility C compared to facility A.
- *even though* temperature fluctuated daily in facility B, and
- *even though* some tubers cooled in a matter of hours, whereas others took several weeks,

all treatments resulting in statistically similar outcomes, with the plants growing well.



- Renewable energy: installing solar panels or purchasing green energy.
- Fuel use efficiency: adopting practices such as minimum tillage and efficient tractor use can lower fuel consumption.
- Soil management: minimising soil compaction and tillage helps maintain soil health and structure.
- Waste minimisation: reducing waste production is crucial for lowering the farm's carbon footprint.

Regarding carbon farming, Clinton emphasises the importance of understanding your base line emissions.

"As there is no incentive for 'business as usual', it is very important to demonstrate activities on farm that will increase efficiencies and reduce emissions."

"This means that in relation to increasing carbon storage in soil, it is necessary to understand the current baseline," Clinton said.

The three factors that need to be calculated include:

- Actual organic carbon, which is affected by management practice, including plant productivity, rotation strategy, and soil management
- Attainable organic carbon, impacted by climate conditions, including average rainfall, temperature, and solar radiation
- Potential organic carbon, limited by soil type, for example clay content, bulk density, depth, mineralogy

There is no 'silver bullet' to this global dilemma, and we can't just look to strategies to offset the problem (or offset the problems of other industries).

Clinton's takeaway advice:

- 1. Know your current emissions** – do a baseline of your current emissions and know the emissions intensity of your production. There are several free tools that can be used to do this (refer to page 28).
- 2. Know your current sequestration** – in crunching the numbers, also know your current sequestration of any permanent vegetation on farm. Given the

extent of soil disturbance in potato production, permanent storage of soil organic carbon most likely be low.

### 3. What's your future sequestration?

– consider any material changes to your production system or strategies that you may be considering to reduce your emissions in the future.

### 4. Talk to your supply chain –

understand what your supply chain needs are, particularly around the emissions intensity of production and insetting strategies. If you can produce a lower emissions intensity potato, what is your market advantage for doing so?

## OFFSETTING VERSES INSETTING

While carbon offsetting has been a common practice, there is now a growing emphasis on carbon insetting.

To clarify: For growers, carbon offsetting involves purchasing carbon credits from external projects, like reforestation, to reduce their farm's CO<sub>2</sub> balance.



In contrast, carbon insetting focuses on implementing nature-based solutions within the farm's own operations. This includes practices such as reforestation, agroforestry, renewable energy projects, and regenerative agriculture. By creating these projects, the grower's 'inset project' creates carbon offsets to sell to others.

## CARBON FARMING

Carbon farming is a prime example of insetting.

Potato growers can benefit from various co-benefits of carbon projects, including enhanced biodiversity, economic gains from increased productivity, and resilience against extreme weather events. For example, increased soil fertility can reduce the need for other inputs, while improved soil structure can protect against erosion and buffer against drought effects.

Carbon farming can also generate income by creating carbon credits (selling to those whose only option may be to offset). To generate these credits, projects must be new and additional to activities already being performed. It is important for farmers to check the Emissions Reduction Fund rules before starting any carbon farming activities to ensure compliance and eligibility.

Carbon farming also improves the natural capital of an area – in other words, the natural assets, processes, and cycles that support ecosystems.

## LEARN MORE



To explore this topic further, **the Australian-Grown Horticulture Sustainability Framework handbook** is a great start.

## ACKNOWLEDGMENT

*With thanks to Clinton Muller, Senior Consultant at RMCG, for his input and guidance.*

## MEASURING ENVIRONMENTAL PERFORMANCE

As the global push for sustainability intensifies, transparency in environmental performance is becoming crucial for businesses across all sectors. Starting from July 2025, large retailers in Australia will be required to report the emissions from their entire supply chain, including those from their agricultural suppliers.

Mandatory carbon reporting for large retailers means that every link in their supply chain will be scrutinised for its carbon footprint. This includes the emissions produced by farms during the cultivation, harvesting, and processing of potatoes.

### Tools for Estimating Emissions

To meet these new requirements, potato growers can utilise specialised tools designed to estimate greenhouse gas emissions. Two prominent tools available to Australian farmers are the Horticulture Greenhouse Accounting tool (H-GAF) and the Cool Farm Tool.

#### ■ Horticulture Greenhouse Accounting Tool (H-GAF):

1. Australian standards: H-GAF is tailored for Australian horticultural conditions and uses standards from the Australian National Greenhouse Accounts Factors.
2. Ease of use: Designed with the specific needs of Australian growers in mind, H-GAF simplifies the process of calculating emissions, making it accessible for farmers who may not have extensive technical expertise.
3. Local relevance: By considering local climate, soil types, and farming practices, H-GAF provides a precise measure of a farm's carbon footprint, helping growers to identify specific areas for improvement.

#### ■ Cool Farm Tool:

- Global: The Cool Farm Tool is widely accepted by multinational companies and is used globally across various agricultural sectors. This broad acceptance makes it a valuable tool for farms looking to sell to international markets or to retailers with a global presence.
- Versatile: The Cool Farm Tool is versatile and can be used for a variety of crops and farming systems. Its flexibility allows it to cater to different farming practices and environmental conditions.
- Comprehensive: This tool offers a detailed analysis of emissions across all farming activities, helping farmers to understand the full scope of their environmental impact and to develop comprehensive strategies for emission reduction.

# POTATOLINK ON THE ROAD

## UNDERSTANDING SEED CERTIFICATION AND IMPROVING INPUT USE EFFICIENCY

In April, 50 growers gathered at the Tasmanian Vegetable Research Facility (TIA) to learn more about seed certification and input use efficiency.

### UNDERSTANDING SEED CERTIFICATION

The Seed Certification Information Day provided an important platform for growers to engage with experts and gain valuable insights into the Tasmanian Seed Potato Certification Scheme. Doug Clark, TasSeed Manager, led the event, providing a comprehensive overview of the certification scheme and answering questions to help growers make informed decisions when purchasing seed potatoes.

With many commercial growers lacking clarity on seed certification, Doug explained that seed is categorised into three types.

**Certified seed** meets the National Standard for quality, variety purity, and minimal disease. **Approved seed** meets certain processing company specifications but is not fully certified.

**Provisional seed** is uncertified and potentially problematic.

Issues had arisen from growers unknowingly purchasing provisional seed, which can lead to disease problems, which emphasises the

importance of recognising these distinctions and seeking more information from local certifiers when in doubt. Clarification from the local certifier can prevent future issues, as demonstrated by growers who switched from provisional to certified seed lines after experiencing problems.

Doug further explained the seed quality colour codes: **Red** indicates minimum quality seed, which is certified but not suitable for growing more seed. **Black** is for further seed production, and **gold**, as the name suggests, indicates the best quality seed with some testing available.

Ann-Maree Donoghue, Seed Potato Officer at TIA, demonstrated the seed certification process, including

sampling and inspecting seeds for defects. She explained the 1, 2, 3 grading system for Powdery scab and Common scab severity, where 1 indicates low severity and 3 indicates fully covered defects.

The speakers also highlighted that certified seed can still face issues if mishandled during storage or



### HOW DO I KNOW I AM BUYING CERTIFIED SEED?

When purchasing seed from a certified seed grower or a merchandiser, the seed purchaser should always ask to see the label stating that it is certified. Certified potato seed is either gold, black or red label (label colour may be different between certifying authorities) with the below information:

- Name of Grower
- Variety – Generation
- Region grown
- Paddock number
- Rating
- Month and year of harvest
- Signature of an authorised certification officer

1. <https://www.utas.edu.au/tia/research/research-projects/project/horticulture/tasmanian-certified-seed-potato-scheme>

transportation. Proper management from harvest to sowing is crucial to maintaining seed quality.

The second workshop focused on optimising irrigation and nutrition management with Marek Matuszek (Ag Logic), Dr Doris Blaesing (RMCG), Tim Walker (PotatoLink), and Ossie Lang (VegNET).

## OPTIMISING WATER INPUTS

The session emphasised the integration of soil moisture probes with field observations for precise irrigation scheduling, highlighting the importance of understanding the soil-plant-water relationship, soil types, and infiltration patterns.

Effective risk mitigation strategies include avoiding waterlogging, maintaining soil structure, and optimising moisture use. Soil moisture probes validate existing irrigation practices and provide real-time data for informed decision-making.

Key points include:

- Ensuring efficient irrigation scheduling considers the crop growth stage and field conditions
- Interpreting weather forecasts
- Understanding root system dynamics, including the root zone outside the mound
- Timely placement of probes

The ultimate goal is to match irrigation with actual crop water needs to save water and increase yields (for more on this topic, see page 16 of this issue, *101 Irrigation*).

## OPTIMISING NUTRIENT INPUTS

Irrigation and nutrition are interconnected, as water is essential for nutrient mobility through the soil, roots, and plants. Therefore, achieving optimal yields involves balancing nutrients, which can be challenging.

Proper nutrient application in terms of rate, timing, and location prevents

waste, reduces costs, and protects the environment. Doris Blaesing from RMCG provided insights into nutrient use.

Her key points included:

- A fertiliser program should be based on a soil test result used to fix deficiencies in the soil and crop removal rates over time.
  - Overapplication of nitrogen (N) reduces Nitrogen Use Efficiency (NUE) as potatoes can only absorb a limited amount at each crop stage, and both excess and deficiency of N can reduce crop quality and yield. When looking at potato yields vs nitrogen inputs of commercial crops, a clear relationship cannot be established because there are many drivers of yield that can override the nitrogen effect.
  - Potassium is crucial for tuber yield, size, quality, and efficient water transport through plant tissues, enhancing nutrient uptake and crop health. Potatoes take up far more potassium than nitrogen.
  - Calcium is a major nutrient that is vital for tuber initiation, disease resistance, and cell wall strength, which improves skin quality. Calcium uptake into a tuber is
- Phosphorus is easily fixed by volcanic soils. Pre-spreading should occur as close as possible ahead of planting; band placing may be an advantage. Single super can supply sulphur and calcium as well as phosphorus.
  - Trace elements (Fe, Mn, Cu, Zn, Mo, B) are as important as major elements (N, P, K, S, Mg, Ca).
  - Plant testing can give information on nutrient uptake during the season.
  - Compound fertilisers, containing a balanced mix of essential major and micronutrients (trace elements), can achieve good results because they are balanced and distributed throughout the soil.
  - Tools like NDVI images by, for example, Data Farming (<https://www.datafarming.com.au/>) can help map nutrient variations in fields. Healthy soils with good structure, organic matter content, and pore spaces, facilitate air and water movement, root penetration, and nutrient uptake, and thus may lower the need for fertiliser.

### EXPLORE THE TOPIC FURTHER



#### Seed:

Seed Sourcing and Purchasing Checklist



#### Nutrition:

Nutrient element functions in vegetable crops fact sheet



#### Irrigation:

Matching Irrigation to Crop Growth fact sheet



#### Nutrition:

Getting more value from fertiliser fact sheet



#### Irrigation:

Getting the most out of Bureau of Meteorology data



#### Nutrition:

Changing needs of a growing crop



#### Irrigation:

Irrigation monitoring in potatoes – Practical use of IrriSAT and soil moisture sensors: Part 1 and Part 2

# MIKE TITLEY CELEBRATED WITH THE MEDAL OF THE ORDER OF AUSTRALIA (OAM) FOR CONTRIBUTIONS TO AGRICULTURE

Mike Titley, a leader and influencer of the Australian vegetable industry for over 35 years, has been honoured with the prestigious Order of Australia for his exceptional contributions to horticulture.



His career, which blended scientific rigor with practical and meaningful application, has influenced vegetable agronomy, both domestically and internationally.

Mike's approach has always been grower-focused, ensuring that his research and innovations were not only theoretically sound but also implementable by growers. His profound knowledge of vegetable

varieties and their suitability to different climates and regions has been a cornerstone of his work, making him an invaluable asset to the industry.

Mike worked with the Australian potato industry, first with Frito-Lay where he was involved in the scheduling and quality of potatoes throughout Australia, the development of new cultivars of potatoes using

tissue-cultured techno-tubers, and the establishment of a potato varietal testing at a field station in Thailand. He later worked on potato variety evaluation for Arnott's and SnackBrands.

One of Mike's significant achievements has been the development of major new industries in Australia, including commercial broccoli and babyleaf salad production. His research into

varieties and crop scheduling, which provided the foundation for consistent and high-quality broccoli production, has been instrumental in transforming broccoli from a highly seasonal and minor crop into a staple available year-round in Australia. This work was also crucial in establishing broccoli as a significant export to Southeast Asia, dramatically increasing the cultivation area and export volume within a few years.

Through a research project with Applied Horticultural Research, Mike established key factors driving quality and shelf life of babyleaf vegetables, helping growers produce crops like spinach, lettuce, and rocket as 'baby leaf crops' with high efficiency. This revolutionised the leafy vegetable industry, helping to make babyleaf salad vegetables a staple in Australian supermarkets.

In the processing vegetable sector, Mike's contributions have been transformative. He developed systems that ensured a consistent supply of high-quality produce to processors, addressing the industry's challenges and setting new standards for quality and continuity.

The vegetable seed industry is another enduring passion of Mike's. His work has underscored the importance of matching cultivars to specific seasons, regions, and markets, a complex task vital to successful commercial vegetable production. Over 20 years in the seed industry, Mike's innovative approaches and lateral thinking have significantly advanced vegetable growing practices across Australia.

Mike's impact extends beyond Australia. His international aid work with the Australian Centre for International Agricultural Research (ACIAR) and the Asian Development Bank (ADB) has improved agricultural practices and reduced poverty in

developing countries including Vietnam, the Philippines, and several African nations. His focus on teaching farmers to adopt new practices has led to significant yield improvements and increased incomes, showcasing his commitment to global agricultural development.

In addition to his research and international contributions, Mike has been a passionate educator. His tenure at the University of Queensland, Gatton (formerly Queensland Agricultural College), as a lecturer in vegetable agronomy, left a lasting mark on the horticultural industry. Many of his students attribute their success to his inspirational teaching and practical insights.

Dr Gordon Rogers, managing director of Applied Horticultural Research (AHR), was one such student.

"I was fortunate to study under Mike while at Gatton. His philosophy, that change only happens when knowledge is effectively passed on to those who can apply it, has had a profound impact on me and my own career," Gordon said.

"Supporting innovation through research and communication is the cornerstone of what we try to do here at AHR every day, and I am very grateful to Mike for leading the way."

Moreover, Mike's leadership extended to the Gatton EXPO, which he developed into Australia's premier horticultural field day. His ability to schedule crop maturity precisely for the event, provided growers with a unique opportunity to compare varieties under optimal conditions, attracting thousands of visitors and numerous exhibitors.

Throughout his career, Mike has remained a staunch advocate and ambassador for the vegetable industry. His international collaborations,

leadership roles in various horticultural societies, and numerous accolades, including the Graham Gregory Award for excellence in Horticultural Science, underscore his dedication and influence.

Mike's applied science knowledge and research innovations, and his ability to communicate both to affect change, has not only shaped Australia's horticultural industry, but has inspired a generation of agricultural scientists and horticulturists.

The Medal of the Order of Australia is a fitting tribute to a man whose work has profoundly shaped the Australian vegetable industry. His legacy of scientific excellence, practical innovation, and educational impact will continue to benefit growers and the broader agricultural community for generations to come.



# vegnet update



**AUSVEG**

**Hort  
Innovation**

**VEGETABLE  
FUND**

**Hort  
Innovation**

**ONION  
FUND**

VegNET is funded by Hort Innovation using the vegetable and onion research and development levies and funds from the Australian Government.

# VegNET Overview



VegNET is the vegetable and onion industry extension program that is run by growers, for growers and delivered by AUSVEG.

The program aims to keep Australian vegetable and onion growers informed about current R&D activities, results and resources – supporting the adoption of industry best practice and bolstering vegetable and onion productivity and profitability in key growing areas across the country.

Coordinated nationally by AUSVEG, VegNET is delivered 'on-the ground' by regional development officers (RDOs) in key growing regions who are responsible for developing and executing regional extension plans.

A critical step in ensuring growers receive assistance is the identification of each region's key priority issues, resources and connections requirements.

The most common challenges identified in consultation with industry are:

- Water (availability, quality and cost)
- Labour (availability, awards, HR and skills)
- Input costs
- Biosecurity
- Pest management
- Market development (including export)
- Post-harvest and marketing
- Urban encroachment
- Social license (environmental impact and chemical (mis)usage)
- Business management

Now in **Phase Three**, the VegNET program is running with RDOs based in organisations with strong grower networks in vegetable and onion production regions.

The program is overseen by a National Coordinator, who works with each regional group to ensure growers have consistent access to an industry-focused extension program that will put their needs first in their efforts to be productive, profitable and more competitive in an ever-increasingly global marketplace.

In 2016 Hort Innovation invested in 10 regional capacity building projects to effectively transfer R&D information to vegetable growers through regionally-based extension projects and associated coordination and training projects. These projects were contracted to delivery partners based in the ten major vegetable growing regions and were unified under a national brand – VegNET.

**Phase One** The first phase of VegNET finished in early 2020, with the regional development officers (RDOs) delivering R&D awareness and extension activities in their geographical regions.

**Phase Two** The second phase of VegNET finished in September 2021, and resulted in each region developing regional priority areas for extension. These regional priorities were collated into national priority areas to inform a national extension program that is nationally-consistent and regionally-specific.

VegNET is funded by Hort Innovation, using the vegetable and onion research and development levies and contributions from the Australian Government. Hort Innovation is the grower-owned, not-for-profit research and development corporation for Australian horticulture.

## Contacts

LOCAL REGIONAL DEVELOPMENT OFFICER

### NEW SOUTH WALES - Penrith

#### Sylvia Jelinek

Local Land Services NSW  
M. 0427 086 724  
sylvia.jelinek@lls.nsw.gov.au

### NORTHERN TERRITORY - Darwin

#### Mariah Maughan

NT Farmers  
M. 0410 067 422  
ido@ntfarmers.org.au

### QUEENSLAND - N & FN - Bowen

#### Luke Jurgens

Bowen Gumlu Growers Association  
M. 0419 429 808  
rdo@bowengumlugrowers.com.au

### QUEENSLAND

#### Wide Bay Burnett - Bundaberg

#### Jessy Logan

Bundaberg Fruit & Vegetables Growers  
M. 0407 366 797  
VegNET@bfvg.com.au

### QUEENSLAND - SE - Gatton

#### Darren Brown

Lockyer Valley Growers Inc  
M. 0456 956 340  
ido@lockyervalleygrowers.com.au

### SOUTH AUSTRALIA - Adelaide

#### Peta Coughlin

AUSVEG SA  
M. 0409 029 745  
peta.coughlin@ausveg.com.au

### TASMANIA - Launceston

#### Ossie Lang

RM Consulting Group  
M. 0430 380 414  
ossiel@rmcg.com.au

### VICTORIA - Gippsland, Sale

#### Emily Scott

Food & Fibre Gippsland  
M. 0455 214 102  
emily.scott@foodandfibregippsland.com.au

### VICTORIA - N, S and W - Horsham

#### Danielle Park

AUSVEG VIC  
M. 0432 324 822  
rdo@ausvegvic.com.au

### WESTERN AUSTRALIA - Perth

#### Katrina Hill | vegetablesWA

M. 0427 373 037  
katrina.hill@vegetableswa.com.au

### NATIONAL

#### Cherry Emerick

AUSVEG  
M. 0418 389 680  
Cherry.emerick@ausveg.com.au



## Hort Connections networking for VegNET

Opportunities for the VegNET Regional Development Officers to meet with the extended national industry are rare. Hort Connections provides a platform to network, extend knowledge and learn from each other.

Hort Connections 2024 was held in Melbourne within easy distance of some of Victoria's premier vegetable growing regions.

For VegNET Regional Development Officers (RDOs) it was time for their annual planning session. With these sessions, RDOs have engaged prior with their Regional Extension Advisory Group (REAG) to plan the year ahead based on regional priorities as determined by their respective industry bodies and growers. The chance to unite as a team to exchange ideas during these sessions is enlightening and strengthens the RDO's skills and knowledge.

Individually, it also provides RDOs an opportunity to network with growers from their regions and share ideas that can be applied back home. This is particularly true of the Farm Tours that form part of the Hort Connections program, and of course the Trade Show.

This year's Farm Tours took place in three key growing regions – Werribee and Bacchus March; Mornington Peninsula and the Yarra Valley, along with a fourth tour that visited the wholesale markets and retail outlets. These tours showed a range of produce, production systems and environments that have elements of learning that can be applied in other regions.

**Hort Connections 2025 will be held in Brisbane, giving greater access for growers based in the north of Australia, and showcase the nuances of growing in a diverse region for weather.**

Above L-R. VegNET RDOs Emily Scott, Mariah Maughan, Jessy Logan and Ossie Lang at Hort Connections 2024. VegNET RDOs catching up at Hort Connections.

### Improving extension frameworks and learning

Attending the International Farming System Association conference is an opportunity to learn about new ways of supporting industry to develop prosperous farms and production systems. This year's theme, *Systemic Change for Sustainable Futures*, focused on four key areas: transition pathways; harmonising agriculture and communities; capacity development and rethinking food production and consumption.

For VegNET National Coordinator, Cherry Emerick, the opportunity to attend the conference, held in Sicily, Italy provided time to focus on opportunities for improving extension with Australian growers either through revised frameworks, new partnerships and new technologies for engagement and learning.

Industry development and innovation manager, Olive Hood of Hort Innovation, joined Cherry on the trip where they heard from researchers and PhD candidates as well as participated on a day long field trip where firsthand examples of the ideas shared at the conference were demonstrated by local farmers.

On the green gold of Belice Valley, which has been home to olive groves for centuries, Cherry and Olive visited two exporting olive groves. The visit highlighted the benefits of community engagement, making the most of resources, fostering social innovation and, rethinking and reconfiguring food production and consumption across global supply chains; collaborative approaches to local development, and harmonising agriculture and community.

The Asaro family has been farming in the Valle del Belice for more than 100 years. Their business is a very dynamic export-oriented grower in the olive oil sector. Its flagship products are extra virgin olive oil and the 'Oleato', a new line of beverages based on extra virgin olive oil and Arabica coffee, created in partnership with Starbucks.



Above L-R. Cherry Emerick, national coordinator VegNET; Olive Hood, Hort Innovation and Nic Asaro, stand in front a 100 year old olive press.

**Asaro Farm Olive Grove.**

100 percent vertically integrated, 100 percent family owned, 100 percent Sicilian, 100 percent sustainable.

The new generation of farmers in the region is choosing to stay, drawn by a deep passion for the land and the valley's natural beauty. These young farmers are driven by a desire to contribute value to their own land. Asaro believes that agriculture is the foundation of a happy society, essential for feeding the country.

Building a sustainable farm can take up to 20 years, but owner Nic Asaro emphasised the importance of falling in love with the product and family. By working together, they cultivate a strong work ethic and bring other growers along on their journey.

**Constantly seeking innovative ways to use less water and care for the soil, the Asaros foster a community where people become ambassadors for their own cause. The involvement of a chef in promoting their products helps to create long-term connections, further solidifying the community's bond and commitment to their shared agricultural heritage.**

The Geolive Belice Company has more than 70 years of experience in the production and marketing of table olives. They pack directly for sale to foreign markets (Europe, USA, Australia). The company also boasts a 10-year collaboration with the University of Palermo in the field of table olive fermentation.

The two companies are heavily engaged in careful relationships with local suppliers of olives. Asaro has recently launched the 'Belice Valley Farmers' Club', based on the model of the Starbucks Farmer Support Centres, while Geolive Belice is a member of the producers' organisation 'Terra degli Ulivi Società Cooperativa', thanks to which about 100 of its suppliers are provided with technical assistance and phytosanitary monitoring services (e.g. traps, weekly bulletins.).

These two farms are some of the best examples of companies which have been able to combine local identity productions and consumption in a modern Italian style with a global perspective. Both companies emphasise the importance of setting up long-term collaborations among local producers with a view of co-building and successfully managing the entire supply chain, from tree to shelf, including Australian shelves. Through significant investments in technology and innovation partnerships, they have achieved a balance between food safety, quality, and sustainability in production techniques and vibrant local farming communities.

The conference has provided Cherry and Olive with greater understanding of the latest extension research that could be experimented within projects such as VegNET 3.0 for better outcomes for Australian vegetable and onion growers.

**Learn more about International Farming Systems Association here: [ifsa.boku.ac.at](https://ifsa.boku.ac.at)**

#### FIND OUT MORE

Please contact Cherry Emerick AUSVEG on 0418 389 680 or email [cherry.emerick@ausveg.com.au](mailto:cherry.emerick@ausveg.com.au)

VegNET 3.0 is a strategic levy investment under the Hort Innovation Vegetable and Onion Funds. This project has been funded by Hort Innovation using the vegetable and onion research and development levies and contributions from the Australian Government.

Project: VG21000

**Hort Innovation** VEGETABLE FUND

**Hort Innovation** ONION FUND

# Compost and spreadable microbes put to the test in soil health trial

## Case Study September 2023



National Vegetable  
Extension Network  
NORTHERN TERRITORY

### Introduction

Generally, the soils of the Northern Territory (NT) often lack sufficient plant nutrients and soil structure, particularly organic matter. The NT has high rainfall over a few months in the wet season, often resulting in significant water run-off, while fires can destroy grass and leaf litter during the dry season. Over a long period of time, this cycle has resulted in soil which is low in plant nutrients and extremely low in organic matter.

Organic matter is key for soils to hold nutrients and moisture as well as maintain a suitable environment for soil organisms and micro-organisms which are essential for healthy plant development.

Given this challenge, VegNET NT worked with two vegetable growers based near Darwin to find out if soil amendments such as compost and spreadable microbes could improve soil health.

Le Tuong's farm is in the Acacia Hills region of the NT and produces a variety of Asian greens such as snake bean and Asian melons (long melon, hairy melon, bitter melon). Le found very high levels of the soil-borne disease, Fusarium, on one paddock after multiple crop rotations.

Chris Pham's farm is based in the Marrakai region in the NT and also produces a variety of Asian greens, such as snake bean and okra, as well as mangoes. Chris thought his soil lacked nutrients and also struggled with soil-borne diseases such as Fusarium.

**Fusarium can be crippling for snake bean crops as it causes the plant to yellow and then die. While Fusarium is often found in patches throughout a crop, it can affect most of the crop in significant cases.**

**Managing Fusarium in soil is not easy, and there often is no single solution. However, many studies show that improving your soil health can greatly influence the presence of Fusarium in soils.**

### Key messages

- ▶ To help boost the quality of soil in the Northern Territory's vegetable production regions, VegNET NT coordinated two farm trials where either compost or spreadable microbes were applied to an area of soil that is used to grow vegetables. The results were captured using soil tests as well as visual changes to the crops following treatment.
- ▶ The growers were encouraged by the results, which showed an increase in leading indicators of soil health, including cation exchange capacity and organic matter, improved crop quality and reduced incidence of soil-borne diseases.
- ▶ While the results can partly be attributed to the soil amendments, it is important to note that boosting soil health is a long-term commitment, and it takes time to see significant improvements in productivity.



## Compost and spreadable microbes put to the test in soil health trial

### Trial approach

A soil test was taken on both farms prior to applying the compost or microbes to form a baseline for comparison. A soil test was also conducted several months after application and into crop maturity to determine any changes to soil health by measuring the cation exchange capacity (CEC) and organic matter within the soil.

As Le's farm had a paddock that was too wet to apply compost, spreadable microbes were applied to increase the soil quality.

Chris chose to apply certified compost to two areas of his farm where okra would be planted. As seen in Figure 1, the trial section had two rows that were composted, a buffer row and two rows un-treated. The soil test sampled all treated and non-treated rows before and after the compost was applied to increase confidence in the results.

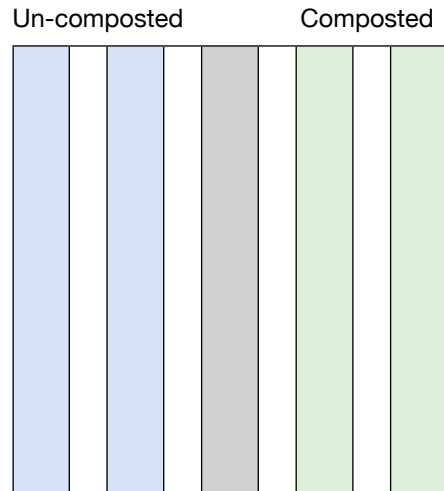


Figure 1: Trial setup at Chris Pham's farm

### What is CEC?

The Cation Exchange Capacity (CEC) of soil corresponds to the total capacity of a material to hold exchangeable cations.

The higher the CEC, the greater the soil's ability to hold onto essential nutrients and provide a buffer against soil acidification.

### What is organic matter?

Organic matter results from partly decayed plants and animal residues. Organic matter assists in maintaining soil structure, the supply and retention of nutrients, soil activity and water retention.

Essentially, organic matter can greatly improve the health of soil and therefore have an impact on the plants grown in that soil.



NT vegetable grower Chris Pham next to the okra paddock which was treated with certified compost to improve soil health

## Compost and spreadable microbes put to the test in soil health trial

### Interpreting trial results

As shown in Tables 1 and 2, both farm trials showed a considerable increase in soil health.

The soil analysis showed that Le’s CEC increased from 2.5 cmol (+)/kg to 3.5 cmol (+)/kg after adding microbes to the soil. However, the percentage of organic matter did not change significantly due to the application of microbes rather than compost. It should be noted that while microbial diversity can increase soil organic matter formation through faster transformation of plant inputs into decomposition products, applying compost is the best way to see a noticeable increase in organic matter.

Meanwhile, Chris’s CEC increased from 2.1 cmol(+)/kg to 3.3 cmol(+)/kg after applying compost and organic matter also increased from 1.1% to 1.7%. As mentioned earlier, the NT has naturally low organic matter content in its soils so if Chris can work towards 2% organic matter he will be above average.

Table 1: Soil test results from Le Tuong’s farm

Le’s farm (spreadable microbes)	Soil test timing	CEC (cmol(+)/kg)	Organic Matter %
Pre microbe application	Sep 2022	2.5	No change
Post microbe application	Apr 2023	3.5	

Table 2: Soil test results from Chris Pham’s farm

Chris’s farm (Compost)	Soil test timing	CEC (cmol(+)/kg)	Organic Matter % (Total carbon*1.75)
Pre compost application	Dec 2022	2.1	1.1
Post compost application <b>Un-composted rows</b>	May 2023	2.2	0.99
Post compost application <b>Composted rows</b>	May 2023	3.3	1.7



Soils are notoriously poor in many vegetable growing regions across the NT.

## Compost and spreadable microbes put to the test in soil health trial

### Improving grower productivity, profitability, preparedness and competitiveness

Ultimately, if growers are to increase the cost of their inputs by applying compost and/or microbes to their soils, they need to see a benefit such as increased production over time. While soil testing has shown that applying compost and microbes has improved the soil, the visible benefit to the crop is also important.

Le has seen an improvement in his snake bean crop since applying the microbes. He has a longer harvesting window than the adjacent paddock which was not treated. Fusarium is undoubtedly still an issue, however, the damage in the treated crop has decreased compared with the adjacent paddock.

In addition to applying microbes, Le has also implemented other strategies to minimise soil-borne diseases and/or improve soil health. This includes introducing organic fertiliser into his nutrient program and uses less conventional fertilisers.

Before applying the microbes, Le injected a product called EndoSan through his water lines to target Fusarium in his crops. The product is a stabilised hydrogen peroxide solution that kills microorganisms such as harmful bacteria, but it also targets beneficial microorganisms. While Le did wait some time before spreading the microbes after using the product, EndoSan may have assisted in decreasing the incidence of Fusarium. However, it is unlikely to have caused the increase in CEC, which is likely due to the microbe application.

Le thinks that applying microbes as well as making other changes to his management system, is a positive step in maximising productivity and has since purchased some compost to trial on one of his paddocks.

Chris has seen the okra paddock, which was treated with compost, is less stressed and appears to be taking up fertiliser better than the paddock, which was not treated. Chris also applied a product called Nucleon to the paddock, which is a liquid enzyme additive intended to enhance nutrient availability to soil microbes and broaden nutrient uptake by the plant roots. This, too, could have improved the health of the okra crop, but the product was not applied to the treated area in Figure 1 which indicates that the compost likely improved the soil health by increasing the CEC and organic matter of the soil.

The visual differences between the non-treated and treated crop rows in Figure 1 were not significant, which does highlight that improving soil health to increase crop production and quality is a long-term investment.

### Final word

The trial results show that applying microbes and/or compost has potential to improve soil health in the Northern Territory, both in terms of increasing CEC and organic matter.

However, judging the 'worth' of applying compost in just a few months and seeing production benefits may leave some growers questioning if the practice of applying compost is economical. Only the grower can make that decision. However, they should consider that building soil health takes time, and the best results will be seen from long-term changes such as applying compost over several years.

### Further information

Contact VegNET NT Regional Development Officer Mariah Maughan at [ido@ntfarmers.org.au](mailto:ido@ntfarmers.org.au) or 0417 618 468.



# NSW Cambodian growers change tack to boost soil health

## Case Study September 2023



### Introduction

The Australian Cambodian Growers Association of NSW is on a soil health improvement journey, with their champion grower Kim Ngov testing and demonstrating soil health improvement practices over the last few years. The group is eager to learn about improved soil health management and are keen to improve crop productivity as many members farm their crops on heavy clay loam and low nutrient soils.

Plastic mulch is often used by field vegetable growers to control weeds, reduce herbicide use and retain soil moisture. However, the use of plastic mulch limits accessibility to the soil to apply compost or to sow cover crops, so alternative growing practices need to be considered to improve soil health.

Many of the group's growers are hesitant and lacking confidence to change farm practices as it can be a daunting experience. While the use of a demonstration site can help to alleviate the stress and see changes first-hand while learning best practice, many farms are not large enough to set aside a demonstration plot to trial alternative soil management practices.



To help the Australian Cambodian Growers Association of NSW, VegNET NSW Regional Development Officer (RDO) Sylvia Jelinek – in collaboration with Dr Kelvin Montagu and Stephanie Tabone from the Soil Wealth and Integrated Crop Protection (ICP) project (MT22004) – is providing guidance and support to the growers to encourage best practice and make changes on farm easier for the group.

### Key messages

- ▶ VegNET NSW is working with the Australian Cambodian Growers Association of NSW and the Soil Wealth and Integrated Crop Protection (ICP) project to improve soil health through alternative growing practices.
- ▶ Following a workshop on soil health and cover crops with interested growers, a demonstration site was set up in south-west Sydney to trial practices that would improve soil structure, reduce established soil-borne diseases such as clubroot and white rot, and ultimately improve yield and reduce inputs.
- ▶ As many growers are hesitant to trial different production approaches, VegNET NSW will continue working with the Australian Cambodian Growers Association of NSW to share learnings and increase grower confidence to improve their productivity and profitability through better soil management practices.

◀ *Dr Kelvin Montagu presenting on soil health in the September 2022 workshop with growers from the Australian Cambodian Growers Association of NSW.*

## NSW Cambodian growers change tack to boost soil health

### Soil-focused plan of attack

In August 2022, 12 growers had their soil sampled to gain a baseline analysis of their soil composition. A VegNET NSW Soil Health and Cover Crops workshop was then held with the participating growers, led by Kelvin and Stephanie. It was a great day of learning and included discussions on soil biology, cover cropping, tillage, nutrition and interpreting soil test results from their own farms. Growers received some cover crop seeds following the workshop, as many were keen to try cover crops on their farms.

Growers Julie and Sopha Heng of Kemps Creek in south-west Sydney decided to trial a year of alternative soil management on their farm under the guidance of Kelvin and Stephanie. A soil management action plan was developed in December 2022, with the objective to improve soil health by:

- ▶ Improving soil structure
- ▶ Reducing compaction of subsoil (>15 cm depth) and eliminating the hard pan
- ▶ Reducing surface capping
- ▶ Improving drainage
- ▶ Reducing disease in the spring onion crop
- ▶ Improving yield and reducing input costs.



Root system hard pan. Image courtesy of Stephanie Tabone (Soil Wealth ICP).

Known diseases at the site included, clubroot (*Plasmodiophora brassicae*) which has developed from ongoing cropping of brassica vegetables (bok choy, Chinese cabbage, mustard plant) and onion white rot (*Sclerotium cepivorum*) in spring onion crops.

Eight 1m wide experimental beds were used for the trial alongside control beds which represented normal practice. The structure of the topsoil (0–15 cm) was porous and friable, while the subsoil (>15 cm) was compacted. The treatment plots had compost applied to increase organic matter levels and then the soil was deep ripped to 35 cm to overcome the compaction at depth.

A Japanese millet cover crop was planted in February 2023 and incorporated through rotary hoeing at a shallow depth to promote germination. Annual ryegrass was also planted in the inter-row space to suppress weeds and improve soil structure. The control beds were prepared using the grower's normal practice and did not have a cover crop.

The cover crop was grown for approximately six to eight weeks, then terminated using herbicide as it became quite weedy towards the end of that period. The area was then rotary hoed and spring onions planted in early June 2023 across the treatment and control areas. In mid-June, the spring onions were inoculated with a biological product containing *Trichoderma* for the control of onion white rot.



In-field discussion on soil conditions with Dr Kelvin Montagu and Stephanie Tabone (Soil Wealth ICP), Kim Ngov (grower) and Julie Heng (grower/farm owner).

## NSW Cambodian growers change tack to boost soil health

### Improving grower productivity, profitability, preparedness and competitiveness

Soil improvement is the long-term goal for this trial and, at the time of writing, the growers were taking soil samples to measure changes in soil health indicators. It is important to note that while soil amendments such as compost can lead to quicker results in terms of boosting soil health, it can take some time to see significant increases in soil carbon levels and soil structure using cover crops.

The growers will also monitor the effectiveness of the mild *Trichoderma* application on the incidence of white rot in the current spring onion crop, particularly given the crop was planted late in the season and has experienced lower temperatures at night compared to other winter seasons.

The most important learnings from the initial trial were the high-level of grower engagement, participation and willingness to try the practices over a longer time period. There were a few challenges in building confidence to change practices in weed management and reducing tillage

### Next steps

In the meantime the growers will continue to monitor weeds and potentially continue to apply *Trichoderma* to reduce white rot. There is also an opportunity to replicate the trial during the upcoming summer season. As changing practices can be daunting, VegNET NSW will provide further mentoring support during the next trial with the use of selective herbicides to overcome any persistent weed issues.

VegNET NSW will also work with other growers in the Australian Cambodian Growers Association of NSW that are interested in conducting trials to undertake demonstrations on their farms.

### Further information and resources

Contact VegNET NSW Regional Development Officer Sylvia Jelinek at [sylvia.jelinek@lls.nsw.gov.au](mailto:sylvia.jelinek@lls.nsw.gov.au) or 0427 086 724.

*Soil Wealth and Integrated Crop Protection (ICP) – Phase 3 (MT22004)* has been funded by Hort Innovation using the vegetable and melon research and development levies and contributions from the Australian Government.



VEGNET

## Wide Bay Burnett

REGIONAL UPDATE

### Lots of change and exciting activities on the horizon!

VegNET Regional Development Officer (RDO) Jessie Logan has had a busy couple of months, with the Bundaberg Fruit and Vegetable Growers office moving to a new central location in Bundaberg. In between the move, the BFVG staff also supported the delivery of the Biannual BFVG Gala Dinner. The event saw 530 people come together to celebrate horticulture across our region. It was great to see so many familiar faces taking a break from their day to day to enjoy an evening of culinary delight, drinks, decor and entertainment.

Between all the glitz and glam, VegNET RDO Jessie Logan travelled down to the Gympie region to undertake joint visits with Growcom to engage with vegetable growers and share some current project activities that may be of interest. The visits were positive, with many growers keen to see more workshops held locally and volunteered to participate in upcoming trials on their farms. The team engaged with seven vegetable growers and it was great to get to learn about some of their challenges so industry can work towards potential solutions.

The VegNET project was fortunate to have six growers from the Bundaberg/Gympie/Fraser Coast regions express interest in the Fall Armyworm National Monitoring Program through RapidAIM technologies. The new RapidAIM Fall Armyworm traps will be installed on site in early August. This project is a Hort Innovation funded project that will be part of a national monitoring program for Fall Armyworm. The project is led by the Bowen Gumlu Growers Association and delivered locally by VegNET Regional Development Officers across Australia.

The VegNET RDO has also supported the establishment of the Fall Armyworm Lure Trial work which Bundaberg Fruit and Vegetable Growers is partnering with Macquarie University to deliver locally. Two farms are involved in this project, which will trial the efficacy of four different lure types. The trial is set to run for 12 months.

With the establishment of new trapping programs across the region, it is timely to offer a Multi Pest workshop to talk about the tools available to support Integrated Pest Management for different pests including Fruit Fly and Fall Armyworm. The workshop will also cover current information on Guava Root Knot Nematode, while international Expert Dr Johann Desaegeer is visiting the region. Growcom will also be leading a Pest Sense Workshop in Gympie after interest from the recent grower interests, with support from the VegNET project.

A Soil Wealth ICP demo site has been established in Bundaberg with Applied Horticultural Research (AHR) - preliminary soil testing is underway. The primary aim of this demo site is to measure and assess the host grower's current irrigation and nutrition practices in a capsicum crop under drip irrigation on sandy soils. The collected data will guide decision-making and inform trials, which will test the impact of any management practice changes on water and nutrient use efficiency, input costs, environmental sustainability, and crop yield and quality.

In addition to this work, the VegNET project has also worked with AHR to explore spray efficiencies on farm, in particular spray coverage inside capsicum flowers.

This potentially could increase efficacy of spray programs, to understand how well applications reach the desired target (inside flower). Spray speed and pressure will be assessed to see which combination provides the best coverage. Direct spray impact needs to occur within the flower to enable efficacy of the chemical in preventing internal mould spore development. The project is keen to hear from any other vegetable growers using air assisted spray rigs to extend this trial into that mode of application of fungicides.

Above L-R. Gala Dinner picture of BFVG team. Spray efficiency testing on farm Dr Naomi Diplock Research Scientist AHR. Below. VegNET RDO Jessie Logan Soil Sampling at the Bundaberg Soil Wealth ICP Demo site.



#### FIND OUT MORE

Please contact Jessie Logan on 0407 366 797 or email [VegNET@bfg.com.au](mailto:VegNET@bfg.com.au)

New address: 255 Bourbong St, Bundaberg West QLD 4670

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Project: VG21000

**Hort Innovation** VEGETABLE FUND

**Hort Innovation** ONION FUND

VEGNET

## New South Wales

REGIONAL UPDATE

## Greater Sydney horticulture bus trip for North Coast growers

A group of NSW North Coast protected cropping growers and agronomists attended a horticultural bus trip to Sydney in May to visit high performing farms and research institutions in the Sydney and NSW Central Coast. This was an opportunity to learn new ideas and explore the horticultural landscape in the Greater Sydney Region. The trip was funded by North Coast Local Land Services with the support from VegNET NSW and aimed to encourage networking and information sharing between the Greater Sydney and North Coast protected cropping areas.

### Technology and unique growing

The standard for biosecurity and PPE was set high and featured heavily on this tour to ensure the plant health and safety of farms and institutions visited, as well as maintaining the 'practice what we preach' message for visiting other farms and expectations of visitors to the growers' own farms.

Day one of the bus trip had stops along the Pacific Motorway to see Ricardoes Tomatoes and Strawberries near Port Macquarie. Ricardoes is not your average greenhouse farm. They have a local and diverse customer base and markets in place for second grade product which buffers them from market pricing fluctuations. They have a pick-your-own strawberries agritourism business as part of their unique business model. Next stop was to Family Fresh Farm at Peats Ridge, a 'high-tech' glasshouse facility producing snacking cucumbers for the supermarket sector. Nicky and Wade Mann demonstrated the technical aspects of production in the facility including leaf, rootzone and atmospheric sensors. This visit was a real 'pinch me' moment for

the bus trip attendees, including travelling hosts Ewan Leighton and Harriet Brickhill from North Coast Local Land Services. Growers remarked that it was 'next level and above benchmark'. It was amazing technology to see with staff camaraderie and dedicated Vanuatu workers.

### Learning and touring

Day two was packed from sunrise to sunset, starting at Sydney Produce Markets for a tour and breakfast. This produce market is the largest in the southern hemisphere and one of the largest in the world. Growers saw where their produce goes and see their agents at work. Afterwards, the group was able to explore the Markets and see the huge diversity of produce available.

Continuing on through southwest Sydney, the group visited low to medium tech farms in Kemps Creek and Wallacia where growers were shown novel ways to reduce nutrient runoff. This included capturing and piping nutrient-rich wastewater to adjacent farms to feed field-grown vegetables. A modulated shipping container system filtered, sanitised and reused captured effluent water. Growers enjoyed visiting greenhouse vegetable grower Carol Hatem, who was generous with her time. The North Coast growers could relate and connect really well with Carol's similar size farm and operations.

### Your levies at work

Growers also visited the Western Sydney University's National Vegetable Protected Cropping Centre. During these visits growers were shown how Hort Innovation industry levy funds were being used to research high priority topics from the sector including a polyethylene film colour trial and food security and safety. Dr Michelle Mak was enthusiastic to have growers there

to show them 'science and levies at work'. Goran Lopaticki is the facility coordinator, and the love of his job was apparent while guiding the group through the daily functions of the Protected Cropping Centre. Tour attendees were also shown a low-tech tunnel research that PhD students are using for their studies.

The final visit was to the NSW Department of Primary Industries 'Central Coast Primary Industries Centre' at Ourimbah. Joshua Jarvis showed growers through a greenhouse pest and disease persistence trial, as well as technical aspects of running a greenhouse research facility, including relatable topics like cleaning plastics and irrigation. Dr Sukhvinder Pal (SP) Singh who leads the Horticultural Food Safety Research Program at NSW Biosecurity and Food Safety gave an engaging presentation to the growers updating them on changes being made to the Primary Production and Processing (PPP) Standards set to be introduced to berries, leafy vegetables, and melons in February 2025, highlighting that even greenhouse cucumbers are vulnerable to potential food safety issues.

Above L-R. Growers at Sydney Produce Markets. Growers at Western Sydney University's National Vegetable Protected Cropping Centre.

Images courtesy Ewan Leighton LLS.

### FIND OUT MORE

Please contact Sylvia Jelinek on 0427 086 724 or email [sylvia.jelinek@lls.nsw.gov.au](mailto:sylvia.jelinek@lls.nsw.gov.au)

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Project: VG21000

**Hort Innovation** VEGETABLE FUND

**Hort Innovation** ONION FUND



VEGNET VICTORIA  
**Gippsland**  
REGIONAL UPDATE



## Winter Warmer Seminars inspire in Gippsland

“The value in this event, as in all other Winter Series events, is increased knowledge and a change in your way of thinking.” From Hort Connections to the Winter Warmers Seminar Series, knowledge growth has been at the forefront of the last few months for Gippsland’s horticulture industry.

This year Hort Connections was an excellent opportunity for many Gippsland growers to attend to network and gain ideas from the trade floor and the tours and well worth the drive up to the big smoke.

The annual Winter Warmers Seminar Series has become a popular fixture on the VegNET Gippsland calendar following its inception in 2023. Session 1 of the 2024 Winter Warmers Seminar Series inspired growers who heard Dr Paul Horne speak at the International Spinach Conference in 2023 and wanted to learn more about Integrated Pest Management (IPM). More than 20 Gippsland growers and agronomists attended Dr Horne’s workshops in early July with feedback showing an 80 percent increase in attendees’ knowledge, skills and awareness of IPM strategies thanks to the events. One grower commented, “Thank you Dr Horne and VegNET Gippsland, please continue to offer these sessions; bringing industry together with a leading brain in front of us, little *think tanks* that move the industry forward.”

The event will hopefully be a catalyst for change when it comes to pesticide usage and beneficial insects, with 100 percent of attendees indicating that they would likely change farm practices due to learnings from the event. Many growers noted their interest in the idea of a sacrificial plantings, along with other cultural controls such as

providing beneficial insects with a sugar source. VegNET Gippsland hopes to run field walks with Dr Horne in early summer as a follow-up to the Seminar Series workshops.

Following the successful drone demonstration night and the associated case study on ‘The role of spray drones in vegetable farming’, Emily is writing a case study on the next steps of drone use. The case study will focus on providing readers with information on what it takes to get a spray drone up and running, from registration, licensing and compliance, to costs and in-field setup. So, keep your eyes peeled for its release!



Top L-R. Hort Connections 2024 farm tours. Growers and agronomists learning about beneficial insects with Dr Paul Horne.

Above. Dr Paul Horne presenting at Session 1 of the Winter Warmers Seminar Series.

VegNET Gippsland is active on social media and our webpage, with information on upcoming events, copies of our monthly newsletter and links to all our existing case studies, including:

- **Pilot program supports CaLD workers to settle into Gippsland**  
*September 2023 (RMCG)*
- **Seminar series supports professional development in Gippsland**  
*September 2023*
- **The practicalities of soil data monitoring in intensive vegetable production**  
*December 2023*
- **The impacts of severe and compound rain events on baby leaf crops**  
*January 2024*
- **The learnings and challenges of running a study tour**  
*January 2024*
- **The role of spray drones in vegetable farming**  
*April 2024*

### FIND OUT MORE

Please contact Emily Scott on 0455 214 102 or email [emily.scott@foodandfibregippsland.com.au](mailto:emily.scott@foodandfibregippsland.com.au) Follow ‘VegNET Gippsland’ on Instagram and Facebook and check out our webpage at [foodandfibregippsland.com.au/vegnet](http://foodandfibregippsland.com.au/vegnet)

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## Western Australia

REGIONAL UPDATE

### Capacity grows with relationships

The Hort Connections event, provided many WA growers and industry to come together, share information, and explore ideas in a dynamic environment for collaboration and knowledge exchange.

One attending WA grower mentioned successful networking with 'new business opportunities arising', and another new attendee was encouraged by the accomplishment of the young innovators in industry and inspired to follow the same professional pathway.

By connecting the right people and resources together it has set the stage for meaningful future projects that benefit both individual growing regions and their businesses and to further initiate cross-regional relationship brokering for capacity building.

Growers are encouraged to attend these transformative events that can elevate your horticultural practices and connect with the industry network, and potentially bring new opportunities.

### WA's Zeke Zalsman wins Young Grower of the Year - Hort Connections 2024

Zeke Zalsman, from Zaldeesh Farms is an innovative, passionate vegetable grower in Western Australia and has been named the 2024 Corteva Agriscience Young Grower of the Year from a list of 10 other worthy finalists across Australia.

In response to Perth climate challenges and gas prices, Zeke was the first grower to investigate, trial and adopt heat pump technology in greenhouse production in Australia supported by the VegNET project and the Innovation Fund.

Zeke's founding work with heat pump technology for greenhouse heating has

not only reduced operating costs and enhanced production quality in the business but has also started a national movement by setting a new benchmark for sustainability and innovation in horticulture.

Zeke pitched the initial idea highlighting the issues that many growers would be experiencing and the concept to the VegNET RDO which led to collaboration and the first successfully created Innovation funded project nationally within the VegNET program.

The project provided feasibility studies for three WA growers, assessing the capital expenditure and benefits of PV electric heat pump technology versus the farm's existing greenhouse heating systems. The findings of the study have since inspired many growers countrywide to consider this technology in their production systems.

Zeke has now also joined the VegNET Regional extension advisory group (REAG) providing insight and advice to the region's wider activities in vegetable extension in Western Australia.

The Zaldeesh Farms journey underscores the value of embracing new technologies and sustainability practices across the business and is a powerful reminder that with the right support and resources, we can drive sustainable growth and innovation in horticulture.

Zeke offered valuable advice to fellow growers encouraging more uptake of financial booster and support mechanism's and the often-swift allocation of energy grants and resource efficiency grants in WA.

"Just apply for the grants available, even if you might have to decline the offer once approved due to timing or cash flow issues. It's better to be in the running than miss out entirely," said Zeke.

This initiative has expanded to provide

protected cropping workshops supported by VegNET and the Innovation Fund across regions in WA in August 2024.

The workshop series aims to meet the needs of different scales and stages of businesses in WA. The new project responds to the growing interest in protected cropping systems, due to land and water availability, climate impact, weather events and increased market competitiveness.

#### Workshop topics include:

- Start up, scale up and transition.
- New and emerging technologies, from low tech and low-cost options to higher tech.
- A practical short masterclass for improving on farm efficiencies Water and Nutrient.
- Advanced Masterclass in Protected Cropping.
- Business economics and value chain workshop.

Growers are encouraged to leverage the support available through the VegNET project and the Innovation Fund to develop projects that benefit both business capacity and regional resilience especially with increased water challenges and access in some regions.

Above L-R. Zeke Zalsman, heat pumps installed at Zaldeesh Farms. Zeke Zalsman - Young Grower of the Year.

#### FIND OUT MORE

Please contact Katrina Hill on 0427 373 037 or email [katrina.hill@vegetableswa.com.au](mailto:katrina.hill@vegetableswa.com.au)

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## Northern Territory

REGIONAL UPDATE

## A wealth of farming history and new ideas for improved productivity

A strong family background in farming fruits and vegetables has enabled George and Christina Mallias build a successful enterprise. An openness to new methods gives the farm more options for the future.

George and Christina Mallias own and manage a vegetable and fruit farm in the Berry Springs region of the Northern Territory. Farming is in their blood, with their respective families farming vegetables and fruit in other parts of the world.

They both have a dedication for growing good produce and are always open to new ideas on how they can best grow their produce. More than anything, George and Christina appreciate the lifestyle farming in the NT provides them, with flexibility, a great community around them and a great environment to live in.

### How long have you been farming and what do you grow?

**George:** I bought the farm back in 1983. It was hard because money was short, and I had to work in town so my income could go back to the farm until the farm was profitable enough for me to start working on it full time. We started with zucchini, watermelon, squash, cucumbers pumpkin and mangoes. A lot of the produce was sent by airfreight to Sydney, and it was good money.

**Christina:** I have been involved with the farm for about nine years. In the early days I was busy raising our children. As they got older, I was able to start selling at the local markets and being more involved with the farm.

**George:** I like farming in the Northern Territory because I like the lifestyle. The people are friendly, the environment is beautiful.

### What are some of the challenges of farming in the NT?

**George:** The challenges of farming in the NT are the prices and weather. Fertiliser costs are very high, which makes margins small. If we are sending to interstate markets, we need to factor in those costs as well.

The weather is the second major challenge we have. With our wet season bringing heavy rain, I have paddocks flooded well into the dry season. In May, I still can't plant in some of our low-lying paddocks which are missed opportunities in the growing season. These are the big challenges, everything else I feel we can manage.

### What is something on the horizon for your farm and business?

**Christina:** We would like to grow less mangoes and focus on crops that we can pick throughout the year alongside our vegetables such as other tropical fruits like guava, pawpaw, water apple and dragon fruit. Zucchini and squash, we intend to keep the same amount going into the future and sell to local markets.

**George:** We had 4,500 mango trees but I don't plan on replacing any of them. I have 1200-1500 left. Many of the others have been lost over time to fires which is another problem for us.

### Christina, you attended the VegNET Protected Cropping Industry Tour last year, what was your greatest takeaway from that tour?

**Christina:** The best information I took from the conference was about hydroponics, which was good because we had just started hydroponics on the farm. In the farmer workshops at the PCA conference

they went into great detail on important things. In particular, I learnt more information about the best watering schedules and in relation to the time of day that I did not know before. I also didn't know we could buy grow bags in the NT. Now I know they stock coco-coir bags at a local supplier.

Before the conference we really only had videos we would look up to get different opinions on how to set up a hydroponic system, just pieces of information here and there. Once we went to the PCA and I went to on a farm visit which had a hydroponic system I was able to get a better understanding of how the system works.

I also met a supplier at the conference who then came to visit us when he was visiting the NT. He was able to look at our system and give us feedback on how to improve our system.

Above. Christina and George Mallias.

#### FIND OUT MORE

Please contact Mariah Maughan on 0417 618 468 or email [ido@ntfarmers.org.au](mailto:ido@ntfarmers.org.au)

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VEGNET FAR NORTH  
**Queensland**  
REGIONAL UPDATE

## Introducing Luke Jurgens as the VegNET RDO for Bowen Gumlu

In the heart of North Queensland, where farming tradition meets cutting-edge innovation, Luke Jurgens has stepped into a pivotal role as the new North Queensland VegNET Regional Development Officer with the Bowen Gumlu Growers Association (BGGA). With deep roots in farming and a passion for agricultural advancement, Luke brings a wealth of experience and a fresh perspective to the challenges facing the region's growers.

Luke's journey into agriculture was almost predestined, born into a well-established farming family in the Bowen Gumlu area. Growing up surrounded by the ebb and flow of agricultural seasons, he developed a profound understanding of the industry's nuances, its potential, and its pitfalls. Armed with this intimate knowledge, Luke embarked on a mission to transform North Queensland's agricultural landscape.

In 2018, Luke took a leap forward by founding an agtech startup aimed at revolutionising farming practices. His vision was clear: empower local growers with state-of-the-art agricultural solutions that enhance efficiency, sustainability, and profitability. This entrepreneurial spirit and commitment to innovation made Luke a natural fit for the RDO role, where he now plans to champion sustainable growth and prosperity across the region.

One of Luke's first projects as RDO involves spearheading the Fall Armyworm (FAW) National Surveillance Innovation Fund Project. Funded by the VegNET Innovation Fund, this ambitious program marks a collaborative effort to combat the invasive pest threatening Australia's agricultural heartland. Luke and the team at BGGA are at the forefront, working closely with the

National Vegetable Extension Network of Regional Development Officers to ensure comprehensive coverage and effective implementation nationwide.

The fall armyworm, native to the Americas, has proven to be a formidable adversary since its arrival in northern Australia in early 2020. Known for its insatiable appetite and resistance to conventional pesticides, FAW poses a significant threat to staple crops like maize, rice, and sorghum. To address this challenge, Luke is working with RapidAIM's innovative detection traps, designed to monitor FAW populations with precision.

RapidAIM traps employ a sophisticated blend of pheromones and visual cues to attract male FAW moths, strategically positioned across fields to intercept and capture these pests. The captured moths undergo thorough analysis, providing essential data on population density and movement patterns. This real-time information is then shared via a centralised data base accessible to farmers and experts alike, enabling swift decision-making and proactive pest management strategies.

The technological backbone of RapidAIM is its advanced sensor network, capable of delivering critical data directly to those who need it most. By identifying FAW hotspots early on, farmers can implement targeted interventions such as precise pesticide application or alternative management practices. This not only mitigates crop losses but also reduces the environmental footprint associated with pest control measures.

The scope of the FAW National Surveillance project extends far and wide, covering key

horticultural regions across Australia. From Bowen and Bundaberg in Queensland to Gippsland in Victoria and beyond, these innovative traps are strategically deployed where they are most needed. This comprehensive approach ensures that farmers in every region have access to the tools and information necessary to safeguard their crops and livelihoods.

In conclusion, the initiative led by BGGA, in partnership with AUSVEG, represents a significant leap forward in Australian agriculture. By leveraging Luke's expertise, local insights, and state-of-the-art technology, the project not only aims to curb the spread of the fall armyworm but also sets a precedent for collaborative, data-driven solutions in pest management. As Luke continues to drive innovation and sustainability in North Queensland's farming community, his leadership promises a future where agriculture thrives in harmony with nature and technology.

Above L-R. RapidAIM set to trap Fall Armyworm  
Luke Jurgens joins the VegNET team as the RDO for Bowen Gumlu.

### FIND OUT MORE

Please contact Luke Jurgens on 0419 429 808 or email [rdo@bowengumlugrowers.com.au](mailto:rdo@bowengumlugrowers.com.au)

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VEGNET SOUTH EAST QUEENSLAND

## Lockyer Valley

REGIONAL UPDATE

### Lockyer Valley Growers Expo 2024: A celebration of agricultural excellence

The Lockyer Valley Growers Expo 2024 unfolded over two days, with perfect weather that set an ideal backdrop for the event. The collective efforts of 11 seed companies and the Lockyer Valley Growers committee culminated in a memorable and successful gathering.

#### Behind the scenes: The dedicated efforts

The success of the Expo was the result of meticulous planning and dedicated efforts behind the scenes. Planning commenced late last year, with seed companies beginning nursery plantings as early as January. By February, the first transplants were already in the ground, continuing through late April when baby leaf varieties were directly sown.

Special recognition goes to Ant McConville and the Queensland Department of Agriculture and Fisheries (QDAF) team for their exceptional management of agronomy and fieldwork from January to June, ensuring the crops were primed for showcasing at their peak during the Expo. Their attention to detail was evident in the vibrant displays that greeted attendees.

#### A global showcase of genetic innovation

As a first-time participant, I was amazed by the vast array of genetics (more than 500 varieties) from around the world on display. Many varieties were showcased for the first time in Australia, providing a steep but rewarding learning curve for all attendees. It was a testament to the innovation and dedication of the global agricultural community.

#### A gathering of growers: From near and far

The Expo drew growers from across the nation and internationally from New Zealand, South Africa and the US, creating a vibrant tapestry of shared knowledge and experiences. Conversations with growers from Victoria, New South Wales, and Western Australia were particularly enlightening. The local community was well represented, with a strong contingent from the Lockyer Valley, complemented by participants from the Fassifern Valley and Stanthorpe regions.

#### Cultivating connections and seizing opportunities

The Lockyer Valley Growers Expo 2024 proved immensely beneficial to all involved, offering invaluable insights, inspiration, business prospects, and networking opportunities for growers and exhibitors alike. The event served as fertile ground for cultivating new ideas and forging meaningful connections within the agricultural sector.

Noteworthy engagements included discussions with Andrew Francey and Olive Hood regarding nationally directed training initiatives tailored to the specific needs of vegetable growers. Engagements with service providers, agtech companies, and especially seed companies were particularly insightful. These interactions deepened understanding of the intricate processes involved in developing and trialling new varieties, addressing grower concerns, and enhancing outcomes through traits like faster growth, colour and disease resistance.

#### A heartfelt thanks and future prospects

Heartfelt thanks are extended to all who contributed to making this event a resounding success. Your dedication and passion were pivotal in shaping the Expo's triumph. Looking ahead, we eagerly anticipate continued growth and innovation within the agricultural community, spurred by the momentum and learnings gained at this exceptional event.

Above L-R. Lockyer Valley Growers Expo 2024, view from the skies. Scene from Expo 2024. Below. Scene from Expo 2024.



#### FIND OUT MORE

Please contact Darren Brown, Lockyer Valley Growers on 0456 956 340 or email [ido@lockyervalleygrowers.com.au](mailto:ido@lockyervalleygrowers.com.au). VegNET 3.0 is a strategic levy investment under the Hort Innovation Vegetable and Onion Funds. This project has been funded by Hort Innovation using the vegetable and onion research and development levies and contributions from the Australian Government.

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**South Australia**

REGIONAL UPDATE

**Regional field visit to Riverland**

Brendon Price from Australian Vermiculture.

Growers and agronomists joined VegNET SA for a field tour to visit two innovative South Australian agribusinesses in the Riverland, Australian Vermiculture working with LawrieCo and Solan SA PTY LTD Australian Potato Seed Specialists.

The tour to the Riverland provided an opportunity to see a working vermiculture production site producing new amendments for horticulture and combine a visit to Australia-leading potato mini-tuber production nursery. The event was a great opportunity for growers to enjoy some social time with other growers and agronomists with a lunch generously hosted by Lawrie Co and Australian Vermiculture.

The Riverland is home to a range of innovative producers and agribusinesses who contribute to the diversity of produce throughout the region. The largest industry is agriculture which generates one in five regional jobs and accounts for 40 percent of regional businesses. In 2022–23 the Riverland horticulture industry generated \$1.17 billion in farmgate revenue for South Australia and the regions Gross Regional Product continues to grow.

The Riverland region of South Australia has seen significant growth in vegetable production over recent years, driven by various factors including climate suitability, technological advancements, and market demand. The establishment of agribusinesses such as Solan and Australian Vermiculture in the Riverland are encouraging examples of the growth of the horticulture sector in the region.

The first stop on the tour was Solan, where Liteisha Lochert, General Manager,

generously gave her time to host the site visit and showed the group all aspects of the production facility. Solan was initially started in August 1992 by a group of potato growers based in the Mallee region of South Australia to improve production outcomes. The facility manages all aspects of potato seed production from tissue culture to mini tuber production, seed storage and dispatch directly to licensed growers.

The primary aim of the facility was to research and establish an early generation potato seed supply. Initially, a small tissue culture laboratory was established to work on producing plantlets for the onsite production nursery and the adoption of new technologies continues to be at the forefront of production, ensuring Solan continues its history of producing high quality potato seed to the Australian potato industry

The production nursery uses a soilless media and pot production system contained within a steel and polycarbonate construction. Thrip proof mesh covers all air inlets to prohibit entry of insect vectors that carry potato diseases. A wet wall air conditioning system assists in temperature management controlled by a PLC system, irrigation is via drip system. All water used in the facility is treated and an IPM management program is used as part of Solan's pest management program. The opportunity to learn about this successful agribusiness provided insight to the growers and agronomists on innovative approaches to industry challenges.

The tour's second visit was to the largest worm farm in the southern hemisphere providing an in-depth look at how the



VEGNET  
**South Australia**  
REGIONAL UPDATE

Vermi products have been developed and commercialised, hosted by Australian Vermiculture to visit their vermiculture site. LawrieCo are managing sales and marketing for Australian Vermiculture and hosted the site visit, thank you to General Manager Mat Denton and Area Sales Manager John Paynter.

The company founders, Brendan and Del Price, and Corey Simmons who is the business development manager, personally hosted the tour and shared their enthusiasm for vermiculture which soon saw everyone in the dirt digging looking for worms. Brendon and Del shared their business journey from their start in Broken Hill in the backyard of renowned artist and friend Pro Hart to the establishment of the largest worm farm in the southern hemisphere in Blanchetown. Brendon's goal was not only the production of superior organic soil enhancers but also the integration of scientific techniques

into commercially viable agricultural projects. This dual focus on environmental sustainability and commercial viability demonstrates an innovative approach to improving agricultural practices and achieving business success.

This emerging industry is building momentum and there are many worldwide studies with exceptional productivity results for worm-based products. The Vermi farm uses chicken manure and bedding as its clean source material, avoiding plastic waste and other contaminants and all products are organic certified. The development of a range of products suitable for different vegetable production systems offers growers an opportunity to tap into the potential of vermiculture. LawrieCo is managing the sales and marketing for Australian Vermiculture and are eager to introduce growers to the benefits of vermiculture and offer the opportunity for growers and agronomists to visit the site.

Thank you to LawrieCo, Australian Vermiculture and Solan for supporting this event, the opportunity to connect growers and agronomists to the wider sector was only possible because of their willingness to share their expertise and give their time.

Above L-R. Delegates searching for worms at Australian Permiculture. Inspecting seed production at Solan..

Below L-R. Visiting permiculture site, Australian Permiculture. Below right: Leteisha Lochert, Solan explains the production of seed potatoes.

**FIND OUT MORE**

Please contact Peta Coughlin, AUSVEG SA on 0409 029 745 or email [peta.coughlin@ausveg.com.au](mailto:peta.coughlin@ausveg.com.au)  
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VICTORIA  
NORTH,  
WEST AND  
SOUTH-EAST

VEGNET NORTH, WEST & SOUTH-EAST

## Victoria

REGIONAL UPDATE

Farm tours highlighted the Victorian vegetable and horticultural industry in the lead up to Hort Connections 2024. Leading one of the tours, the VegNET – Victoria (North, West and South-East regions) RDO, Danielle Park provides an overview.

Hort Connections returned to Melbourne after a five-year hiatus. As a part of the welcoming conference attendees back to Victoria after the absence, three industry tours were held in the lead up to the conference, providing the opportunity to showcase horticultural businesses, the innovations and a sneak peek at the achievements of the horticulture sector in the state.

### Bacchus Marsh and Boomaroo Nurseries Farm Tour

Heading west from the Melbourne CBD, a vegetable-focussed tour first stopped at Boomaroo Nurseries in Lara. The Boomaroo team were able to provide a thorough overview of their processes, from seed to seedling to farm. The precision seeding process and the ability to respond to changes in seasonal conditions and

weather events were key elements highlighted during the tour.

A visit to Tripod Farmers and a demonstration of the Carbon Robotics LaserWeeder prompted many discussions. The smell of weeds burning following a laser strike was distinct.

A big thank you to the team from Tripod Farmers and Carbon Robotics for providing the opportunity to observe the technology in action and to learn more about the role it already playing in the Tripod Farmers systems.

A final stop at Boratto Farms saw Dino Boratto welcome the tour and provide background to the region and the farm, whilst standing above the Bacchus Marsh vegetable property.

### Mornington Peninsula Farm Tour

Travelling to Melbourne’s southeast, the second vegetable focussed tour was welcomed by Rick Butler of Butler Market Gardens to learn more about the process of growing in a protected cropping environment.

A visit to Peter Schreurs and Sons vegetable farm highlighted the soil health focus and the time and tracking over time involved in system changes.

Paul Gazzola hosted the group at Gazzola Farms in Somerville and a farm tour showcased the management of the harvest and packing procedure.

### Epping Market and Yarra Valley Farm Tour

The third tour saw attendees make an early start in order to visit the Epping Markets in Melbourne’s northern suburbs before visiting the Yarra Valley’s Fresh Berry Co, Red Rich Fruit and St Huberts Winery. As with all of those who opened their doors and hosted tours, the time and effort made by all involved is much appreciated. The tours provided an excellent opportunity to learn and share insights across regions and sectors.

AUSVEG VIC would like to thank all those involved in making the farm tours a success.

Above L-R. Boomaroo Nurseries, Tripod Farmers Bacchus Marsh, Butler Market Gardens.

Left. Markets and Yarra Valley tour stopped in at Red Rich Fruits.



#### FIND OUT MORE

Register for VegNET – Victoria’s Regional Update  
Please contact VegNET – Victoria (North, West and South-East regions) RDO Danielle Park on 0432 324 822 or email [rdo@ausvegvic.com.au](mailto:rdo@ausvegvic.com.au)  
To find out about AUSVEG VIC visit [ausvegvic.com.au](http://ausvegvic.com.au)  
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VEGNET  
**Tasmania**  
REGIONAL UPDATE

## Pea-king over the fence, learning together in the field and through agronomic benchmarking

Tasmania dominates Australia's pea production, contributing about 91 percent of the national processing crop for Simplot Australia. The High-Performing Peas (HPP) project, led by VegNET Tasmania, investigated the drivers for high yielding pea crops and how to optimise pea yields from what was learned.

Tasmania is the capital of pea production in Australia, contributing approximately 91 percent of the nation's processing crop. All crops are grown under contract for Simplot Australia. Peas are not only a good rotational vegetable crop but also aid soil health and nitrogen cycling, which is increasingly vital given the rising costs of fertilisers. However, despite their benefits, the financial viability of pea cultivation has been challenged by fluctuating market prices and increased input costs. To address these challenges, the High-Performing Peas (HPP) project was piloted through VegNET Tasmania to explore agronomic practices that could help optimise pea yields reliably year to year and improve returns for growers. Simplot supported the project via field officers and their research team collecting data that could not be collected by the project due to time requirements.

The project analysed data from 12 paddocks, hosted in-paddock discussion group sessions at key crop stages and provided growers with an in-depth seasonal report. The data encompassed soil tests, irrigation and crop management practices and plant health indicators. This data collected by the project and Simplot was analysed to establish benchmarks and seek out patterns from high-performing paddocks in the 2024 season results. Looking to the future the team is looking to build on this project's success by refining data collection, supporting further research, and expanding benchmarking as a tool to be used in other crops and regions.

### Grower engagement

Two in-season discussion groups and an end-of-season results evening facilitated knowledge sharing and discussion among growers, agronomists, and the field staff. These sessions focused on best practices for crop establishment, irrigation management, and soil test interpretation and were based around the timing of key growth stages. These sessions were critical in understanding practical challenges faced by growers and encouraging discussion about the key decision points for pea production. At the end of the season each grower received a detailed report reviewing their crop and seasonal data, along with drone imagery that was collected by Simplot, soil test results and some benchmarks indicating where their crop sat within the project cohort. Along with the sessions throughout the project, the team has shared the project details and results at the Simplot R&D updates and grower social events.

Above. Participants at one of our in-paddock discussion sessions.

<sup>1</sup> Australian Horticulture Statistics Handbook 2022/23. Hort Innovation



Our top performers, Alistair Mitchelson, James Fish and James Clutterbuck with Tasmania RDO Ossie Lang.

### What we analysed and what we found

The 2023/2024 season HPP project, aimed to identify factors contributing to high-performing pea crops. This review was undertaken by comparing the top three paddocks (by return achieved) against the rest of the group. From the data reviewed there was no apparent consistency that separated the top performers from the rest of the group in the following: area, variety, number of irrigations, seeding depth, sowing rate, preplant moisture, preplant nitrogen levels, existing micronutrient levels or irrigation volumes.

**There was some consistency in the following data:**

#### Seeder type

- The top three paddocks used a Vaderstad Rapid seeder. It was also noted that these three paddocks had the same operator using that equipment.

#### Plant counts

- At establishment, plant counts averaged between 90-100 plants per m<sup>2</sup>. This range falls in the optimal range that prior research has shown. The other paddocks were outside this range with either lower than 90 plants per m<sup>2</sup> or more than 100 plants per m<sup>2</sup>. The establishment plant counts would have been influenced by the seeder used (and its calibration), along with other factors listed above (seeding depth, sowing rate etc).

#### Application of sulphur in the fertiliser program

- The higher performing paddocks all included some sulphur in their fertiliser program with little or no nitrogen added. Sulphur has a role in nitrogen fixation and this result suggests it may be a beneficial component of the fertiliser regime. Soil tests indicated that sulphur levels were within recommended ranges across all paddocks.

#### Calcium / Magnesium ratios

- Furthermore, the calcium-to-magnesium (Ca/Mg) ratio at sowing averaged between 4.3 and 4.5, which falls within the commonly recommended range of 4 to 6. This ratio was more variable across other paddocks. The Ca/Mg ratio is important as one indicator of exchangeable calcium in the soil.

It is important to note that this project reviewed a limited number of crops as three of the 12 paddocks were not harvested at the end of the season, and it has only one year of data. The crop comparisons would need further validation through extended data collection over more crops and years to allow for a robust analysis.

#### Future work

The project participants were happy with the reporting they received and have already provided suggestions for running the project again. On that basis there are several recommendations following this pilot project:

- **Refine Data Collection:** Future iterations of the project should refine the data collection process to capture the most relevant and detailed information. With a targeted data collection the project will be able to include more paddocks to provide a broader data set to analyse.
- **Further Research:** Additional research is needed to determine if the identified relationships between agronomic practices and yield are consistently repeatable and beneficial for production.

- **Broaden Benchmarking:** Applying the benchmarking approach to other regions and crops could provide valuable insights and drive improvements in vegetable production practices beyond peas and in other parts of Australia.

The HPP project participants and Simplot are keen to see another iteration of this project. This would continue to provide lasting benefits for pea growers in Tasmania, ultimately enhancing yield potential and economic returns while promoting sustainable agricultural practices. There is interest to use this approach in other crops.

### Acknowledgements

A project of this size would not be successful without the cooperation of the growers, agronomists and the field staff involved. The feedback from those who worked with us on this project has been invaluable. The team would also like to extend a huge thank you to the Simplot team who worked with us on this project in particular, Ellie, Nik, Ben, Pat and Angus. Without your support we would have not been able to deliver this project as successfully as we have.

#### FIND OUT MORE

Please contact Ossie Lange on 0430 380 414 or email [ossiel@rmcg.com.au](mailto:ossiel@rmcg.com.au)

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# AUSVEG

## state update

### NORTHERN TERRITORY

Water use, regulation and legislation reform is currently front of mind for many in agriculture in the Northern Territory (NT). The NT Government is developing new legislation to replace the Water Act 1992 with the vision of creating contemporary legislation that supports sustainable water resource management and builds trust with the industries and people that use it. The current legislation, the Water Act, provides a sound legislative basis for water resource management however the new legislation will ensure water resource management is fit for future, can adapt to climate change, growing competition for water, and meets community expectations with enhanced governance and accountability.

The Northern Territory Farmers Association (NT Farmers) represents and advocates for the plant-based industries of the NT. The peak industry body has and will continue to be involved in the consultation process for the new legislation and supports all efforts aimed at implementing regulated water resource management arrangements that deliver sustainable, equitable and reliable access to water resources for all legitimate water users. Agribusinesses make a very substantial contribution to the economic and social wellbeing of communities across the NT - particularly in the regional and rural parts of the Territory. Given the significant contribution of agricultural enterprises to the economic and social fabric of the Territory, NT Farmers feels it is critical that government develops and implements policies that ensure access to reliable and sustainable water resources sufficient to support the growth and development of these enterprises.

#### Water in the Territory 2022-2023 Snapshot in Katherine and Berry Springs regions

##### Katherine Region

The NT produces more than 50 percent of Australia's mangoes, with the majority of those mangoes cultivated in the Katherine region. In addition to mangoes, the Katherine region is home to pumpkin and melon production, as well as asparagus, and smaller quantities of other vegetables. Many of these farms extract their water from underground aquifers.

Therefore, the management of these aquifers is imperative to ensure stable water supply throughout varying seasons. Revised management of local aquifers has seen an increase in water regulation with several farming operations being faced with the prospect of 'giving water back' due to underutilisation of their current annual water allocation license.

##### Berry Springs Region

The Berry Springs region, located on the outskirts of Darwin grows a significant number of Asian vegetables that are predominantly sent to Sydney and Melbourne wholesale markets. The water supply for these farms is also predominately sourced from an underground aquifer, which is currently over allocated. To address this the NT Government through a management plan are working to ensure all users are licensed, and all licensed users are utilising the majority of their water license annually. If users are not meeting these requirements, water is likely to be re-allocated.

NT Farmers supports the ability of current water license holders to retain their unused water where they can demonstrate reasons why the water has not been used and they have evidence to demonstrate their plans for future use (for example a business plan and/or evidence of investment in development).

There is no doubt the 'use it or lose it' policy places some angst amongst growers in both the Katherine and Berry Springs regions. This process may potentially free up water availability for other users who are waiting for a water license. However, it is important to note that the water reclaimed by the government may be re-allocated to other purposes such as stock and domestic water as well as the Aboriginal water reserve. Whilst environmental and cultural requirements are crucial, there is concern that the NT agricultural industry, may be losing water allocations.

##### Mariah Maughan

NT Farmers Association | [ido@ntfarmers.org.au](mailto:ido@ntfarmers.org.au)  
Phone. 0417 618 468 | 08 8983 3233



# AUSVEG state update

## QUEENSLAND

With a new financial year comes the joy of unpacking yet another change to the Horticultural Award. While the C14 decision remains a significant point of interest, it is the interpretation of this decision that truly matters to us. Key questions include how 'after three months in the industry' will be defined—will it be crop-specific or based on a broader understanding of industry experience? Will it be measured in calendar months or hours worked? How capable workers will be defined hinges on these clarifications. Additionally, how will previous experience with other employers be factored in? As always, we have so many questions!

June was a big month for horticulture. Looking around the huge trade show at Hort Connections I couldn't help wondering why the importance and impact of fresh produce is sometimes lost on decision makers. The number of businesses both directly and indirectly dependent on growers is mind blowing to say the least. The economic significance of fresh produce in regional economies is a topic the QFVG Board has asked me to seek to further define and understand as we continue our efforts to highlight the importance of horticulture in this country.

The release of the Queensland Supermarket Pricing Inquiry was another significant moment. The Queensland Inquiry concluded with eight recommendations, with Recommendation Two suggesting the establishment of the Office of the Queensland Farmers' Commissioner. This was a novel idea, so I gathered feedback from growers at Hort Connections. The consensus was clear: 'as long as it doesn't impose additional costs on growers and is designed to assist them, it's a welcome development'. Given the Australian Government Committee on Food Security recommended the Australian Government appoint a Minister for Food, it makes sense Queensland considers how we would align to such a position.

I look forward to the day when I can report that everything is flourishing in horticulture, with our growers being proud, profitable, and productive. Until then, rest assured that QFVG are working tirelessly on behalf of Queensland growers or as I said to one grower, 'you do the growing, and we'll do the crowing'! It's a team effort to ensure we have growers in Queensland for generations to come.

### Rachel Chambers

Queensland Fruit & Vegetable Growers  
QFVG CEO | [rchambers@qfvg.com.au](mailto:rchambers@qfvg.com.au)  
Phone. 0488 034 344

## NEW SOUTH WALES

Amid persistent market concentration and market power misuse in the supermarket retail sector, NSW Farmers has continued to advocate for a fairer playing field for farmers this year.

Most recently, the Australian Competition and Consumer Commission (ACCC) Supermarket Inquiry has been a core focus of these efforts as the ACCC examines how major retailers are exercising their significant market power within the sector.

NSW Farmers submitted 17 recommendations to the ACCC for consideration as part of its investigations and to inform potential regulatory responses to be delivered as part of its review. With the aid of NSW Farmers, a roundtable between producers and the ACCC was also facilitated to ensure the lived experiences of producers could be heard and understood by the Inquiry.

By the time this magazine hits mailboxes, the interim report on the ACCC's review will be released, with a final report due in early 2025.

Meanwhile, the final report of the latest five-yearly review of the Food and Grocery Code of Conduct (FGCC) has now been received, amid heightened scrutiny of the supermarket sector.

NSW Farmers entered a submission to this review which outlined the need for a strengthened, mandatory Code. The recommendations of this review into the FGCC reflected the sentiments of this submission closely, with the report recommending:

- That the Code become mandatory for supermarkets with revenue greater than \$5 billion, effectively covering Woolworths, Coles, ALDI and Metcash.
- The option for a supplier to request an independent mediator or arbitrator to address an alleged breach of the Code.
- Significantly increased maximum civil pecuniary penalties, and infringement notice penalties.

While the review's recommendations are a positive first step, close monitoring of the state-of-play must continue to ensure that dispute resolution processes can adequately protect farmers from retaliation, and that the barriers towards getting the large potential maximum fines are not too onerous to be effective.

Work must also continue to advance the creation of divestiture powers as a last-resort tool in the toolbox to prosecute practices such as price gouging or market power abuse within the supermarket sector.

In early 2024, the Senate considered the Competition and Consumer Amendment Act which would have allowed for courts to possess such powers. While the Bill did not successfully pass parliament, NSW Farmers will continue to build support for divestiture powers as a priority into the future.

# AUSVEG state update

## NEW SOUTH WALES CONTINUED

On the other hand, news the biosecurity tax on farmers is currently on ice should be a positive sign for farmers that indicates advocacy can and will have a real impact on decisions made around the agricultural sector. The dial is finally shifting on competition issues, and meaningful reform of the supermarket sector is now closer than ever.

The next NSW Farmers Horticulture Committee for 2024-25 has now also been elected at the organisation's Annual Conference in July, and work to advance policy priorities has already begun. We look forward to sharing the next updates on our advocacy in the space soon.

**Find out more including how to become a member via our website: [nswfarmers.org.au](http://nswfarmers.org.au)**

## VICTORIA

### Update on Victorian Vegetable Growers

As the Victorian vegetable growing season progresses, AUSVEG VIC is pleased to report on the resilience and innovation shown by our local growers, despite the challenges posed by fluctuating weather conditions and market demands.

### Community and Collaboration

A key highlight of the past few months has been the increased collaboration within our community. AUSVEG VIC committee members have been actively engaging with our partnering charity, FareShare, dedicating time to their new farms. Our committee has played a crucial role in prepping the grounds and assisting with the initial setup. This partnership not only supports FareShare's mission to fight hunger but also strengthens our ties with the community.

### Save the Date

#### 2025 Annual Awards for Excellence Gala

We are excited to announce the date for our 2025 Annual Awards for Excellence Gala. Mark your calendars for the 3rd of May 2025, when we will gather at the Rydges Melbourne to celebrate the outstanding achievements of our growers and industry partners. This event promises to be a night of recognition, celebration, and networking, showcasing the best of Victorian vegetable growing.

The Awards for Excellence Gala is an opportunity to acknowledge the hard work and dedication of our members. Categories will include Grower of the Year, Young Grower of the Year, Women in Horticulture, Environmental & Sustainability Award, and many more. We encourage all members to nominate their peers and participate in this celebration of excellence.

**More details will be provided in our upcoming newsletters.**

**Elen Welch**  
NSW Farmers  
Senior Policy Advisor – Agricultural Industries (Extensives)  
Phone. 0419 124 691

**Zaine Watson**  
Executive Officer  
AUSVEG VIC | [zaine.watson@ausvegvic.com.au](mailto:zaine.watson@ausvegvic.com.au)  
Phone. 0413 760 776



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