

# AUSTRALIAN GROWER

2024/25 SUMMER

VEGETABLES / ONIONS / POTATOES

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**Australia-Japan  
trade relations**

**Soil health for onions**  
**Tasmania's Spud Doctor**  
**Carrot rust fly:**  
a root rot menace

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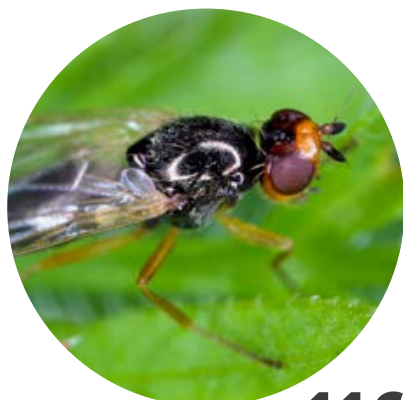
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**Cover.** 2024 Australia-Japan Horticulture Showcase. See page 26. Photo courtesy Anna Osetroff.

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## MESSAGE FROM THE AUSVEG Chair

### As another year comes to a close and a Federal election approaches, our industry continues to face tough conditions.

Our recent AUSVEG Industry Sentiment Report has confirmed that a cost-of-production crisis, workforce shortages, governance overload, and unsustainable returns are severely impacting farm profitability.

Survey results continue to show that one third of growers are considering leaving the industry within the next year, and 50 percent are less profitable than a year ago.

Achieving the changes growers need requires a strategic approach to advocacy and a deep understanding of our sector's challenges. AUSVEG is committed to fulfilling this role for the vegetable, potato and onion growers we represent.

With an election coming, our engagement with the Government and Opposition is more and more important.

Following the appointment of Federal Agriculture Minister Julie Collins MP, and Assistant Agriculture Minister Senator Anthony Chisholm, we have continued to regularly raise the key issues and views of our growers.

This has included giving briefings on our Industry Sentiment Report, and its concerning findings – which has not only provided a picture of our industry's biggest issues, but also demonstrates the value and importance of grower participation in our regular surveys.

Having our issues understood, and acted on, also requires advocacy beyond the agriculture portfolio. Our strong record of engagement with inquiries, politicians, ministerial and department staff and regulators across the workplace relations, trade, home affairs, competition, immigration, farm chemistry domains, among others, has continued throughout 2024.

Recently, I also hosted the Deputy Leader of the Opposition and Shadow Agriculture Minister, David Littleproud MP, the Federal Member for Gippsland Darren Chester MP, and the Victorian Member for Gippsland East Tim Bull MLA at Bulmer Farms. This was another important opportunity for political engagement to promote understanding of our sector and our challenges.

It's one thing to meet with politicians and participate in inquiries, but another to get results. Pushing for the changes growers need can be hard going, but we have seen some positive developments. The Government holding off on more changes to the PALM scheme, and, at least for now, pausing the biosecurity tax and removal of the 88-day regional work requirement for backpackers, are a couple of examples. A commitment to make the Australian Food and Grocery Code mandatory and stronger is another.

**While these are short of the wide-scale changes most growers want and need, they wouldn't have happened – and the situation could have been much worse – if groups like AUSVEG hadn't been pushing.**

Advocacy needs to be a two-way street, and we'll continue seeking bigger improvements. AUSVEG is willing to continue engaging constructively on the issues that matter the most to growers, but we need to see the same from all sides of politics.

Ahead of the Federal election, the AUSVEG Board and State Members recently met in Canberra to consider our priorities, and the outcomes and commitments growers need. These were recently launched and will inform our ongoing political engagement during the election campaign and beyond.

While a suite of solutions is needed on the Government policy front, there are also big-ticket initiatives that need attention.

With national vegetable consumption remaining woefully low, there are major opportunities to give our industry a serious lift through a national focus on getting Australians eating more vegetables.

Recent industry research shows that lifting vegetable consumption by just one serve per person per day by 2030 can achieve a \$3.3 billion economic benefit across the supply chain, and \$1.4 billion in healthcare system savings by reducing the dietary-linked disease burden.

Higher vegetable consumption needs to be a national priority.

**As we continue ahead to the election and beyond, AUSVEG will keep pushing on the issues that matter most to growers. Our priority is securing solutions that help turn our industry's fortunes around.**

In concluding, I would also like to acknowledge Geoff Moar, who during our recent Board and State Member meetings in Canberra was bestowed with the honour of Life Membership of AUSVEG, following his retirement as a Board Director in late 2023.

As our inaugural Life Member, Geoff's honour recognises his outstanding leadership and service to AUSVEG over two decades as a Director and Chairman of the Board, from the inception of AUSVEG in its current structure in 2004.

Thank you to Geoff, and all the growers whose ongoing commitment has contributed to AUSVEG's evolution into the widely recognised, leading Australian agricultural peak industry body that it is today.

**Bill Bulmer**  
AUSVEG CHAIR



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## THE STATE OF THE SECTOR WITH THE **AUSVEG CEO**

**Difficult economic conditions are continuing to hit Australian consumers and businesses, ensuring the cost-of-living crisis will remain the dominant issue in the upcoming Federal election.**

While the headline consumer price index has moderated from the highs of 12 to 24 months ago, Australian households continue to struggle.

Australian vegetable growing businesses are also facing their own persistent inflation-linked challenges in the form of a cost-of-production crisis.

### **Recent data has highlighted the ongoing economic volatility.**

Australian Securities and Investments Commission figures show that in the September quarter business failures hit record highs with a more than 45 percent increase in insolvency appointments across the economy, compared to the same period last year.

In September new CommBank-commissioned research found that 65 percent of surveyed small and medium sized business owners and managers had to deal with unexpected expenses amounting to \$7.3 billion. Equipment repairs and replacements (48 percent), higher supplier costs (33 percent) and increased utilities costs (32 percent) were the most commonly identified areas of unplanned expenditure.

### **More than 50 percent of respondents also indicated that their mental health had been impacted in the last 12 months by the economic climate.**

Clearly consistent challenges for businesses across the country are continuing to take a major financial and personal toll, and Australia's vegetable, potato and onion growers are no exception.

### **Vegetable industry sentiment**

During September, AUSVEG released its 2024 Industry Sentiment Report, which lays out and quantifies the many challenges and issues facing Australian vegetable growing businesses. The report is based on direct feedback from growers through our six-monthly sentiment surveys.

The headline findings are very concerning. In the most recent survey, more than 50 percent of growers indicated they were financially worse off than they were a year ago, and 28 percent expected to be worse off in a further 12 months.

With almost 50 percent of grower respondents seeing their future business outlook as very poor or poor, and a further 37 percent ranking their outlook as average, it is unsurprising, but still very worrying, that the most recent survey affirmed that one third of growers are considering leaving the sector in the next 12 months.

Input cost increases, poor prices paid by buyers, increased labour costs, cost of compliance with regulations and standards and a lack of profits for capital investment and innovation were identified as the top five factors endangering the medium-term sustainability of vegetable growing businesses.

Illustrating the magnitude of one major operating expense, labour averaged 38 percent of growers' overall cost of production, and was as high as 71 percent for some businesses.

### **Overwhelming compliance burden**

In addition to significant increases in the cost of key farming inputs, the burden of governance and compliance stood out as another critical issue.

Costs linked to compliance, as well as the sheer volume of schemes growers are required to comply with are the aspects of compliance identified as most negatively impacting vegetable growing businesses.

Industrial relations and workforce schemes, occupational health and safety, taxation and food safety were just some of the top compliance challenges identified by growers in the latest survey.

The raft of issues quantified by the survey make clear that a range of fit for purpose solutions are desperately needed, to cut red tape, encourage innovation and investment, and improve the profitability and sustainability of Australia's vegetable industry.

### **Promoting positive change**

The Industry Sentiment Report findings should stand as a stark warning when it comes to the viability of Australia's vegetable industry, and in the longer-term, national food security.

The nation has been fortunate so far that the impact of some of these challenges on food security have been somewhat masked by recent favourable weather conditions and fewer supply chain disruptions.

However, as one third of growers continue telling us they are considering walking away, ongoing margin squeeze and difficult conditions, combined with any further set-back, could lead to more growers deciding it is all too difficult. This in turn risks leading to reduced production, higher consumer prices, and increased reliance on imported product.

As the recent detection in South Australia of Tomato brown rugose fruit virus has also shown, with devastating impact on affected growers, our sector continues to face threats on a range of fronts.

### **Our industry's tenuous position means finding solutions to our issues must be a national priority.**

With a Federal election fast approaching, AUSVEG is committed to capitalising on the opportunity to further the case of the vegetable, potato and onion growers we represent.

The AUSVEG Board and State Members convened recently in Canberra to consider the many issues facing our sector, and identify our key election priorities and commitments AUSVEG will seek on behalf of Australia's growers.

The need for action on the themes of consumption, food security, workforce, migration, competition, trade and market access, biosecurity and business sustainability clearly stood out as priorities.

CONTINUED ON PAGE 10 >

## THE STATE OF THE SECTOR WITH THE AUSVEG CEO



These key pillars – reinforced by insights from our recent sentiment report – will continue to inform AUSVEG’s advocacy in the election lead-up and beyond. We are continuing to engage with all political parties, to ensure the views and issues of Australia’s vegetable growers are heard and acted upon.

### Aiming big to boost consumption

Just as the causes of the many difficulties facing our industry are complex, so too is finding solutions. In many cases, adjustments to Government policy or legislation are required, and issues often span multiple portfolios or departments, and delve into party political territory.

The challenging complexity of achieving change does not mean we shouldn’t attempt it, and AUSVEG will continue pushing for the necessary measures that most materially improve growers’ bottom lines.

Alongside the complex policy adjustments required there are also opportunities for visionary initiatives and reforms.

Simple economics tells us that one of the most effective ways to turn around a business’s – or industry’s – fortunes is to boost demand for their product.

### This is why AUSVEG is deeply committed to seeing vegetable consumption lift in Australia.

More than 80 percent of Australians recognise that a healthy diet will improve their long-term health and agree that eating an extra serve of vegetables daily is a simple way to achieve that outcome.

Despite this, only 6.5 percent of the Australian population meet their recommended daily vegetable intake of five-plus serves per day.

In fact, the recently completed levy-funded baseline study for ‘Plus one serve of vegetables by 2030’ found that the average vegetable serves per Australian per day may be closer to 1.8 when food wastage is taken into account. That figure is even lower than the average of 2.4 serves reflected in official statistics.

While the wide gap between recommended and actual consumption is very alarming, it also represents an opportunity.

The same industry research referenced above has also identified that by boosting vegetable consumption among Australians by just one serve per day by 2030 there are significant bottom line benefits to be realised on many fronts.

### Industry would receive a \$3.3 billion net vegetable supply chain economic benefit, spanning from retailers to growers across vegetable production regions.

Australians would benefit from improved health flowing from higher vegetable consumption, and the economy and health budget would benefit from the addition of almost 13,000 new jobs, and \$1.4 billion in healthcare system savings due to reduced dietary-linked disease burden over time.

While there are obvious benefits, realising them requires significant commitment, coordination and partnership from industry, supply chain members, and Government, to reduce barriers to consumption and ensure more vegetable make it onto Australians’ plates.

Government and retail partner backing is crucial. Government can play a positive and pivotal role by providing funding and resources for awareness, education and

public health campaigns that can make a significant impact in lifting vegetable consumption.

Retailers also have a key part to play in championing local produce. By highlighting the many benefits of Australian-grown vegetables, retailers can exercise their significant market power to influence consumer behaviour and drive sales. Collaboration between retailers and industry on a consumption campaign has enormous potential to lift vegetable sales.

Australia’s vegetable industry, economy, healthcare system, retailers and Government need a good news story, and a nationally coordinated effort to lift vegetable consumption fits the bill.

With a Federal election expected to be called any day now, the time is ripe for such a commitment – not just for Australia’s vegetable industry, but for our nation’s long-term health, and food security.

While the ongoing challenges facing Australian vegetable growers are significant, there are also opportunities for rejuvenation and revitalisation. By addressing the issues of demand, as well as the many challenges we face as industry, there is scope to achieve a more sustainable and financially viable future.

AUSVEG will continue advancing that objective on behalf of all the growers we represent, using all the levers available to us.

**Michael Coote**  
CEO, AUSVEG

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## Teaching young people the value of fresh fruit and vegetables through pleasurable food education

**With the vast majority of young people not receiving the recommended intake of vegetables, a holistic approach to health is part of the ethos of the Stephanie Alexander Kitchen Garden Foundation.**

The key to sustainably changing the healthy eating habits of young people is through hands-on learning, according to Dr Cathy Wilkinson, the CEO of the Stephanie Alexander Kitchen Garden Foundation (SAKGF).

Presenting at Hort Connections 2024, Dr Wilkinson outlined the approach taken by the Foundation to sustainably improve the health and wellbeing of young people.

By understanding how to grow, harvest and prepare seasonal produce, the Foundation brings a greater awareness and appreciation of fruit and vegetables to bring about long lasting behavioural change in eating habits.

Established more than 20 years ago, the Foundation has developed curriculum-aligned education resources for schools, early childhood learning centres and community-placed projects using a philosophy of 'pleasurable food education'.

The program encourages young people to establish a garden, whether it be herbs in a pot to a full vegetable plot. By planting seasonal produce, students are exposed to fresh, simple, vegetable-focused meals, harvested and prepared by the students.

"We have seen a change in young people's attitude to vegetables," said Dr Wilkinson.

"They are more likely to try new foods, eat more vegetables, be creative with what is seasonally available and share that knowledge with family and the greater community.

"In school canteens we have seen sugar-based drinks replaced with water and offer a greater level of vegetable-based food options.

**"We were delighted to see a school holding a pizza night using excess produce from their garden. It's a fantastic way for children to connect with community."**

Dr Wilkinson said that the founder of the SAKGF, well known chef Stephanie Alexander AO, believed that growing, harvesting, preparing and sharing of fruit and vegetables created positive memories for young people that they take into adulthood.

Research studies have shown that the Stephanie Alexander Kitchen Garden Foundation programs educate and equip young people with knowledge and skills about food which influence their habits and behaviours in the home and broader community.

With more than 1,000 members in the program to date, the Foundation has developed educational resources to support school curriculums that is now recognised by the Australian Curriculum, Assessment and Reporting Authority (ACARA) to improve food literacy.

Hort Connections 2024 was proud to have the Stephanie Alexander Kitchen Garden Foundation as the Charity Partner for the event.

In promoting vegetable consumption to young people, AUSVEG was proud to sponsor the Level Up Your Veg Award, as part of the Foundation's inaugural Kitchen Garden Awards. This category showcased how kitchen and garden lessons encourage students to try new vegetables.

Congratulations to the 2024 winner of this category, Sunbury Primary School, VIC.

### **Planting, harvesting and cooking a previously-unknown vegetable**

Grade 5/6 Sunbury Primary School students embarked on a new level of independence, planting a crop that they had never grown before – the Jerusalem artichoke. Research was undertaken, leading to seed-saving to ensure a continued crop supply.

The students' confidence in the kitchen soared as they linked their gardening efforts with newfound culinary skills, choosing to make a Jerusalem Artichoke Tart, created with hand-made pastry and eggs from the school chickens. Broad bean plant leaves from their garden 'The Patch', replaced spinach, which students found added a subtle pea flavour to the dish, complementing the 'light potato flavour of the artichokes'.

**Above.** Dr Cathy Wilkinson, the CEO of the SAKGF. **Left L-R.** 'The Patch' entrance at Sunbury Primary School. AUSVEG sponsored the Foundation's Level Up Your Veg Award, and attended the presentation by Stephanie Alexander AO to Sunbury Primary School.



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## Bayer Researcher of the Year Dr Doris Blaesing



**As a researcher, Dr Blaesing learned early on that making the results meaningful for growers was integral to the work she wanted to do.**

In the world of horticulture soil and crop health, the name 'Doris' can be heard frequently in conversations around the country. The name belongs to Dr Doris Blaesing, who at Hort Connections in June 2024 was presented with the Bayer Researcher of the Year Award.

Dr Blaesing is a leading figure in the soil and crop health management, biosecurity and certification fields. The award was a reflection of her longstanding contributions to and support of the industry in these areas, as well as recent work around seed potato certification, and fertiliser use efficiency.

In her role with national agricultural and environmental consultancy RMCG, Dr Blaesing is a regular contributor to industry programs, and many growers and agronomists rely on Doris for her ready advice and assistance.

From a young age, Dr Blaesing has preferred the outdoors and horticulture, leading to a choice in horticultural studies for her education in her native Germany. An interest in soil health stemmed from research with the berry industry, and later led to a doctorate to understand the interactions of soil, root and crop health.

"The blueberry industry was a new venture in Germany at the time, so to understand what growers were facing that meant spending time with them on-farm," said Dr Blaesing.

"It was that experience that showed me the importance of extension work to apply the knowledge of research. It taught me a lot about farming, about growers' passion and the role research must play."

**Dr Blaesing was offered an opportunity to move to Australia for a port-harvest horticulture role with the Victorian Department of Agriculture. The contrast between post-harvest in Germany and the year-round, warm climate production in Australia created a huge learning curve for Doris.**

"I had to learn about packaging and shipping, how many boxes to a pallet, how many pallets to a container," she said.

"The temperatures and distances of Australia compared to Germany are very challenging, and it taught me a lot about the packing end of production, and how important it is to start with good quality.

"However, the Department then took the view that as a scientist, I should be in the lab and office doing research, not going out to farms."

Dr Blaesing felt she was better placed supporting farmers, so took a role as Horticulture Manager with a Tasmanian onion exporter, Vecon, who wanted to expand into other crops.

"Through trial and error, and a lot of mistakes, we established a couple of new crops, and for me I learned what it means to be an Australian vegetable grower," she said.

"In Germany, growers get a winter break from production – it is too cold to grow anything which means there is time to do things like equipment maintenance and planning. In Australia, there is no clear seasonal break – it just keeps going."

In terms of soil health, Doris also experienced salinity for the first time, and came to understand that Australian soils are very old compared to Europe's relatively young soils. The absolute reliance on irrigation was also new.

In Germany, regulation of nitrogen use had been in place since the 1980s and there is a soil protection law – it is only in recent years that Australian horticulture has recognised the role excess nitrogen plays in the environment.

**Above L-R.** Dr Doris Blaesing was presented with the Bayer Researcher of the Year Award at Hort Connections 2024 by Senator the Hon Murray Watt and Bayer's Warren Inwood. *Photo courtesy Andrew Beveridge.*

A period of time with the processing tomato industry also strengthened Doris' conviction of the value of generating and applying research data on-farm, and of talking directly to farmers about their individual needs to make research relevant.

With that knowledge, Doris was part of a team commissioned by Horticulture Australia Limited, the predecessor to Hort Innovation, to undertake a project to review plant and soil health research.

"The Plant Health Review project was led by me with support from Kristen Stirling and Anne-Maree Boland of RMCG," said Dr Blaesing.

"Subsequently, the then Horticulture Australia Limited asked me to work with a design team comprising growers, researchers and technical people to develop research and extension projects and how they would be delivered based on priorities identified by previous work."

**Soil health and integrated crop protection were two of the areas identified as priorities for extension, which eventually led to the creation of the Soil Wealth and Integrated Crop Protection (ICP) project.**

"Research projects identified included the development of DNA testing for soilborne diseases affecting vegetables, led by SARDI; weed control in vegetables conducted by the University of New England; and precision agriculture work delivered by QDAF," Dr Blaesing said.

"All were three-year projects. The grower-driven Soil Wealth ICP project was extended for five years after that in Phase 2, and is now in its second year of Phase 3."

Doris has now been recognised with the Researcher of the Year award twice, testament to her dedication to applied research and extension and genuinely helping farmers improve their production systems.

"It is lovely to be recognised for the hard work and travel that you do, but it really is a team effort," she said. "The support of my colleagues and being questioned about why things work the way they do makes me a better researcher and advisor."

"The award is more than just research. It is about how we convey that knowledge to growers to improve soil and crop management, and ultimately reduce inputs and increase productivity. Extension programs are an essential part of the research, and it is what I love most about what I do."

It comes as no surprise then that Doris' favourite thing to do on the weekend is to work in her vegetable patch and orchard and share the harvest with those in need in her home community. Although she draws the line at growing kale!

**FOR MORE INFORMATION**

Visit the Soil Wealth and ICP project at [soilwealth.com.au](http://soilwealth.com.au)



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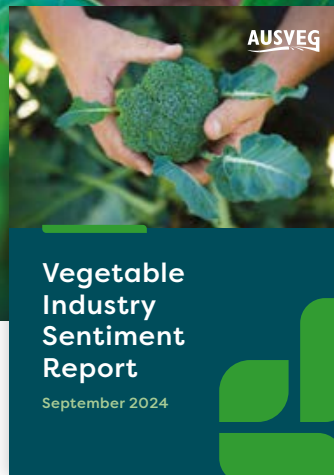
\*Research from La Trobe University shows that strawberry marketable yield has increased by 29%



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# Report casts light on industry sentiment



Scan QR code to read the full Industry Sentiment Report.



The AUSVEG Industry Sentiment Report has measured the challenges facing Australia’s \$5.8 billion vegetable industry.

In September 2024, AUSVEG released its Industry Sentiment Report as part of efforts to measure and address the key issues facing Australia’s vegetable industry and growers.

While it has been widely understood that business conditions in the sector have been challenging for some time, the report is the result of successive surveys conducted by AUSVEG every six months since mid-2023 to quantify and capture a current and cumulative snapshot of sentiment among growers.

Concerningly, the report affirms that Australian vegetable growers are continuing to question their economic viability as more than a year’s worth of low or negative margins continue to bite, leaving 34 percent of grower respondents considering walking away from the sector.

## Challenges identified across a range of issues from business costs and profitability, to workforce to industrial relations to compliance and regulatory burden paint a stark picture.

However, the insights gathered directly from growers through the surveys also provide invaluable weight to AUSVEG’s advocacy efforts on behalf of industry, to improve the profitability and sustainability of Australian vegetable growing businesses.

This information will continue to be used as we seek necessary adjustments to government legislative, policy, and regulatory settings that contribute to the long-term viability of our sector, and will also help shape the priority commitments we will seek from all political parties on behalf of the industry, ahead of a Federal election due within the next six months.

Below we provide a summary of some of the key issues and themes identified in the AUSVEG Industry Sentiment Report.

### Long-term sustainability

With one in three grower respondents indicating they are considering leaving the industry within the next 12 months, ongoing rock-bottom sentiment continues to raise concerning questions about the sustainability of the sector, and Australia’s food security in the longer term.

Input cost increases (56 percent), poor returns (45 percent), labour cost increases (41 percent), lack of operating profit for capital improvement, expansions or innovation (40 percent), and the burden of compliance and regulation (35 percent) were identified as the key factors leading growers to question their futures.

### Lack of profitability

In light of the cost-of-production crisis and unsustainable farmgate returns confronting growers, the report highlights severe profitability challenges.

In July 2024, 50 percent of growers indicated they were financially worse off than they were 12 months ago, and 28 percent indicated that they would be financially worse off by June 2025. Only 9 percent identified they were financially better off compared to 12 months ago, and just 6 percent expected they would be financially better off in another 12 months.

## Challenging business conditions have led to almost 50 percent seeing their future business outlook as either very poor, or poor, and a further 37 percent ranking their outlook as average.

The severe margin squeeze has also affected growers’ ability to invest in capital improvements and innovation. More than 64 percent indicated they had delayed or reduced investment in innovations such as new equipment purchases, with 72 percent indicating that they had delayed or reduced spending on capital improvements.

### Workforce shortages

The report reflects that workforce shortages and labour costs have continued to feature among growers’ biggest challenges.

In 2024, 46 percent of growers experienced workforce shortages across a range of full-time, part-time and casual positions, as filling a range of skilled, semi-skilled and unskilled positions continued to prove challenging. About 35 percent of growers expected workforce to worsen, and only 10 percent expected them to improve.

Workforce shortages were most heavily felt in production roles such as forklift driver (11 percent), tractor driver (9 percent) and machine operators (9 percent), but a lack of senior staff was also reflected in shortages across supervisor (9 percent) and manager (8 percent) positions.

Labour costs remained a major issue, averaging 38 percent of a grower’s overall cost of production, and reaching as high as 71 percent in the top 10 percentile.

### Workforce schemes

Changes to the Pacific Australia Labour Mobility (PALM) scheme, which came into effect at the beginning of 2024, rendered it unworkable for many growers. This was reflected in the January 2024 survey, which indicated that 32 percent of growers who utilised the PALM scheme intended to reduce their PALM workforce.





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In July 2024, 24 percent of respondents still intended to reduce their engagement of PALM workers.

While the survey also indicated that engagement with the PALM scheme increased from 34 percent in January 2024 to 45 percent in January 2024 following the decision to retain 30-hour weekly averaging over a month, over that same time period respondents indicated the proportion of their workforce who were working holiday makers increased from 29 percent to 38 percent.

More than 62 percent of growers indicated that the removal of the 88-day specified work requirement for working holiday maker visa extensions would have a severe or critical impact on their business.

**Overwhelming compliance burden**

In the most recent sentiment survey, the significant and growing cost, as well as the sheer volume, of schemes growers are required to comply with are the aspects of compliance identified as having the most significant negative material impact on their businesses.

More than 64 percent of growers identified that compliance requirements around food safety and quality assurance schemes were not just a challenge but were having a high or critical impact on their businesses.

Industrial relations and workforce schemes, occupational health and safety, water catchment and irrigation and taxation were among the other top compliance challenges growers identified in the latest survey.

**Solutions**

While the impact of some of the challenges confronting vegetable growing businesses on Australia’s food security have been somewhat masked by recent favourable weather conditions and fewer supply chain disruptions, it is clear from the survey responses that the industry remains in a precarious position.

Ongoing margin squeeze and difficult conditions, combined with any further setback, could easily trigger a cascade effect resulting in reduced production, higher consumer prices, and increased reliance on imported product.

From the many issues identified, it is clear that a suite of carefully considered, fit-for-purpose solutions are needed from Government to ensure Australia’s vegetable industry remains viable, now and into the future.

Informed by the survey results, AUSVEG will continue advocating both publicly and behind the scenes, for the changes needed to improve grower profitability, and the long-term viability of Australia’s vegetable industry.

A focus on bolstering Australia’s waning vegetable consumption is also among the solutions proposed by AUSVEG, to help reverse the industry’s fortunes, given just 6.5 percent of Australians are meeting their recommended five serves per day.

Recent industry research has identified that Australians may be eating as little as 1.8 serves of vegetables per person per day when food wastage is taken

into account – less than the already low average of 2.4 serves reflected in official statistics.

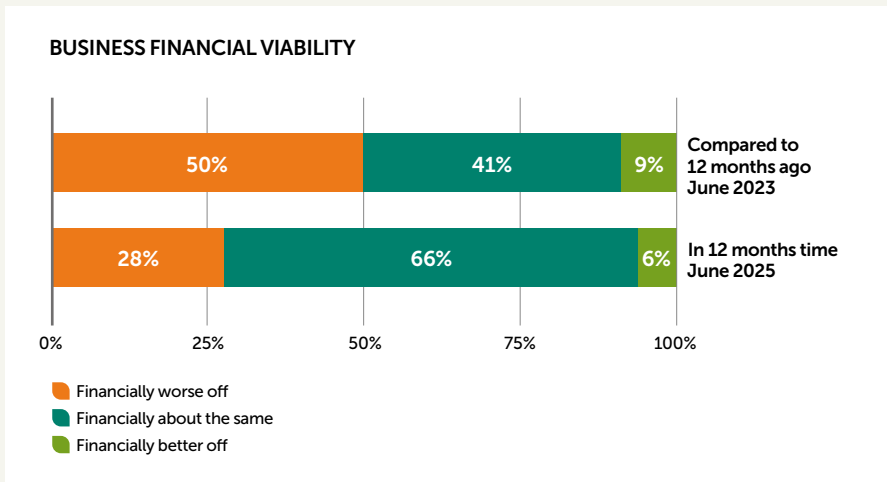
That same research has identified that by lifting vegetable consumption by just one serve per person per day by 2030, there is potential to achieve a \$3.3 billion net vegetable supply chain economic benefit, and \$1.4 billion in healthcare system savings due to reduced dietary-linked disease burden over time.

**WHAT’S NEXT**

Insights gleaned from Industry Sentiment Surveys will continue to be used to inform AUSVEG advocacy activities and representations to government on behalf of industry.

With the release of the survey report having drawn considerable political and media interest, and a Federal election looming, AUSVEG is committed to its ongoing advocacy for initiatives that improve the outlook and long-term sustainability of Australia’s vegetable industry, and the growers we represent.

AUSVEG thanks all growers who have taken the time to complete our recent sentiment surveys, and encourages participation in future updates of the initiative.



**2024 BUSINESS OUTLOOK**



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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

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of the gross sale value at the first point of sale

Onions R&D AT

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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

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

	OUTCOME 1	OUTCOME 2	OUTCOME 3	OUTCOME 4
	<b>Extension and capability</b>	<b>Industry supply, productivity &amp; sustainability</b>	<b>Demand creation</b>	<b>Business insights</b>
	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.



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# Minor Use Permits

ISSUED AUGUST 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
PER14422 Version 4	Switch Fungicide (cyprodinil + fludioxonil)/Rubus & Rubus Hybrids/Grey Mould	28 Feb 2014 – 31 July 2025	Hort Innovation	All states & territories, except VIC
PER14839 Version 4	Zineb/Eggplant, Spinach & Silverbeet/ Anthracnose (Colletotrichum spp.)	1 Aug 2014 – 31 July 2029	Hort Innovation	All states & territories except VIC
PER11441 Version 4	Propachlor/Radish, swede, turnip/Grass & Broadleaf weeds	27 May 2009 – 31 July 2029	Hort Innovation	All states & territories except VIC
PER94451 Version 1	Spinetoram/Various vegetable and herb crops/Leaf miners	5 July 2024 – 31 July 2027	Hort Innovation	All states & territories, except VIC
PER84890 Version 4	Pyriproxifen/Beans/Silverleaf whitefly	15 May 2018 – 31 July 2027	Hort Innovation	All states & territories, except VIC
PER14890 Version 4	Methomyl/Spring onions & Shallots/Western Flower Thrips	25 Nov 2014 – 31 July 2029	Hort Innovation	All states & territories
PER14906 Version 4	Triadimenol/Leek, Welsh Onion, Shallot, Spring Onion & Chinese Onion/White Rot (Sclerotium)	22 Oct 2014 – 31 July 2029	Hort Innovation	All states & territories, except VIC
PER14583 Version 6	Chlorpyrifos/Various Vegetable Crops/Various Insect Pests	1 April 2014 – 31 July 2025	Hort Innovation	All states & territories, except VIC
PER14907 Version 4	Emamectin/Brassica leafy vegetables/Various pests	9 Dec 2014 – 31 Aug 2029	Hort Innovation	All states & territories, except VIC
PER11440 Version 8	Procymidone/Peppers/Sclerotinia rot	1 June 2009 – 31 Aug 2029	Hort Innovation	All states & territories, except VIC
PER14479 Version 6	Propiconazole/Various vegetable crops/Various pests	12 May 2014 – 31 Aug 2029	Hort Innovation	All states & territories, except VIC
PER8930 Version 7	Phorate/Eggplant, peppers, shallots and spring onions/Aphids, jassids, mites, thrips & onion maggot	14 Aug 2011 – 31 Aug 2029	Hort Innovation	All states & territories
PER94854 Version 1	Isocycloseram/Celery, Baby Leaf Spinach, Baby Leaf Lettuce, Kale, Open Leaf Lettuce, Parsley, Coriander, Shallots & Leek/ Serpentine leaf miner	9 Aug 2024 – 31 Aug 2025	Hort Innovation	All states & territories
PER95266 Version 1	Clothianidin/Fruiting Vegetables, Cucurbits/Cucumber Fruit Fly	21 Aug 2024 – 31 Jan 2026	Hort Innovation	All states & territories
PER95268 Version 1	Clothianidin/Fruiting Vegetables, excluding cucurbits/ Mediterranean fruit fly & Queensland fruit fly	21 Aug 2024 – 31 Jan 2026	Hort Innovation	All states & territories

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://legislation.gov.au/Series/F2015L00468) to confirm if there are MRL established by the Australia New Zealand Food Standards Code.

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GROW FORWARD







# export/ trade + update



## 2024 Australia-Japan Horticulture Showcase

**A tour of Australian growers by a Japanese delegation has kicked off a project to strengthen the trading relationship with this important export market.**

In June 2024, Hort Innovation commenced the *Australian Horticulture Showcase: Cultivating trusted relationships with Japan* program, an initiative designed to strengthen and expand the trading relationship between Australia and Japan.

This program is an important step in enhancing Australia's role as a global leader in horticultural innovation and sustainable fresh produce production and supply, while solidifying the trade ties with Japan, one of the Australian horticulture industry's key export markets.

Funded by Hort Innovation's Frontiers investment program and a Department of Agriculture, Fisheries and Forestry (DAFF) Showcasing Australian Horticulture Grant, this program is delivered through Hort Innovation, led by AUSVEG and supported by the Australian Fresh Produce Alliance (AFPA).

### Japan-Australia Delegate Exchange Program

The first tranche of the program was the *Japan-Australia Delegate Exchange Program*, an inbound activity which took place on 6-12 October 2024. The program saw Hort Innovation host a delegation of Japanese horticultural industry leaders and representatives, importers, researchers, and government officials in Australia, including the incoming DAFF Ag Counsellor to Japan, on a five-day trade mission.

### Victoria Farm visits – food waste initiatives and advanced orchard management

The official activities commenced with farm visits in Victoria, where the delegation visited Fresh Select in Werribee and Montague Farms in Narre Warren.

Fresh Select has built a strong reputation over 60 years for providing the freshest and most carefully cultivated vegetables, and its latest investment to produce dehydrated vegetable powder, called NutriV.

The next stop was Montague Farms, a business with a history dating back to 1948 which currently has more than 4.6 million fruit trees in the ground.

These visits offered a deep dive into large-scale vegetable production and advanced orchard management. Both farms showcased cutting-edge sustainable practices that contribute to Australia's reputation for producing high quality, clean and safe fresh produce.

### Queensland's premium produce – citrus, berries and table grapes

The program continued as the group travelled to Queensland, where they visited Ironbark Citrus, Smart Berries, and RJN Cua in Mundubbera.

The delegation started with visits to Ironbark Citrus, known for their top-quality mandarin products and sustainable farming practices. The Japanese delegation then visited Smart Berries, where innovation and technology converge to produce some of the finest berries in the region. The final stop for the day was RJN Cua Vineyards, where the beautiful vineyards enjoy water supplied from the nearby Burnett River, resulting in supremely juicy grapes bursting with flavour.

The Japanese delegation visited a range of horticulture businesses in Victoria, Queensland and New South Wales.





This day highlighted Australia's expertise in premium citrus, berry, and table grape production, three sectors with significant and further growth potential in the Japanese market. Discussions were focused on pest management and post-harvest management, topics of great interest to the visiting Japanese.

**The heart of Bundaberg** – citrus, macadamia, zucchini, watermelon

The third day saw the group visit three leading farms in Bundaberg, Queensland. The delegation visited Abbotsleigh Citrus, Macadamia Management Group, and Marto Farms.

Abbotsleigh Citrus Farm, part of the Nutrano Group, is known for their high-quality oranges and lemons and their sustainable farming practices, which have set industry standards for environmental stewardship.

The Macadamia Management Group is a pioneer in macadamia farming, dedicated to producing top-quality macadamia nuts while prioritising environmental conservation.

Marto Farms is renowned for their innovative approach to farming, including the integration of robotics, and their commitment to community engagement.

The farm tours highlighted not only the scale of operations but also the sophisticated technologies and sustainable management systems used to ensure consistent, great quality and the finest produce.

**New South Wales** – cutting-edge berries

The delegation then travelled to Coffs Harbour in New South Wales to visit Costa Berries, one of Australia's largest berry producers.

This visit showcased the role of technological advancements in maintaining the quality, freshness, and competitiveness of Australian berries in international markets. The delegation was particularly interested in the precision agriculture techniques employed at Costa Berries, which ensure optimal growing conditions and reduce environmental impact. The day's visit sparked animated discussions

about future collaborative research efforts between Australian and Japanese growers.

**A grand finale of knowledge sharing**

The final day of the program included a Knowledge Exchange Forum and Hort Produce Showcase.

This forum brought together industry leaders and researchers from both countries to engage in in-depth discussions on research, technical innovations, and sustainable practices shaping the future of horticulture. It provided a platform for participants to exchange knowledge and explore collaborative opportunities.

The final event of the program was the Australia-Japan Horticulture Industry Networking Dinner. This dinner was the perfect finale, offering a relaxed atmosphere for further conversation, networking and relationship building.

The Australia-Japan Horticulture Showcase initiative is funded by Hort Innovation's Frontiers investment program and a Department of Agriculture, Fisheries and Forestry (DAFF) Showcasing Australian Horticulture Grant.

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## INTERNATIONAL TRADE UPDATE

# Australian vegetable export overview

JANUARY TO AUGUST 2024

Based on data from the Global Trade Atlas, for the period of January to August 2024 there was a 4 percent decrease in Australia’s vegetable export value, from \$171 million to \$165 million, and total export volume dropped by 2 percent from 150,257 tonnes to 147,348 tonnes.

Singapore, the United Arab Emirates, South Korea, Malaysia, and Thailand were the top five markets for fresh vegetable exports in this period.

Singapore remained the top Australian fresh vegetable export destination by value, with an increase in export value of 7 percent, from \$26.5 million to \$28.4 million, and maintained a similar export volume of 16,306 tonnes.

The United Arab Emirates recorded a decrease of 13 percent in export value, from \$22.2 million to \$19.3 million, with a decline of export volume of 14 percent, from 25,792 tonnes to 22,097 tonnes.

Australian fresh vegetable exports to Malaysia shrunk by 12 percent in value, and declined by 14 percent in volume.

### Change in vegetable exports by destination

TABLE 1. JANUARY TO AUGUST 2024

Source: Global Trade Atlas 2024

TRADE PARTNER	2023		2024		% ↑ 2023–2024	
	AUD\$	TONNES	AUD\$	TONNES	AUD\$	TONNES
<b>Total Fresh Vegetable Exports</b>	<b>\$171,155,738</b>	<b>150,257</b>	<b>\$164,252,459</b>	<b>147,348</b>	<b>-4%</b>	<b>-2%</b>
Singapore	\$26,530,790	16,377	\$28,439,325	16,306	7%	0%
United Arab Emirates	\$22,253,265	25,792	\$19,371,259	22,097	-13%	-14%
Korea, South	\$14,545,871	19,146	\$18,477,001	24,392	27%	27%
Malaysia	\$17,823,691	17,235	\$15,767,639	14,750	-12%	-14%
Thailand	\$11,623,812	11,742	\$10,964,048	11,891	-6%	1%
Hong Kong	\$8,649,063	4,314	\$7,817,343	3,313	-10%	-23%
Philippines	\$5,980,778	8,165	\$7,720,873	7,657	29%	-6%
New Zealand	\$8,961,138	2,491	\$6,911,981	1,741	-23%	-30%
Saudi Arabia	\$8,959,907	10,177	\$6,835,465	8,821	-24%	-13%
Taiwan	\$7,166,351	5,634	\$6,254,199	5,748	-13%	2%



Above. Exports to Malaysia, one of Australia’s largest markets, dropped in 2024.

Root vegetables such as carrots, potatoes and onions remained the top three export crops for the industry.

### Change in vegetable exports by crop

TABLE 2. JANUARY TO AUGUST 2024

Source: Global Trade Atlas 2024

CROP	2023		2024		% ↑ 2023–2024	
	AUD\$	TONNES	AUD\$	TONNES	AUD\$	TONNES
Carrot	\$51,312,719	61,278	\$41,347,518	50,794	-19%	-17%
Potato	\$32,302,875	35,814	\$39,955,046	42,293	24%	18%
Onion	\$39,563,867	38,227	\$39,205,966	41,467	-1%	8%
Cauliflower & Broccoli	\$9,104,362	2,700	\$10,906,385	2,776	20%	3%
Celery	\$5,273,754	3,164	\$4,955,487	2,916	-6%	-8%
Beans	\$5,007,162	1,174	\$3,656,954	731	-27%	-38%
Lettuce	\$3,926,473	776	\$3,309,153	489	-16%	-37%
Tomato	\$4,703,856	1,121	\$3,148,521	630	-33%	-44%
Pumpkin	\$2,879,955	2,090	\$3,016,273	1,995	5%	-5%
Salad Beets	\$1,455,447	299	\$1,852,956	389	27%	30%



Australian carrots for sale in a Bangkok supermarket.

### CHANGE IN VEGETABLE EXPORTS BY COUNTRY

JANUARY TO AUGUST 2024

#### Singapore

TABLE 3

Source: Global Trade Atlas 2024

CROPS	2023		2024		% ↑ 2023–2024	
	AUD\$	TONNES	AUD\$	TONNES	AUD\$	TONNES
Cauliflower & Broccoli	\$5,010,672	1,562	\$7,582,522	2,046	51%	31%
Carrot	\$6,718,274	7,756	\$6,082,817	6,727	-9%	-13%
Pumpkin	\$2,167,599	1,727	\$2,653,940	1,839	22%	6%
Potato	\$2,518,051	1,606	\$2,527,047	1,598	0%	0%
Celery	\$2,171,313	1,379	\$1,975,492	1,251	-9%	-9%
Onion	\$988,844	753	\$1,616,179	1,700	63%	126%
Lettuce	\$1,905,988	426	\$1,547,582	225	-19%	-47%
Tomato	\$1,594,504	300	\$1,382,693	258	-13%	-14%
Cabbage & Kale	\$625,013	198	\$658,832	139	5%	-30%
Brussels sprouts	\$290,193	85	\$487,898	136	68%	60%

#### United Arab Emirates

TABLE 4

Source: Global Trade Atlas 2024

CROPS	2023		2024		% ↑ 2023–2024	
	AUD\$	TONNES	AUD\$	TONNES	AUD\$	TONNES
Carrot	\$15,944,325	20,768	\$11,655,071	15,885	-27%	-24%
Onion	\$3,787,093	3,500	\$4,572,722	4,205	21%	20%
Potato	\$1,563,471	1,236	\$2,262,295	1,729	45%	40%
Celery	\$258,059	122	\$343,634	170	33%	39%
Salad Beets	\$192,870	25	\$145,637	22	-24%	-12%
Cauliflower & Broccoli	\$22,936	6	\$40,636	7	77%	17%
Spinach	\$40,018	4	\$31,865	5	-20%	25%
Pumpkin	\$66,028	24	\$4,582	2	-93%	-92%

#### South Korea

TABLE 5

Source: Global Trade Atlas 2024

CROPS	2023		2024		% ↑ 2023–2024	
	AUD\$	TONNES	AUD\$	TONNES	AUD\$	TONNES
Potato	\$13,932,751	19,019	\$18,156,437	24,332	30%	28%
Brussels sprouts	\$406,933	78	\$148,692	38	-63%	-51%
Cauliflower & Broccoli	\$144,495	40	\$79,711	10	-45%	-75%
Salad beets	\$20,161	3	\$35,777	4	77%	33%
Carrot			\$18,850	3	N/A	N/A
Asparagus			\$14,300	1	N/A	N/A

## INTERNATIONAL TRADE UPDATE

# Australian onion export overview

JANUARY TO AUGUST 2024

Based on data from the Global Trade Atlas, there was a 1 percent decrease in onion export value, from \$40.2 million to \$39.9 million, and total export volume increased by 8 percent from 38,370 tonnes to 41,626 tonnes.

The top five markets for fresh onion exports were Thailand, the United Arab Emirates, the Netherlands and Malaysia. There was strong growth recorded for the United Arab Emirates, the Netherlands and Japan from January to August 2024 (refer to Table 6).

## Change in onion exports by destination

TABLE 6. JANUARY TO AUGUST 2024

Source: Global Trade Atlas 2024

TRADE PARTNER	2023		2024		% ↑ 2023–2024	
	AUD\$	TONNES	AUD\$	TONNES	AUD\$	TONNES
<b>Total Fresh onion exports</b>	<b>\$40,253,215</b>	<b>38,370</b>	<b>\$39,916,851</b>	<b>41,626</b>	<b>-1%</b>	<b>8%</b>
Thailand	\$7,589,043	9,987	\$7,872,131	9,906	4%	-1%
United Arab Emirates	\$3,788,009	3,500	\$4,574,810	4,205	21%	20%
Netherlands	\$3,440,390	2,583	\$4,342,129	4,087	26%	58%
Malaysia	\$4,197,062	4,383	\$3,122,910	3,248	-26%	-26%
Japan	\$2,090,866	1,454	\$2,994,267	2,604	43%	79%
Taiwan	\$3,464,342	3,294	\$2,722,711	3,419	-21%	4%
Belgium	\$1,483,348	1,323	\$2,207,447	2,140	49%	62%
Singapore	\$1,117,810	783	\$1,774,288	1,735	59%	122%
Germany	\$1,237,671	1,287	\$1,596,939	1,881	29%	46%
Spain	\$3,501,322	3,546	\$1,331,271	1,215	-62%	-66%

Thailand is the top Australian fresh onion export destination and recorded strong trade volumes and value over the past four years. In this period, the value of onion exports to Thailand has increased by 4 percent, injecting an additional \$283,088 and bringing the total to \$7.8 million.

The United Arab Emirates has recorded a 21 percent increase in export value, from \$3.8 million to \$4.6 million and an increase in export volume by 20 percent to 4,205 tonnes.

Onion exports to the Netherlands have increased by 26 percent, from \$3.4 million to \$4.3 million, and the export volume has doubled by 58 percent, from 2,583 tonnes to 4,087 tonnes (refer to Table 6).

# Australian onion import overview

JANUARY TO AUGUST 2024

According to data from the Global Trade Atlas, there was a 34 percent increase in onion import value from January to August 2024, from \$2.9 million to \$3.9 million and a 29 percent increase in import volume from 3,175 tonnes to 4,101 tonnes.

China, the Netherlands, and New Zealand are the top three origins of onion imports, with the majority of imports from China being semi-processed onion products.

Semi-processed onion imports from China recorded an increase of 28 percent, from \$2.8 million to \$3.5 million and import volume increased by 24 percent, from 3,122 tonnes to 3,886 tonnes (refer to Table 7).

## Change in onion imports by top 3 destinations

TABLE 7. JANUARY TO AUGUST 2024

Source: Global Trade Atlas 2024

TRADE PARTNER	2023		2024		% ↑ 2023–2024	
	AUD\$	TONNES	AUD\$	TONNES	AUD\$	TONNES
<b>Total Fresh onion imports</b>	<b>\$2,912,628</b>	<b>3,175</b>	<b>\$3,911,625</b>	<b>4,104</b>	<b>34%</b>	<b>29%</b>
China	\$2,755,066	3,122	\$3,535,675	3,886	28%	24%
Netherlands	\$154,829	53	\$297,315	114	92%	115%
New Zealand			\$68,524	104	N/A	N/A

**INTERNATIONAL TRADE UPDATE**

**Australia-UAE trade deal**

In September 2024, the Australian Government secured the Australia-United Arab Emirates Comprehensive Economic Partnership Agreement (Australia-UAE CEPA), which will help further secure and develop one of the largest export markets for Australian vegetables. The finalisation of the agreement will promote further trade growth and liberalisation between the two nations.

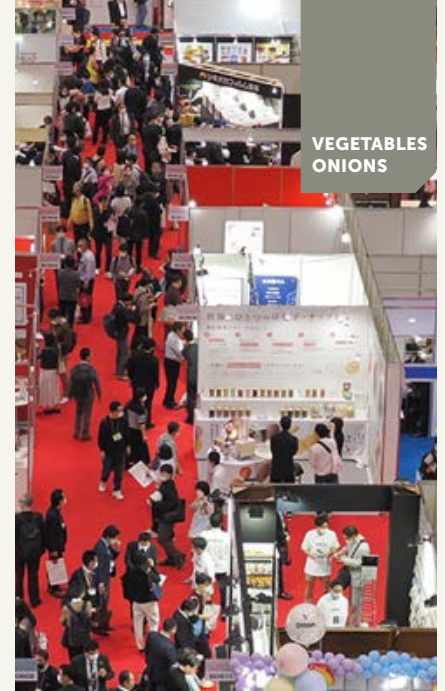
The UAE is a key and valued long-term trading partner for the Australian industry as it underpins the vegetable industry's ability to trade competitively in the UAE market, where Australian grower-exporters currently enjoy tariff free trade for most fresh vegetables.

With the finalisation of the Australia-UAE CEPA, AUSVEG expects to further increase trade development activities in the UAE, ensuring that the Australian vegetable, onion, and potato industries continue to maintain a strong presence and market share in the region.

**International Trade Events**

Through the *Multi-industry export program*, AUSVEG coordinates grower participation in and exhibition at several international trade missions aligned with major trade events in regions.

Event	2025	Location
Gulfood	16-21 February	Dubai World Trade Centre (DWTC)
Foodex	10-14 March	Tokyo Big Sight, Japan
South East Asia Trade Mission	April	Thailand, Malaysia & Singapore (TBC)
FHA F&B	8-11 April	Singapore Expo
AUSVEG Fresh Produce Showcase	4 June	Brisbane, QLD
Reverse Trade Mission (inbound)	June	Queensland
Asia Fruit Logistica	3-5 Sept	Asia World Expo (Hong Kong)



**FIND OUT MORE**

Please contact Andrea Lin, International Trade Specialist, AUSVEG andrea.lin@ausveg.com.au or +61 3 9882 0277

The *Multi-industry export program (Vegetables, Onions and Melons)* is funded by Hort Innovation using the vegetable, onion and melon research and development levies and contributions from the Australian Government. Project: MT21009

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## Celebrating 100 Years Shaping the Future of Plant Breeding

**Vegetable seed breeding company, Rijk Zwaan, is celebrating 100 years. In 1924 Mr Rijk Zwaan opened a seed shop in Rotterdam, the Netherlands. Passionate about seed quality, he built his own seed production and breeding facilities.**

It's the early 1900s and Mr Rijk Zwaan is walking through a cabbage plot, using his cane to point out varieties with the best colour, shape, or disease resistance. This is conventional plant breeding, where farmers select the best-looking plants, saving the seeds to plant next year. Would Mr Zwaan believe we're now using computers and artificial intelligence to predict plant behaviour, or that plant breeders work alongside robotics specialists?

For thousands of years, humans have used selection to develop plants with desirable traits. These methods have evolved with technological advances; in the last century, we've expanded our knowledge in genetics, molecular breeding and biotechnology. What does the next 100 years look like for plant breeding?

According to Rijk Zwaan Managing Director (R&D), Timothy March, plant breeding has moved towards big data collection which influences the types of skills required for this specialised field.

Genomic selection is a breeding method that uses data, such as genetic information, in statistical models to identify the best combination of parent plants.

"In the lab or greenhouse, you can produce thousands of 'kids' from the parents," Mr March explains.

"You then DNA test them and from your data and modelling, you can say, 'This has a certain combination of DNA so it's likely to have this level of yield, or this level of disease resistance'. So, you might only be testing 50 new varieties in the field, instead of 1,000 which saves you a lot of time and resources."

Rijk Zwaan has invested in this technology over the past decade.

"The idea with Genomic Selection and AI models, is you put in all the information about the genetic makeup of varieties, and all the data about environmental variables of where those varieties are grown such as the climate, soil types and agronomic practices. From that, you can get far better predictions of how these varieties will perform in different environments."

Orali RZ, is Rijk Zwaan's first rockmelon variety created using genomic selection. Released in 2023, Orali addresses grower needs for better maturity indicators.

Mr March says the next focus is applying new technologies to phenotyping - the measurement of observable plant characteristics.

"A lot of this work...relies on new prediction models and data sets. That's why we are pushing ahead with digital phenotyping because we need all these in-depth data sets to feed into these models," Mr March says.

**"We need these new breeding technologies to continue innovating – to produce better varieties, faster that match population growth and ensure global food security."**

Rijk Zwaan has digital phenotyping specialists in the Netherlands, France, Spain and Australia to support our breeding teams. While the industry is seeing a technological shift, plant breeding in its simplest form is still highly valuable.

**Above L-R.** Melon seedlings. Stefanie Renaud - Digital Phenotyping Specialist for Rijk Zwaan Australia: Capturing data on lettuce seedlings using a camera drone. Mr. Rijk Zwaan, assessing trials in 1966.

"One of the key things that breeding has at its basis is genetic diversity. That's what drives plant breeding and that's how you get new traits, and there's different ways to get that genetic diversity," Mr March says.

"A more traditional approach is to use natural variation. At Rijk Zwaan we are still very interested in using natural diversity because there are a lot of wild relatives of our vegetable crops present across the world, including in Australia,"

Every day, millions of people eat fruits and vegetables grown from Rijk Zwaan seeds. That responsibility inspires us to focus on continuous innovation. Each year, we invest 30% of our turnover into research and development - around €150 million (\$240 million AUD).

"While there's a lot of work happening to make staple foods more nutritious, our view is we should aim to eat a varied diet of different fruits and vegetables, and you'll get those nutrients. That is one reason why Rijk Zwaan is actively breeding in over 30 different crops," Mr March says.

Rijk Zwaan's breeders also work to make vegetables tastier, more appealing and more accessible. Breeding for traits such as resilience to diverse environments, disease resistance and productivity helps ensure our future food security.

Labour-saving attributes such as mechanical harvesting, reduced input requirements, minimised fertiliser usage, and lowered heating needs in greenhouse crops are becoming increasingly crucial.

"That's the thing about breeding - we're continuing to develop varieties within changing climates and to meet the needs of growers. Breeding in itself is an evolution program."

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



# vegetable fund update



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

**Hort  
Innovation** **VEGETABLE  
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# A bug on your farm can harm your crop, and your market

**Bugs on your farm can devastate crop yield. Still, with vigilant biosecurity, the risks can be mitigated and the impact on your business minimised.**

As an island nation, Australia's biosecurity has its successes, but with international trade and movement of people increasing, the risk of exotic pests entering the country is only going up. But don't worry, there are steps you can take to protect your farm business.

Shakira Johnson and Dr Rosalie Daniel from AUSVEG's biosecurity team recently spoke at the Annual Vegetable Industry Seminar (AVIS) during Hort Connections 2024 about the risks of pest incursions and how growers can mitigate them.

"The impact of a pest incursion can be devastating," said Shakira. "It can lead to crop losses through damage, or because it needs to be destroyed, and limit your market access."

The upside is that with good biosecurity practices, you can reduce the risks of pests, pathogens and weeds entering your farm. Recent examples of pest threats the vegetable industry has faced include:

- Tomato potato psyllid
- Fall armyworm
- Exotic leafminers
- Guava root-knot nematode
- Varroa mite.

Knowing what the risks are and preparing for them in advance makes a huge difference, as can be seen with the differing responses to these recent pest incursions.

A well-researched host list made a significant difference when serpentine leafminer entered Australia in 2020, for example, with fewer vegetables subject to trade restrictions than otherwise would have been the case in the absence of a scientifically researched host list.

A clear contingency plan was in place for exotic leafminers, with varying degrees of usage by industry and state jurisdictions, enabling a response to be mobilised more rapidly.

Newly arrived invasive pests to Australia, such as fall armyworm or leafminers, typically require further research as they adapt to Australian conditions before they can be integrated into business-as-usual farm management practices. This is critical to equip growers to understand and manage the pests and incorporate their management in overall crop management.

For example, monitoring to determine seasonal movement patterns, pesticide resistance, synergies or competition with



endemic pests, and the effectiveness of beneficial insects already in the environment are all important knowledge in the pest management toolbox.

## What happens in an incursion?

If a pest incursion is confirmed, a committee is formed to decide on the best course of action. This might involve quarantining a farm business and the surrounding area to contain the outbreak and support an opportunity to eradicate the pest.

At the same time, tracing and monitoring is undertaken to determine where the pest is present. The agency leading the response may ask for samples or photos to support accurate identification and monitoring of the pest.

"The time it takes to make decisions and communicate to industry can be challenging for businesses impacted," said Dr Daniel.

"To combat this challenge, AUSVEG, through the VegWatch program, is exploring the potential to use visitor movement data to speed up the decision-making process and improve the chances of eradication."

**Above.** Leafminers on plant leaf. **Inset L-R.** Dr Rosalie Daniel and Shakira Johnson from AUSVEG's biosecurity team presenting at the Annual Vegetable Industry Seminar. *Photo courtesy Andrew Beveridge.*

### How can you protect your farm business?

- **Early detection and reporting:** keep an eye out for signs of pests and report any potential issues as soon as possible.
- **On-farm biosecurity:** implement practices like cleaning equipment, restricting visitor access, and using certified seed.
- **Monitoring:** regularly check your crops for pests and keep records of your farm activities.

Integrating biosecurity practices on-farm allows growers to be aware of what is 'business as usual' on farm, and they are therefore more likely to notice a new plant pest and respond earlier. Limiting how the pest is spread becomes part of the on-farm biosecurity management.

Shakira cited the example of charcoal rot for the strawberry industry in 2020. VSICA Research investigated how the adoption of on-farm biosecurity practices significantly lowered the presence of charcoal rot.

**“What this demonstrates is that growers who had a ‘come clean, go clean’ mindset were more likely to reduce the risk of the disease,” said Shakira.**

“Many growers use chemistries to protect crops, but we may not always have these chemistries available. We need to think about what practices we can employ to lower our risks.

“We would also encourage growers to think about weed management, not only for its impact on crop productivity but

also as potential host plants for pests and diseases of concern.”

**For vehicles and equipment,** on-farm biosecurity practices can include:

- One main farm gate or entrance to restrict movement onto and around the property.
- Cleaning vehicles and equipment, or leaving them outside the farm. Contaminated soil and weed seeds can become caught in tyres, or on the car undercarriage.
- Restrict visiting vehicle movement with designated parking areas and roadways.

**For visitors,** some easily established practices can include:

- A visitor check-in process
- Foot baths
- Shoe brushes
- Disinfectant
- Over-shoe personal protection equipment.

**Other biosecurity practices** that can be employed:

- Source plant material from reputable suppliers.
- Use of certified seed.
- Record farm inputs (e.g. compost).
- Regularly monitor and record crops for plant pests.
- Train staff to be aware of common and exotic plant pests.
- Install traps to aid in pest surveillance.

A recent Hort Innovation levy-funded project, the *Vegetable Industry Biosecurity and Business Continuity Strategy*, known for short as VegWatch, is a collaborative

venture to support biosecurity preparedness, profitability and trade. AUSVEG is the coordinator and one of eight organisations participating.

“As part of that project we have partnered with Onside, who have developed a phone app that allows the grower to monitor and control movement of visitors on and off the farm,” said Dr Daniel, who heads up the AUSVEG contribution to the project.

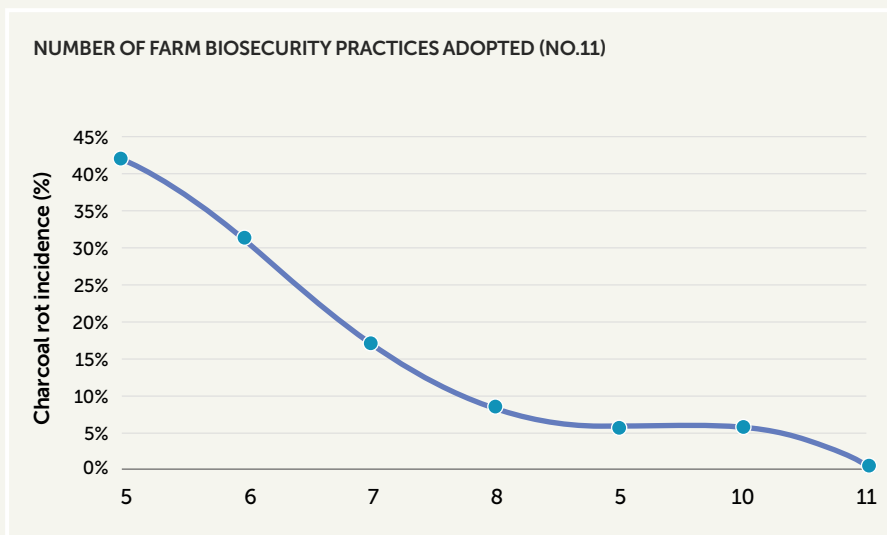
“The app allows visitors to sign in without entering the property; allows the grower to check who the visitor is and what farms they have been to previously and also instruct on what the on-farm biosecurity measures are.

“In addition, if a plant pest incursion does occur, there is a record of movement for that grower to give to the Consultative Committee on Emergency Plant Pests (CCEPP) to establish whether a quarantine zone needs to be established, or if a response plan reimbursement application is eligible.

### Take home message

Remember, on-farm biosecurity doesn't have to be time-consuming or complicated. By being vigilant and taking proactive steps, you can protect your farm and your crops.

**If you see something unusual, call the Exotic Plant Pest Hotline.**



### FOR MORE INFORMATION

Regarding On-farm biosecurity, contact Shakira Johnson at [shakira.johnson@ausveg.com.au](mailto:shakira.johnson@ausveg.com.au).

Regarding Vegetable Industry Biosecurity and Business Continuity Strategy project, contact Dr Rosalie Daniel at [rosalie.daniel@ausveg.com.au](mailto:rosalie.daniel@ausveg.com.au).

The Annual Vegetable Industry Seminar (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.

Project: VG20000

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.

Project: VG22004



# Soil health and sustainability practices in New Zealand

BY DIMI KYRIAKOU, RMCG

**A study tour of New Zealand's innovative horticultural practices provided a group of Australian growers with valuable insights into sustainable farming. Over five days, the study tour visited farms and research institutions, witnessing cutting-edge approaches to soil health and crop management.**



Tour participants learned about NZ's Lighter Touch agroecological program.

Soil Wealth ICP team members Dr Doris Blaesing and Sophia Thach led a group of Australian growers, agronomists, and industry partners on an insightful study tour of New Zealand's horticultural practices.

Over five days, the group visited farms and trial sites, gaining firsthand insights into soil management, crop health innovations, and sustainable farming methods.

Joining the NZ Vegetable Summit on day one provided an excellent introduction to the country's commitment to sustainability and innovation.

In particular, New Zealand's *Lighter Touch* program, which aims to shift from a heavy reliance on agrichemicals to adopting an agroecological approach, could provide a model for Australian growers. The project promotes crop protection that balances productivity with environmental sustainability, an approach increasingly relevant to managing Australia's soil health challenges.

**Field days throughout the North Island provided numerous opportunities to observe sustainable practices in action firsthand.**

AS Wilcox and Sons, a family-owned business, showcased the advantages of a holistic farming approach, emphasising sustainable practices throughout their operations. A key focus was on integrated pest management (IPM), with border crops playing a vital role in natural pest control.



The farm also demonstrated its commitment to soil health by producing compost and compost pellets, while incorporating biological products to improve both soil and crop vitality. Their innovative use of techniques like 'crop-stacking' and the development of a soil health dashboard to track progress reflect a forward-thinking approach to farming. During a visit to their Bombay site, the group saw firsthand how they are trialling the combination of compost, biological products, and IPM strategies, including planting strips to attract beneficial insects, further enhancing ecosystem health.

From practice to research, a tour of Plant and Food Research, New Zealand's government-owned Crown Research Institute that provides much of the research and scientific knowledge to the country's horticultural, arable, seafood, and food and beverage industries, demonstrated the role and the value that research and development play in driving improvements in soil health.

The group returned to the field at Leader-Brand, a large family-owned and operated farming business established in 1975 and one of New Zealand's most progressive horticultural businesses. LeaderBrand's commitment to regenerative agriculture was inspiring, especially their efforts in rejuvenating wetlands and involving the local community in these initiatives. The company's approach to sustainability goes beyond farming, incorporating environmental stewardship into their business model.



The Greengrower team with study tour participants.

Day three took the group to an amazing fully integrated leafy green vertical farm, Greengrower. The entire process from seed to harvest packing takes place within the facility. Seeds are first grown in soil before being transplanted into a hydroponic system, all within a fully controlled environment. This innovative approach allows 1ha of leafy greens to be grown with the same yield as 5ha in the field, while using 95 percent less water. Additionally, the indoor system reduces the growing time to just 28 days, compared to 60 days in traditional field conditions.

New Zealand's strong commitment to research and development in soil health and sustainable practices left a lasting impression on the tour participants.

"The level of research and development in soil health and sustainable practices was truly inspiring," Sophia Thach said.

**"The tour really highlighted the value of collaboration and the role of innovation in sustainable agriculture. We look forward to hosting a New Zealand contingent in Australia in 2025."**

**FIND OUT MORE**

Please contact project leaders  
 Dr Gordon Rogers:  
 02 8627 1040 / gordon@ahr.com.au and  
 Dr Anne-Maree Boland:  
 03 9882 2670 / anne-mareeb@rmcg.com.au.

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.

*Soil wealth and integrated crop protection – phase 3* is funded by Hort Innovation using the vegetable and melon industry research and development levies and contributions from the Australian Government.

Project: MT22004

**Hort Innovation** VEGETABLE FUND

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A CASE STUDY FROM THE MULGOWIE DEMONSTRATION SITE IN QLD

# Optimising nitrogen supply to sweet corn using legume cover crops

BY PAULETTE BAUMGARTL / APPLIED HORTICULTURAL RESEARCH

## The Mulgowie Farming Company, a family-owned producer, grows conventional and organic sweet corn and green beans across Australia.

Known for its strong focus on innovation and sustainable farming practices, Mulgowie teamed up with the Soil Wealth ICP project to examine the potential of legumes to effectively supply nitrogen to a sweet corn crop in a Queensland trial in 2023.

### Cover crop treatments

The trial area of 1.1ha included three different cover crop treatments plus one control, as follows:



**GREEN:** Faba bean crop terminated green at flowering by incorporation (using a rotary hoe). AUG 2023.



**SPRAY:** Faba bean crop terminated at flowering by spraying with herbicide (using glyphosate and carfentrazone-ethyl) and rolling, leaving the residue brown on the soil surface. AUG 2023.



**HARVEST:** Faba bean crop grown to maturity and harvested for grain with stubble left on the soil surface. OCT 2023.



**FALLOW:** with no faba bean crop (control). JULY 2023.

### Fertiliser treatment

At sowing of the sweet corn crop via direct drilling in December 2023, the trial area was split in half:

- Half of the treatment area received base fertiliser (300kg/ha containing 10.5 percent nitrogen).
- Half of the treatment area received no base fertiliser.

Leaving half of the trial area without base fertiliser facilitated an investigation into whether the cover crop alone could supply sufficient nitrogen to the corn crop.

### Soil & climate data

Soil was regularly sampled across treatment areas to monitor the effects of termination methods on plant-available nitrogen and other soil properties.

This including monthly soil tests for available nitrogen, organic matter, C:N ratio, bulk density, and particle size.

Using probes and data loggers, soil moisture and temperature data was collected to assess how treatments influenced these parameters and their potential impact on nutrient cycling.

Rainfall data was accessed via an on-site rain gauge, supplemented by Bureau of Meteorology data from nearby weather stations.

### Plant tissue & biomass analysis

Plant tissue and biomass data were collected to understand nitrogen cycling and to create a nitrogen budget.

Faba bean was tissue tested at flowering and harvest for carbon percentage and nitrogen percentage, and measurements were taken of above-ground biomass (t/ha), with grain yield assessed separately at harvest.

A full nutrient status of the sweet corn at the V4 stage as measured via tissue testing of the fifth leaf from the tip.

At one week before harvest, the following was measured:

- Corn ear leaf testing for full nutrient analysis.
- Above-ground biomass testing (excluding cobs) for nitrogen (percent) and biomass (t/ha).
- Corn cob analysis for nitrogen (percent) and pre-harvest quality and yield assessment.
- Above-ground biomass of Johnson grass was measured (t/ha) to track its growth alongside corn.

### The results & what they mean

Faba beans contributed significantly to nitrogen management in the trial by absorbing excess nitrogen and storing it in their biomass. In the fallow treatment (control), soil nitrogen levels remained at 146kg N/ha due to the absence of heavy rainfall that could cause nitrogen loss (*Figure 1*).

In the faba bean plots, nitrogen levels dropped to 47kg N/ha by July as the plants absorbed nitrogen. By flowering, faba beans produced 5t/ha of biomass containing 242kg N/ha. At harvest, they produced 5.3t/ha of biomass and 3.5t/ha of grain, with 228kg N/ha stored in the plant.

Harvesting the faba beans for grain removed 152kg N/ha, redistributing nitrogen from the shoots to the grain. This shift increased the carbon-to-nitrogen ratio (C:N) from 11.4 at flowering to 37 at harvest, affecting nitrogen cycling by promoting nitrogen immobilisation (*Figure 2*).

FIGURE 1. Soil available nitrogen (kg/ha) under different treatments.

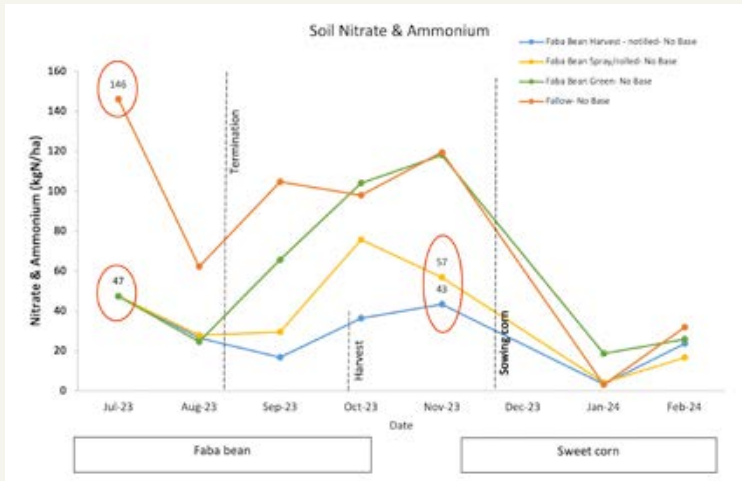


FIGURE 2. Nitrogen (kg/ha) in different plant parts at flowering and at grain maturity.

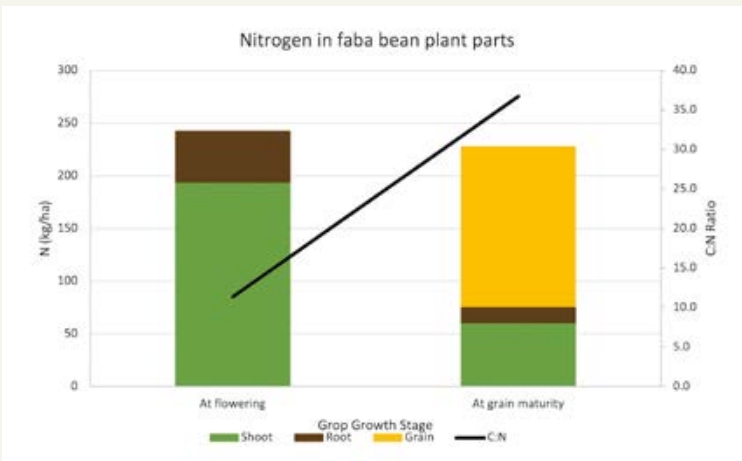
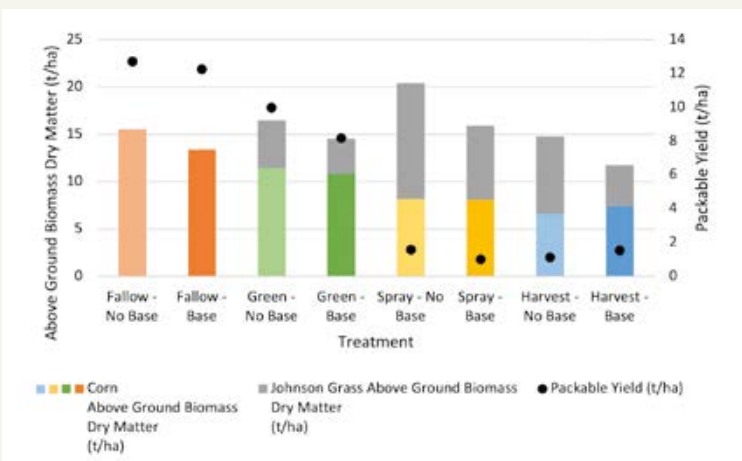


FIGURE 3. Above ground biomass dry matter of sweet corn and Johnson grass (t/ha, left axis), and packable yield (t/ha, right axis) by treatment, at end of corn crop. FEB 2024



**What can we conclude**

Did nitrogen availability from legumes match crop demand? While it is difficult to draw definitive conclusions due to the skewed results from weed pressure, it appeared that nitrogen was more readily available in the green incorporated treatment area. The area where faba beans were terminated by spraying contributed the same amount of nitrogen at termination, yet it became available much more slowly than when it was incorporated green. While the fallow area also showed good results and simplified management, there was a real risk of rapid nitrogen loss with heavy rainfall. Fortunately, the conditions during the trial allowed for nitrogen retention.

Termination method also had an influence on nutrient cycling. Incorporating green residues into the soil led to a rapid nitrogen release from September to November, while spray termination resulted in slower nutrient release. Fine-cut residues decomposed faster, making nitrogen more available. Timing nitrogen release is crucial to match sweet corn’s needs, with the crop’s nitrogen demand peaking from the V6 to R1 growth stages.

**Corn crop – biomass, yield & nitrogen trends**

In late September and October, there was a significant flush of Johnson grass weeds, with a noticeable difference in foliage colour between treatments. The green treatment had darker foliage compared to the spray treatment. The Johnson grass was sprayed with herbicide in November before planting corn, and the corn crop received a light scuffling in the interrow to manage the weeds. Despite these efforts, Johnson grass pressure remained a problem throughout the crop’s growth.

At the tasselling stage of sweet corn, the green treatment showed darker and more uniform foliage compared to the spray and harvest treatments. Due to substantial Johnson grass pressure, data on above-ground biomass of sweet corn was combined with Johnson grass and interpreted as a combined unit. Johnson grass pressure was highest in the spray treatment, followed by the harvest treatment, and lowest in the green treatment, with no pressure in the fallow area. There was a direct correlation between weed pressure and packable yield: increased weed pressure led to a reduction in corn crop size and yield.

Unexpectedly, the total above-ground biomass in areas without base fertiliser was consistently higher than in those with base fertiliser across all termination treatments. The reason for this is unclear.

In the no base fertiliser areas, the fallow, green, and harvest treatments returned similar biomass levels, while the spray treatment had significantly more biomass. Late November soil tests showed that the fallow and green areas had significantly more readily available nitrogen (119kg N/ha) just before planting, compared to the spray treatment area (57kg N/ha), potentially giving the crop a growth advantage over the weeds (Figure 3).

It is unclear why the harvest from the no base fertiliser area returned similar biomass levels to the green and fallow treatments. However, the harvest no base fertiliser area did have lower nitrogen in the above-ground biomass of corn and Johnson grass at the end of the season than the other treatments, likely due to the large amount of nitrogen removed during the faba bean grain harvest.

The Soil Wealth ICP team would like to thank Andrew Johanson, Markus Sinnott, and the broader Mulgowie Farming Company team for their time and contributions to the demonstration site.

**FIND OUT MORE**

Mulgowie demonstration site and the full case study download: [soilwealth.com.au/2024/09/optimising-nitrogen-supply-to-sweet-corn-using-legume-cover-crops-update-from-the-mulgowie-demonstration-site/](https://soilwealth.com.au/2024/09/optimising-nitrogen-supply-to-sweet-corn-using-legume-cover-crops-update-from-the-mulgowie-demonstration-site/)

Soil wealth and integrated crop protection – phase 3 is funded by Hort Innovation using the vegetable and melon industry research and development levies and contributions from the Australian Government.

Project: MT22004



COMMODITY PROFILE

# Leafy Asian vegetables



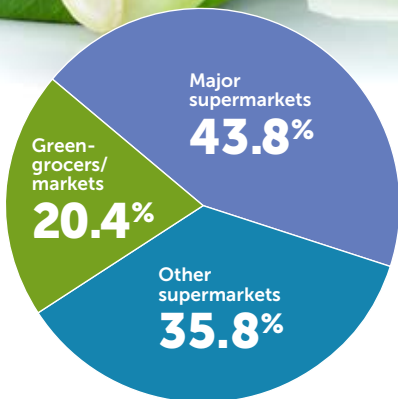
## Purchasing patterns

In the latest 52 weeks ending July 2024, household numbers buying Asian vegetables remained flat – 40 percent.

Consumers are purchasing more often at 7.3 times in a year, but buying less volume and spending less per trip at 3.9kg, down from 4kg the previous year.

Asian vegetables recorded an increase in price per kg vs year prior (\$6.92 vs \$6.79), whilst kale recorded the biggest decline in average price amongst the competitive set (Asian vegetables, broccoli, zucchini, cauliflower, cabbage, kale).

High income household groups represent more than half of all volume sales (51.8 percent) but the decline in market sales is also being driven by this group, with a drop of 8.2 percent from the previous year.



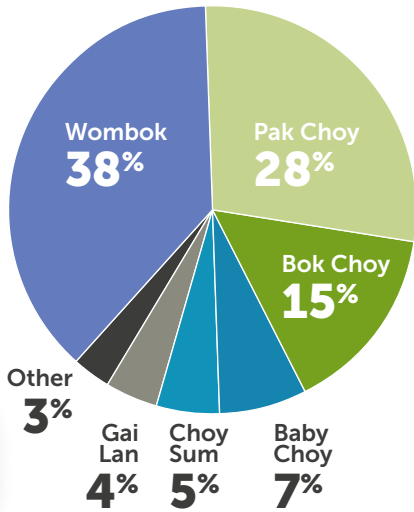
Source: Harvest to Home

Other supermarkets and greengrocers/markets represent a bigger share of Asian vegetable sales, when compared to total vegetables (78.3 percent at major supermarkets).

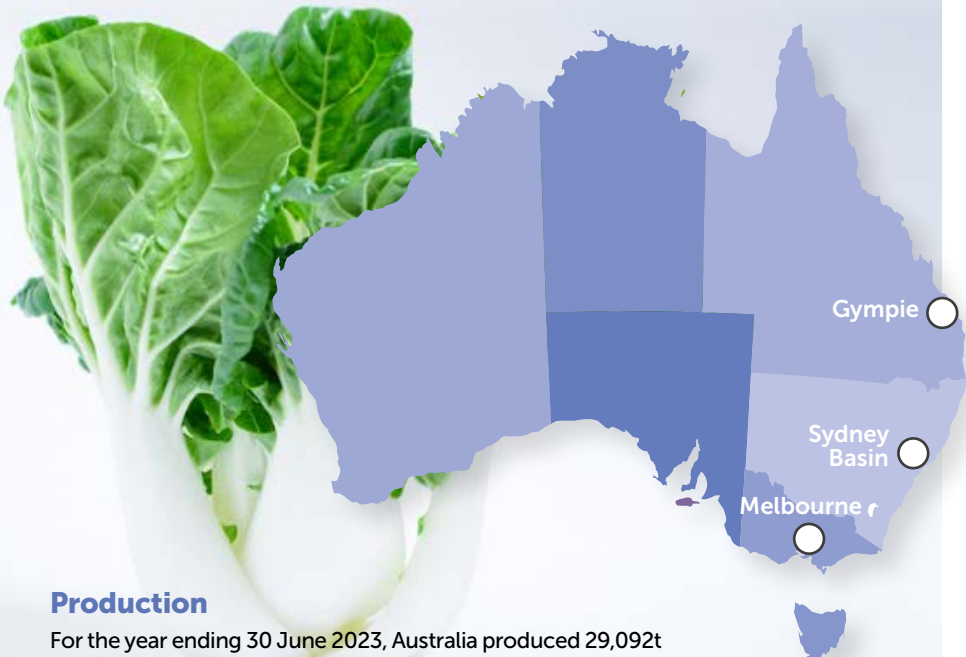


The latest edition of the Handbook was released in February 2024, unpacking the Leafy Asian vegetables sector's performance during the financial year of 2022/23.

## Main varieties grown



Source: Hort Stats Handbook 2022-23



## Production

For the year ending 30 June 2023, Australia produced 29,092t (a 2 percent decrease from previous year) of leafy Asian vegetables with a farm gate value of \$91m (a 6 percent increase from the previous year).

Leafy Asian vegetables are grown Australia wide, but New South Wales is by far the largest producing state.

The Australian Horticulture Statistics Handbook 2021-22 to 2023-24 project has been funded by Hort Innovation using multi-industry research and development levies and funds from the Australian Government.

Project Number: MT21006

The Harvest to Home Consumer Behavioural Retail Data project has been funded by Hort Innovation using multi-industry research and development levies and contributions from the Australian Government.

Project Number: MT21004







## For Bonaccord Group Family is at the heart of business growth

### A 23+ year agricultural partnership between Bonaccord & Rabobank

The Bonaccord Group is synonymous with family, with four Ingram brothers, their spouses, and the next generation working side-by-side. Together, they run a fully integrated operation, producing vegetables, grain and beef while also managing a freight service that supports their diverse business activities.

#### Family values fuel success

It is this strong sense of family that has been integral to the company's success and growth, says CEO Ross Ingram.

"We enjoy what we do," Ross explains.

"We put everything back into the business, so having that solid family foundation and wives that support you and are prepared to work with you is a massive advantage."

Starting out as a 20-hectare dairy farm on the Mitchell River near Lindenow in Victoria's East Gippsland region, the now multi-faceted operation spans around 1,860 hectares, including 100 hectares of leased land.

"We have grown from a dairy farm growing a few vegetables for a processor through to now, producing 30,000 tonnes of vegetables, turning over 1,000 steers a year, and growing barley and wheat," he says. "We also run a transport company of 50 interstate trucks carting produce and goods for other major companies."

The group specialises in fresh and processed vegetables for the domestic market, including broccoli, cauliflower, cabbages, cos lettuce, baby spinach, lettuce mix, sweet corn, beans, and potatoes.

With an in-house nursery to grow seedlings, as well as packing shed, cool rooms, and refrigerated trucks, the business is "fully integrated from one end to the other," Ross says.

#### Innovations driving sustainable growth

Their circular approach sees them utilise the vegetable waste to feed their steers, with around 3,000 tonnes of shed waste including corn husk, cauliflower leaves and cos lettuce trimmings fed out each year.

"We have been feeding out the waste for around 16 years now," he says. "With one of the farms we bought used to run more cattle to feed the waste out."

This focus on sustainability is part of the business's continual adoption of best practice, new innovation and technologies.

"We are very early adopters of technology," Ross says, citing early industry adoption of safety features on their trucks and trailers, GPS technology, on-farm cool rooms, and refrigerated trucks.

However, he emphasises the importance of strategic adoption. "I don't necessarily think you need to adopt every new technology that comes down the track, but you have to ask yourself: Is this going to add value to our business before you go out and spend the money?"

Ross says surrounding themselves with good people has also been a core foundation of their business, with up to 360 people working across the various arms of the business.

"We have an extraordinarily good team of people that work with us – not for us,"

**And it is that sense of partnership, he says, that has also been important in their 23-year relationship with agribusiness lender, Rabobank.**

#### Rabobank by their side

"Rabo have been tremendous, really good to work with over the years." Citing the agricultural background of their managers as critical to understanding rural people and farming.

"They come in; they want to understand our business. So, we have made a point of the bank coming here, showing them around, telling them what our future looks like, what we want to do, showing them some crops, and letting them get their feet dirty. It's very important.

"I would emphasise that to any person's business. Make sure your bank understands your business. All of our Rabobank rural managers have been on farm multiple times, and if they are passing through, they will always call in and have a look around."

Ross' involvement with Rabobank extends beyond banking, being a member of the bank's Rabo Client Council, a group of rural clients that deliver grassroots community initiatives focused on education, rural mental health, and industry capacity.

"Through the Rabo Client Council, we also get the opportunity to have a look at the bank and how it's run. They ask questions about what we think they should be doing. There are no other banks that I know of that does that stuff."

With the fourth generation of Ingram's now growing up on the farm, Ross says the future looks bright.

"Anybody could do what we have done," he says humbly. "It is not rocket science. It is about seeing the opportunities put in front of you, taking up those opportunities and working hard."

**Above.** Generations of the Ingram Family

**Learn more about the Rabo Difference at [rabobank.com.au](http://rabobank.com.au)**



## Robots to boost veggie growers' tech

**A \$4.1M initiative has kicked off to reduce the horticulture industry's cost and labour challenges by adopting advanced mechanisation technology.**

A project designed to give Australian growers a competitive edge with exclusive trials of cutting-edge global machinery kicked off in 2024, headlined by industry events and global study tours.

The project, *Advanced vegetable mechanisation program to maximise labour and cost efficiency*, is a \$4.1M initiative to boost the adoption of advanced mechanisation technology in the Australian vegetable industry, reducing the industry's high input costs and labour challenges that affect grower profitability.

The program will be delivered by Hort Innovation and the Queensland Department of Agriculture and Fisheries (DAF) in partnership with the Global Organisation for Agricultural Robotics (GOFAR) which leads the International Forum of Agricultural Robotics (FIRA).

**Inset.** DAF Director of Vegetables, Systems and Supply Chains Ian Layden.

Hort Innovation chief executive officer Brett Fifield said employing the latest technology was essential in keeping the Australian horticulture sector competitive.

"Hort Innovation plays a role in leading world-class innovation for the horticulture sector, to ensure Australian growers are able to remain globally competitive," Mr Fifield said.

"This grower-focused program will bring global innovations directly into the hands of veggie growers, so that they can play an active role in trialling the technology and communicating its potential benefits."

**The program is committed to sharing findings with growers across the country with field days, showcase events, international study tours, webinars and more for growers to engage directly with the latest equipment and manufacturers.**

DAF Director of Vegetables, Systems and Supply Chains Ian Layden said the ultimate goal of the program was to assist growers and the broader industry to adopt field technologies that would make a difference to input costs.

"Through this program and the collaboration with the Global Organisation for Agricultural Robotics (GOFAR) we are keen to see more growers actively seeking automated and mechanised machinery solutions," Mr Layden said.

"The grower demonstration sites we establish will provide qualitative and quantitative data to highlight the potential efficiency benefits from mechanised machinery solutions, which we hope will help growers make bolder decisions about the technology they invest in.

"Support for growers to integrate new machinery into their field operations is critical, therefore growers and technology providers will be assisted by project partner Farm Concepts, who will play an important role in implementation.

"After the success of the Gatton Smart Farm AgTech Showcase in November 2023, we are already supporting Australian-first robotics trials in the Lockyer Valley, and this new investment and partnership will continue the vital research and engagement we have with vegetable growers and the global technology community."

GOFAR's co director Gwendoline Legrand is convinced that robots are the new era of ag machinery, and that the Australian industry is primed to adopt technology solutions.



**Above L-R.** Autonomous agtech was on display at the Gatton Smart Farm AgTech Showcase in November 2023. Einbock row guard precision guided cultivator: precision inter-row weeder, Gatton Smart Farm AgTech Showcase.

"Through our global networks and knowledge of the technology sector in the US and the EU, GOFAR will provide Australia access to a global network of mechanisation manufacturers and suppliers and machines for Australian growers to trial and optimise," Mrs Legrand said.

"We will connect growers directly to manufacturers, and other commercial growers who are actively adopting new technology."

AUSVEG chief executive officer Michael Coote said the vegetable industry had prioritised investment in advancing technology use within the sector.

"The vegetable industry faces high input costs of labour, energy, chemicals and fertilisers which has a dramatic effect on grower profitability," Mr Coote said.

"We know that technology to address these challenges is out there, but the process of sourcing information, engaging in discussion with manufacturers, importing and trialling machinery is time consuming and costly, which can make it prohibitive to individual growers.

"This program will provide our industry with unparalleled access to engage with the latest available equipment together with the information they need to make informed business decisions."

### Webinar delivers firsthand experiences

In the first webinar held for the project in July 2024, the audience heard firsthand from two growers who have adopted robotics on farm to improve production efficiencies.

Introducing the webinar, Mr Layden outlined to more than 200 attendees the scope of the Australian vegetable industry in terms of production, farmgate value, crops grown and principal growing regions.

Using data from the Global Coalition of Fresh Produce, Ian outlined the greatest challenges facing Australian growers – with labour, crop protection and fertiliser the main pain points, thereby setting the scene for the drivers to improve production efficiencies.

Jono Craven of Harvest Moon and Troy Qualishefski of Qualipac are two growers that have adopted robotics on farm to improve productivity.

Harvest Moon is principally based in Tasmania, with operations in New South Wales, Queensland and Victoria. The major crops are carrots, onions and broccoli, as well as cauliflower, cabbage, green beans, spinach, radish and pumpkin.

The production in Tasmania is based on a cool temperate zone, red basalt soil, with a consistent 1,000mm of annual rain. The terrain, however, can be up-slope, and cross-slope sometimes as much as 15 degrees. Jono highlighted that labour was a major cost to the business, so mechanisation has become a higher priority.

Qualipac conversely operates in a tropical climate in the Lockyer Valley, Warwick and Inglewood and produces broccoli, onion and pumpkin. Corn, green beans and potatoes are grown for the processor markets. The cost of labour has prompted the business to investigate robotics.

In a panel discussion, moderated by DAF's Julie O'Halloran both Jono and Troy outlined the application of robotics currently used on farm.

For Harvest Moon and Qualipac, weeding through mechanical or laser techniques has been employed, to eliminate laborious hand weeding.

When assessing robotic technology, both Jono and Troy looked for equipment that can be adapted to their own production systems.

"We have multiple row spacings, so we need the technology to be able to meet all of those requirements," said Jono.

"It needs to be able to operate on a range of topographies and climates – we have a lot of wet soils on slopes so heavy tractors are not always an option."

"At Qualipac we use a FarmDroid, which is an autonomous seeder and weeder," said Troy. "We have also invested in an AI guided mechanical weeder, which still requires a tractor and operator."

**"In both situations, I looked for something that was easy to use and operate and had supplier service support – it had to work from the day we got it."**

Looking forward, both Troy and Jono envisage that with the increasing cost of capital equipment, smaller autonomous robotics will play a bigger role in the horticulture landscape, to give lower cost operations and greater efficiencies.

The final part of the webinar provided an opportunity for three agtech companies to highlight the benefits of their technology. In a five-minute pitch, NAIOTechnologies, Verdant Robotics and EcoRobotix gave attendees a taste of what is available to the Australian market.

### FIND OUT MORE

Please contact Project Leader Julie O'Halloran 0409 054 263 / Julie.OHalloran@daf.qld.gov.au  
To watch the webinar go to: [app.swapcard.com/event/fira-australia](https://app.swapcard.com/event/fira-australia)

The *Advanced vegetable mechanisation program to maximise labour and cost efficiency* program is funded by Hort Innovation using the vegetable research and development levy and contributions from the Australian Government, in partnership with the Queensland Department of Agriculture and Fisheries, Farm Concepts and GOFAR – FIRA.  
Project: VG23003

**Hort Innovation** VEGETABLE FUND

# Push-pull system for sustainable fall armyworm control in Africa

BY DR RAMESH RAJ PURI, EXTENSION OFFICER DR HEIDI PARKES, SENIOR RESEARCH SCIENTIST, DEPARTMENT OF AGRICULTURE AND FISHERIES, QUEENSLAND

## Concerns about an over-reliance on chemical insecticides to manage fall armyworm have prompted a look at biological alternatives used overseas.

Fall armyworm (FAW) is a major pest for sweet corn growers and a threat to other vegetable crops like capsicum and ginger. Continued reliance on chemical insecticides to manage FAW concerns growers, who are worried about insecticide resistance, increased production costs and threats to integrated pest management.

This concern has driven interest in biological alternatives like parasitoids, biopesticides, and more resilient cropping systems to protect plants from FAW damage. Whilst Australian research is critical, it's also worth looking overseas at the tools and strategies adopted by farmers exposed to the FAW pest for many years.

FAW was first detected in Australia in the Torres Strait in January 2020 and has since spread to every state and territory except South Australia. It has caused significant crop losses in sweet corn, maize and sorghum, and has affected other horticultural, grain and fodder crops to a lesser extent.

FAW infestations of maize and sorghum reached record levels in Queensland and northern New South Wales in 2024, and expansion into winter cereals and pasture grasses raised concerns about the pest's growing impact across industries.

The Hort Innovation co-funded *National fall armyworm innovation system for the Australian vegetable industry* (VG22006) has held a series of webinars aimed at bringing the latest in fall armyworm knowledge from across the globe to Australian industries.

On 18 July, Queensland Department of Agriculture and Fisheries (DAF) extension officer Dr Ramesh Puri hosted the webinar 'Integrated Pest Management for fall armyworm: Experiences from Africa' in

collaboration with the International Centre of Insect Physiology and Ecology (*icipe*) in Kenya. During the session, *icipe* scientists Dr Sevgan Subramanian and Dr Amanuel Tamiru talked about their work on IPM strategies for FAW and push-pull farming systems.

Dr Sevgan presented sustainable solutions for FAW management by smallholders in Africa, detailing effective strategies and advancements in monitoring and managing the pest (*Figure 1*).

Dr Tamiru discussed the chemical ecology underpinning the push-pull farming system, which has proven to be a groundbreaking approach for combating invasive pests like FAW in Africa (*Figure 2*).

### The FAW situation in Africa

African agriculture is characterised by smallholder farmers practising mixed cropping systems, typically on less than 1ha. Maize productivity is low compared with Australia due to factors like poor soils and rainfed cultivation. FAW infestation levels in Africa have significantly decreased since the initial invasion in 2016. The stabilisation of FAW pressure could be due to increased

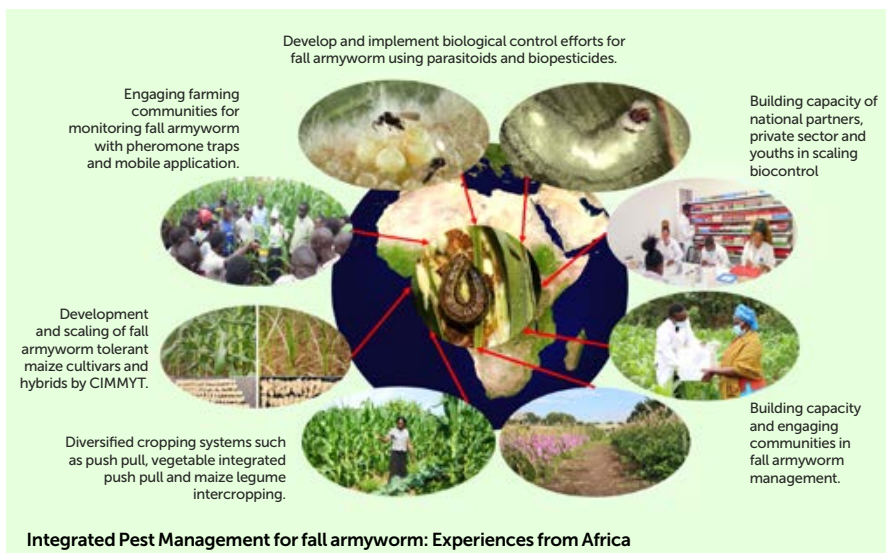
awareness among maize growers about the need for timely and need-based management approaches, the practice of mixed cropping rather than monocropping, and the widespread prevalence of natural enemies.

However, it is too early to call the management of FAW in Africa a success. Pest pressure remains high in agroecological zones, and infestation levels are particularly high in late-planted maize. Whilst African researchers have tested various tools and technologies to better manage FAW including monitoring, push-pull systems, biopesticides, biorational pesticides and natural enemy release, adoption of these practices has been slow.

### Biological options used in Africa

New associations of FAW with natural enemies of other prevalent armyworms have been commonly observed in new invasion regions in Africa and Asia. These new associations of FAW with local parasitoids and predators need to be documented to support their conservation and augmentation. Similarly, biopesticides such as *Metarhizium anisopliae* and

FIGURE 1. Strategies for managing Fall armyworm in Africa.



Source: Dr Sevgan Subramanian, *icipe*, Kenya



FIGURE 2. Push-pull field showing maize intercropped with push crop, greenleaf desmodium (*D. intortum*), and pull crop, *Brachiaria cv mulato II*, as a border crop.

Source: Dr Amanuel Tamiru, *icipe*, Kenya.

baculoviruses effectively manage FAW if integrated with other IPM strategies. These biopesticides are commercially produced, and their efficacy is tested in the field. However, their adoption rates are low due to high costs in Africa, and efforts to build capacity for localised production are ongoing.

**Push-pull farming systems in Africa**

Push-pull is an agroecological farming system that exploits natural insect-plant and plant-plant interactions to manage crop pests. *icipe*'s push-pull system uses the forage legume *Desmodium* as an intercrop to repel pests and attract natural enemies, and a border of forage grass as a trap crop to lure pests away.

Based on their experience with maize, they have found 5 percent cob damage in the push-pull system compared with up to 20-25 percent in the monocrop maize control under reasonable pest pressure (noting that cob damage could also be

caused by pests other than FAW, including birds). The system has not yet been tested with sweet corn.

Push-pull farming – which has been adopted by over 350,000 smallholder maize growers in Sub-Saharan Africa – also enhances soil health and livestock integration. Some farmers use pesticides in push-pull systems, but many do not.

**Lessons for managing FAW Australia**

What can Australian growers, agronomists and researchers learn from Africa's experience with managing FAW?

- Combining agroecological approaches and biocontrol options could provide sustainable and affordable solutions to manage maize pests such as FAW.
- FAW management could be improved with better FAW monitoring, adoption of mixed cropping systems for greater resilience, cataloguing and conserving natural enemies of FAW, and promoting good agricultural practices that allow maize to compensate for FAW damage.

- Understanding FAW's migratory or resident nature in new invasion zones such as Africa and Australia is critical for fine-tuning FAW management strategies.
- Maize grown in a diversified cropping system, such as maize-legume intercropping or push-pull systems, is more resistant to FAW than maize grown in a monocrop system.
- There is an opportunity to adapt diversified maize cropping systems from small to large-scale maize production.

**FIND OUT MORE**

A full webinar recording is available at: [youtu.be/yitToOowaxU](https://youtu.be/yitToOowaxU)

The webinar was delivered as part of the project *National Fall Armyworm (FAW) Innovation System for the Australian Vegetable Industry*, co-funded by Hort Innovation using the vegetable industry research and development levy and contributions from the Australian Government.

Project code: VG22006

**Hort Innovation** VEGETABLE FUND

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# Growers at the helm

## HOW INDUSTRY SHAPES HORT INNOVATION INVESTMENTS

BY HORT INNOVATION



Fiona Hall from Biteriot Cherries

**When it comes to driving growth in horticulture, who better to lead the way than the growers themselves? At Hort Innovation, we ensure that industry voices shape research, trade, and marketing investments, and it's growers like Mark Scott from Nannup Fresh Fruit and Fiona Hall from Biteriot Cherries who are taking the lead.**

Mark Scott, a member of the Summerfruit Strategic Investment Advisory Panel (SIAP), explained his motivation: "I joined the Summerfruit SIAP to ensure that grower input is at the heart of R&D projects." He stressed the importance of balancing immediate needs with long-term profitability. "A profitable industry helps tackle issues like succession planning, sustainability, and young grower involvement." Mark has already experienced the impact of cross-industry ideation sessions, helping to develop projects focused on increasing returns for growers.

Similarly, Fiona Hall, deeply involved in the cherry industry, saw joining the Cherry SIAP as an opportunity to influence key decisions and share best practices. "Watching the industry grow internationally is incredibly rewarding," Fiona said. She is enthusiastic about tackling challenges ahead, including expanding export markets, promoting sustainable initiatives, and adopting new technologies. For Fiona, it's all about ensuring the cherry industry remains profitable and ready for future generations.

### Partnering with industries for targeted investments

Hort Innovation's mission is simple: to ensure industry needs guide investments in research, development, trade, and marketing. To achieve this, it has partnered with each industry's Peak Industry Body, developing an advice mechanism that allows growers to have a direct say in how their levy is invested, while also meeting essential governance requirements.

In 2022/23, this co-design process resulted in 24 industries deciding to refresh their current Strategic Investment Advisory Panels, while 13 others designed new mechanisms tailored to their unique needs. The recent Independent Review of Performance (IRP) praised these collaborative efforts, underscoring the importance of industry-led decision-making.

### What are Strategic Investment Advisory Panels (SIAPs)?

Strategic Investment Advisory Panels comprise growers and other industry representatives who come together to discuss potential levy investments and advise Hort Innovation on where to make the most impact. Most of Hort Innovation's industries have a SIAP, ensuring that investments align with the priorities of those directly involved in the sector.

### Fresh approaches to industry input

Several industries have employed innovative tactics to enhance how Hort Innovation obtains advice, centering around the goal of ensuring that growers' voices are heard. For instance, the citrus industry elected to support the role of a Citrus Investment Advice Coordinator within Citrus Australia. This coordinator engages with stakeholders to identify investment opportunities, consult on priorities, and work with Hort Innovation to bring investment recommendations to the Citrus SIAP.

Meanwhile, the berry industry chose to task Berries Australia with the responsibility of providing high-level project scoping and investment recommendations. The industry also engaged a Research and Development (R&D) Manager to collaborate with Hort Innovation R&D Managers and the Industry Service & Delivery Manager on identifying and developing R&D proposals. These strategies reflect a desire for more tailored solutions and direct grower input in the decision-making process.

### Marketing insights and collaboration

Hort Innovation's marketing team hosts a collaborative planning process for industries with levy-funded marketing programs. A dedicated marketing workshop is delivered with SIAPs to review data and evidence on the effectiveness of marketing campaigns, focusing on what consumers think, feel, and do. Together, they co-design an industry marketing plan for the next financial year. This approach was introduced in direct response to industry feedback, highlighting the need for greater grower involvement in developing marketing strategies.

### Hort Innovation and growers: A dynamic partnership

By partnering with growers and industry bodies, Hort Innovation ensures investments align with the sector's needs, driving profitability and sustainability. It's not just about funding projects; it's about building a thriving horticulture industry together. As Mark and Fiona exemplify, growers are at the heart of this journey, shaping strategies that will help the industry flourish locally and internationally.

#### FIND OUT MORE

Visit [horticulture.com.au/growers](https://horticulture.com.au/growers)

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# 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.



## V The nutritional advantage of fresh produce: a focus on bioactive nutrients and their role in consumer demand

HN22003

DELIVERY PARTNER: MACQUARIE UNIVERSITY

This program is increasing the knowledge and awareness of bioactive compounds derived from plant-based foods across Australia with a major focus on promoting their health and well-being benefits.

The overarching objective is to ensure improved health, productivity, and market access to plant-based products (particularly from fruits, vegetables, nuts, and mushrooms) by Australians and international consumers, catalysed by a better understanding of evidence-based benefits of bioactives, especially among younger adults and children.

The program will develop and implement a comprehensive communication strategy supported by an analytical understanding of the availability and nutritional benefits of different bioactives.

The research team will develop 'Bioactive Master Files' that will include key information about which bioactives are present in which plant-based foods and include a Relative Dietary Intake where appropriate or Nutrient Reference Values for each bioactive.

## V Horticulture Trade Data 2022-2025

MT22005

DELIVERY PARTNER: S&P GLOBAL

This investment provides Hort Innovation with a subscription to the Global Trade Atlas Database. Access to this trade data is used to validate export performance and assist with forming ongoing strategy and focus areas in the area of international trade. This information is shared with relevant industry bodies and delivery partners.

## V Expansion of flies as berry and cucurbit crop pollinators

MT22007

DELIVERY PARTNER:  
UNIVERSITY OF NEW ENGLAND (UNE)

This investment is examining the role flies play in pollinating berry crops in the Coffs Harbour region of New South Wales to better inform future research into alternative managed pollinators.

Coffs Harbour is the major berry growing region of Australia and preliminary work has identified several flies that are effective pollinators. This project was initiated after the eradication activities of the 2022 varroa mite response, where access to managed and feral honey bees has been reduced.

Expected outcomes of the research include the identification of optimal farm management practices that mitigate fly losses and improve pollination by flies, greater pollinator availability and longevity in time and space, year-round in berry crops and evaluation of the optimal composition/placement of co-flowering and other resources to facilitate crop pollination and pollinator health.

This project will expand the work conducted in the Hort Frontiers Pollination Fund investment *Managing flies for crop pollination* (PH16002) by collecting valuable data on a greater number of berry farms situated in the varroa red zone.

### CODE

O Onion P Potato V Vegetable M Melon





**VO 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.

**VO Horticulture National Lean Leaders Program**

MT22011

DELIVERY PARTNER: MOSHIE PTY LTD

This investment provides growers in the apple and pear, onion, raspberry and blackberry, and vegetable industries to participate in a leadership program developed specifically for horticultural industry needs. The program seeks to educate participants on how to lead and sustain continuous improvement in their workplace.

The Moshie National Lean Leaders program is delivered via zoom, consisting of 10 x four-hour workshops across a twenty-week program. Workshops are held fortnightly to allow sufficient time between workshops for participants to apply the learning in their workplace. This format enables significant improvement in the business across the duration of the program.

**V 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.

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# Current Projects

## HORT INNOVATION VEGETABLE FUND

### ✓ Produce Executive Program Scholarships

VG22011

RESEARCH PROVIDER:  
INTERNATIONAL FRESH PRODUCE ASSOCIATION

#### What's it all about?

This project supports four scholarships annually on the IFPA Produce Executive Program for employees from vegetable levy-paying organisations in 2023, 2024 and 2025.

The course combines personal and professional development, skill enhancement, industry forum and practical learning application. The program is a week-long, fully residential executive development course, industry forum and networking event run in May each year that incorporates faculty lectures, in-depth case studies, field trips, workshops on issues and opportunities, group discussions and guest presentations for up to 42 participants annually.

The program provides a rare opportunity to access knowledge and insights across the supply chain by networking with industry peers and through interactive discussions with industry leaders.

The program is designed to integrate course content into the participant's business. Current issues facing individuals, companies and the industry are identified and addressed by recognised industry experts and participants from all value chain segments.

### ✓ Nuffield scholarship

VG14065

RESEARCH PROVIDER: NUFFIELD AUSTRALIA

#### What's it all about?

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.

Application opportunities are advertised in industry channels each year.

### ✓ Management of foliar bacterial diseases in vegetables

VG22001

RESEARCH PROVIDER:  
NSW DEPARTMENT OF PRIMARY INDUSTRIES

#### What's it all about?

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 webinar 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.

This project will be undertaken in two phases:

#### PHASE 1

##### Develop effective early warning tools for major bacterial diseases

This phase will focus on developing tools for growers to detect the presence of major bacterial diseases early and assist them to make informed management decisions before diseases become a large production issue. The project builds on key learnings from previous research to expand current understanding of the survivability and infection risks of bacterial

diseases posed by infected plant debris, weeds, and alternate hosts. In addition, the project will develop proof-of-concept targeted eDNA methods for the detection of key bacterial pathogens in water, soil, and plant debris.

#### PHASE 2

##### Design a biology-informed holistic treatment approach for promoting plant health

In this phase, the research team will use the early warning screens from Phase 1 to develop new guidelines for the timing and dosage of currently available commercial and novel antibacterial treatments. The research team will use high-throughput screening to identify effective bio-protectant bacteria and fungi among products currently available commercially and novel bacterial and endophytic fungal isolates in culture at Hawkesbury Institute for the Environment (HIE), Western Sydney University (WSU). Specifically, the research will assess whether the bioprotectants are effective at suppressing bacterial pathogens in the absence of a plant. The most promising bioprotectants and chemical products will be evaluated in plant assays both in isolation and in strategic combinations (e.g., chemical and biological together) given that a multi-pronged approach is more likely to be effective and reduce the likelihood of bacteria evolving resistance to the treatment(s).



### V Vegetable high school education resources

VG23010

RESEARCH PROVIDER: PRIMARY INDUSTRIES EDUCATION FOUNDATION AUSTRALIA (PIEFA)

#### What is it all about?

This project is developing a comprehensive series of educational resources on vegetable production, careers and nutrition, designed to engage and educate students in a dynamic and interactive way.

The resources will provide a thorough understanding of Australian vegetable production, careers, and nutrition. They will be tailored for students in Years 7 to 10 and align with Version 9.0 of the Australian Curriculum (being adaptable to state and territory curricula).

The suite of resources will include:

- Six curriculum-aligned resources for students
- Three pre-recorded webinars for teachers
- A virtual farm tour.

This initiative instils a culture of informed food choices by introducing students to healthy, sustainable meal options from an early age. It also highlights the diverse opportunities within the horticulture sector, emphasising the critical role of innovation and technology, data analytics, and problem-solving skills, encouraging students to pursue careers essential for sustaining future food security.



### V Advanced vegetable mechanisation program to maximise labour and cost efficiency

VG23003

RESEARCH PROVIDER: DEPARTMENT OF AGRICULTURE AND FISHERIES QUEENSLAND

#### What is it all about?

This program will boost the adoption of advanced mechanisation technology in the Australian vegetable industry, reducing the industry's high input costs and labour challenges that affect grower profitability.

#### Challenge

The vegetable industry faces high input costs of energy, labour, chemicals and fertilisers which has a dramatic effect on grower profitability. Technology exists to address these challenges, but the process of sourcing information, engaging in discussion with manufacturers, importing and trialling machinery is time consuming and costly, which can make it prohibitive to individual growers.

#### Response

The program will deliver field days, show-case events, international study tours, webinars and more for growers to engage directly with the latest equipment and manufacturers. Demonstration sites will also provide qualitative and quantitative data to highlight the potential efficiency benefits from mechanised machinery solutions, which will help growers make bolder decisions about the technology they invest in.

#### Benefit

This program will provide the vegetable industry with unparalleled access to engage with the latest available equipment together with the information they need to make informed business decisions.

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# Current Projects

FRONTIERS PROGRAM

Hort Innovation  
**Frontiers**

## Novel microbiome technologies to increase profitability for Australian horticulture

AS19004

DELIVERY PARTNER: MURDOCH UNIVERSITY

This investment is tasked with developing and deploying new microbiome technologies that will increase the yield, and therefore profitability, of annual and perennial Australian horticultural crops.

These new technologies will be developed by analysing the microbiomes associated with the lifecycle of crops from seed to harvest. The project team will assess how these microbiomes change when exposed to biotic or abiotic stresses. The overall aim is to select combinations of microorganisms that are associated with crops that exhibit higher tolerance to these stresses and develop these into new products that increase crop yield.

## Sustainably growing horticulture value in cool climate Australia

AS20004

DELIVERY PARTNER: UNIVERSITY OF TASMANIA

This investment is tackling the barriers to sustainable expansion in cool climate horticulture by addressing critical issues and risks associated with climatic variability and extremes in temperature and rainfall. The aim is to increase cool climate horticulture by 20% over the next five years.

Key activities of the program include:

- Optimising management practices for high-intensity perennial cropping, particularly in protected cropping systems, for better supply, quality, yield, labour efficiency, and pest and disease outcomes.
- Developing strategies for maximising early return on investment of new horticulture plantings.
- Developing strategies for managing intensive horticultural production on fragile soils and optimal soil, water, and nutrient resource use with a sustainability focus.

The project will focus on high-value crops in cool climate horticulture regions across Australia, including raspberries, blackberries, cherries, potatoes, onions, carrots, and green peas. Several commercially managed farms will be used as research trial sites, some of which will double as demonstration sites.

## Developing management strategies to enhance the recovery of horticulture from bushfires

AS19002

DELIVERY PARTNER:

DEPARTMENT OF PRIMARY INDUSTRIES NSW

Severe climatic events during the summer of the 2019/20 growing season, in addition to the effects of prolonged drought, led to substantial fire damage in apple orchards and other tree crops in NSW and SA. In response, this project is assessing the short- and long-term effects of fire damage in tree crops so that growers are equipped with strategies to reduce impact in the future.

By investigating how fruit and trees respond to fire, the research team will establish the crucial knowledge needed for growers to make informed decisions on fruit marketability and tree recovery post fire-damage. Guidelines will be developed for growers to use to apply the right management options to improve production levels and meet quality standards, as soon as possible after fire damage.

Research and demonstration sites will be established in Batlow, Bilpin, and the Adelaide Hills orchards, which were directly affected by bushfire in the summer of 2019/2020.

## Behavioural and biological management of endemic and exotic leafminers in protected cropping systems

BY22001

DELIVERY PARTNER: MACQUARIE UNIVERSITY

This investment is exploring behavioural and biological methods of managing and detecting endemic and exotic leafminers in protected cropping systems.

The behavioural control aspect of the research will involve developing a visually attractive model trap and identifying volatiles/lures that when combined with the visual trap will have compounding effect on the attractiveness of the trap.

Additionally, the research will describe and identify vibrational signals that could be used as one of the control tools by masking mate recognition and location. This would be of particular value for the management of *Liriomyza* spp. as the adult life span is short and no chemically mediated mating disruption has been reported so far improving the feasibility of application of such tools.

The biological management will identify the best performing biocontrol agent determined through performance evaluations, and use of herbivore induced plant volatiles (HIPVs) to enhance field parasitism.





## Visy invests to support Australian growers

Since Visy began it's actively supported and championed the food and beverage industry. That support extends past being a trusted partner and provider of quality packaging to help get produce to market. For example, every year Visy puts Australia's food industry on the national stage at the Global Food Forum in conjunction with newspaper, *The Australian*, to spotlight the importance of the industry to Australia's economic success.

Since 2013, when Visy started the forum, Australia's farmers have produced 91% more output, which has led to 56% growth in food and beverage manufacturing. That's more than twice the growth rate of all other manufacturing.

The food industry contributes 6% of Australia's GDP and Visy is proud to play its part to support growers. Visy is investing to support Australian growers, farmers and agriculture.

Visy has worked closely with farmers and growers—working to develop innovative and sustainable packaging solutions to meet growers' needs. Its partnerships and sponsorships—AusVeg, Australian Banana Congress and Fruit Growers Tasmania, to name only a few—are one way Visy is supporting the sector.

**Together Visy and the sector have developed sustainable packaging solutions for the sector including fibre punnets for fresh fruit and temperature-controlled cardboard packaging to ensure produce arrives fresh, well presented and protected.**

This year Visy partnered with seafood producer, Tassal Group to produce a cardboard box for prawns, which replaces an expanded polystyrene box. The award-winning prawn box—which is easily recycled and made with recycled content—has already replaced 33,000 polystyrene boxes. While this box has been designed for prawns, it's been designed to withstand cold, wet environments so could be well suited to produce.

As an Australian business with a network of operations across the country—including in many regional areas—Visy's scale and expertise is a real advantage for growers.

Visy continued its strategic expansion across Australia with new intermodal operations at Yennora, Sydney. This site gives customers greater access to key ports and serves as a critical hub for both inbound and outbound logistics, offering intermodal connectivity and warehousing.

In addition to Yennora, Visy has also commenced new rail operations between Adelaide and Perth, further enhancing its use of the national freight network. The company has also launched several new operations, including additional large warehousing and transport facilities in Sydney, Melbourne and Adelaide. Visy is focused on delivering end-to-end supply chain processes, reducing costs for producers, and improving efficiencies.

A notable example of Visy's end-to-end logistics capabilities is its partnership with Mission Foods. Visy manages the entire supply chain for Mission Foods, from sourcing cornflour in California to delivering the final product in Australia.

Also in Sydney, Visy is now operating Australia's most energy-efficient glass furnace at its recycling and remanufacturing facility.

The \$150 million state-of-the-art investment in Penrith is the country's first oxygen-only fueled furnace using less than half the energy than the one it replaced. That's the equivalent of saving enough energy to heat over 32,000 homes every year.

**Visy's Penrith site is the only glass bottle and jar manufacturing factory in New South Wales. It produces over 800 million glass containers every year in support of Australia's world class food and beverage companies like Vegemite, Cottee's Jam, Toohey's New and Bundaberg Ginger Beer.**

Visy's impact goes beyond employment and manufacturing sites to the social fabric of regional towns, the well-being of the employees and the broader community. Visy contributes to regions with a strong primary agricultural presence. Visy remains a key supplier of packaging and related services for generations of farmers. Visy has fostered long-term business relationships and become a trusted partner to local industry.

Sustainability is at the heart of everything Visy does. Visy is using recycled content to power Australia's food and beverage packaging industry. Visy manufactures everything from cardboard boxes, water bottles and jam jars to food and beverage cans, all using recycled content.

That's why Visy believe materials are not recycled until they've been made into new products. So, Visy is closing the loop between packaging, remanufacturing and recycling.

Visy's 75 year partnership with Australia's food and agricultural sector, positions the industry for a strong future.

**Above.** Visy's glass manufacturing site in Penrith makes glass containers for Australia's food and beverage companies.

Learn more about Visy at [visy.com](https://www.visy.com)



## Dobmac, local suppliers of Agricultural Machinery from paddock to pack

Tasmania-based Dobmac Agricultural Machinery has spent over 40 years delivering reliable and innovative solutions for farmers across Australia. Specialising in a wide range of agricultural machinery, the Dobmac name has become known for its quality and ability to tackle the tough conditions of Australia's diverse agricultural environment.

One of Dobmac's flagship offerings is its range of Clamp and Cup Potato Planters, available in 2, 3, 4, and 6 row models. Built with strong, heavy-duty materials, these machines are made to handle the hard work of planting specifically in Australian conditions. Whether you're growing potatoes or ginger, Dobmac's planters provide precision and efficiency, making life a little easier for farmers across the country.

What makes Dobmac different from the rest? It's their focus on working closely with farmers to create machinery that fits each farm's specific needs. Instead of just offering one-size-fits-all equipment, Dobmac takes pride in customising their machines, guaranteeing that they are perfectly suited to the unique demands of every customer's land and crops.

**Above.** Lineup of Dobmac's planters.  
**Inset.** Potato Store Hogs.

Dobmac understands that no two farms are alike, and that's why they're committed to offering tailored solutions. Farmers can choose from a range of custom configurations, ensuring that the machinery they invest in works exactly as they need it to. This attention to detail has made Dobmac a trusted partner for growers in various sectors, from small family farms to larger commercial operations. By creating equipment that's purpose-built for each unique operation, Dobmac helps farmers improve efficiency and reduce costs over time.

As the agriculture scene continues to move forward, Dobmac has kept up by constantly evolving. The company is always on the lookout for new technologies and smarter ways to get the job done. By collaborating with international partners, Dobmac is able to offer a full range of machinery solutions from paddock to plate. These machines include soil cultivation, planting and harvest equipment, field grading, shed grading, box and big bag filling, weighing, bagging and palletising. Whether it's developing specialised equipment for niche markets or bringing in cutting-edge technology from around the world, Dobmac stays ahead of the curve to help farmers improve their productivity and streamline their operations.

A big part of what makes Dobmac stand out is its commitment to customer service. The team at Dobmac goes beyond just selling machinery. They offer full support from start to finish – from the initial design and customisation to delivery, setup, and ongoing maintenance. With a skilled team of engineers and technicians, they're always ready to help, ensuring the equipment stays in top shape year after year. If parts need replacing, Dobmac has a comprehensive supply of spare parts, so downtime is kept to a minimum.

As a family-owned business, Dobmac has deep ties to the Australian farming community. They understand the importance of trust and reliability because they've been in the industry for decades, building strong relationships with their customers. For Dobmac, it's not just about selling machines – it's about delivering peace of mind, knowing that the equipment they provide will perform when it's needed most.

**So, if you're a farmer looking for reliable, durable, and custom-made agricultural machinery, get in touch with Dobmac's sales team. They're ready to help you find the right equipment to boost your farm's efficiency and productivity.**

**FIND OUT MORE** Visit [dobmac.com.au](http://dobmac.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  
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# Putting onions first

## AUSTRALIAN ONIONS' NEW MARKETING CAMPAIGN SET TO DRIVE CONSUMER DEMAND

BY HORT INNOVATION

### A new marketing project aims to take onions from helper to hero in Australian kitchens.

The Australian onion industry is set for an exciting year ahead with the launch of Australian Onions' FY25 Marketing Program. Backed by onion growers and led by Hort Innovation, this levy-funded initiative is designed to spark a renewed demand for onions by reminding consumers of their many layers of benefits. The goal: to get more Aussies to appreciate onions as the first ingredient for a flavoursome, healthy meal and inspire them to buy onions more often.

Onions hold a unique place in Australian kitchens, serving as the starting point for countless dishes across the diverse cuisines that reflect Australia's multicultural identity. They are more than just a staple; onions build the flavour foundation of meals, connecting the nostalgia of family recipes with modern cooking. From their irresistible aroma to their versatility and health benefits, onions are the quiet hero of every great dish.

But here's the challenge: while recent statistics show that around 53 percent of Australian households purchase onions within a four-week period<sup>1</sup>, they are not being bought frequently enough. On average, households buy onions every 31 days<sup>2</sup> - much less often than other staple vegetables like carrots or potatoes. The FY25 campaign aims to change this by positioning onions as a must-have ingredient in everyday meals rather than just an occasional purchase.

A key focus will be on light buyers - these buyers make up just over half of all onion buyers but only purchase onions seven times per year. These consumers, 8.8 million of them, cook three to four times per week<sup>3</sup>, representing a significant opportunity for growth. By encouraging this group to use onions more often, demand will grow, leading to a higher purchase frequency.

### The insights behind the campaign

Despite being generally considered a staple in most households, onions face a unique barrier: many consumers feel they 'already have enough' or simply 'don't need any more'<sup>4</sup>. To overcome this, the campaign will highlight onions' versatility, encouraging Aussies to use them more often in different types of dishes, for multiple occasions across the year.

Interestingly, only 30 percent of consumers say they 'love' onions<sup>5</sup> - far below the average for other comparable vegetables. By focusing on the warmth, nostalgia, and flavour that onions bring to home-cooked meals, the campaign aims to elevate onions from an afterthought to a beloved, go-to ingredient.

Another opportunity for growth identified through the research is promoting onions as a healthy choice. Currently, only 33 percent of consumers view onions as healthy, compared to 58 percent for all other vegetables.<sup>6</sup> By sharing content that showcases their nutritional value, the campaign will help change this perception, positioning onions as not just tasty but a smart choice for health-conscious consumers.

<sup>1</sup> Source: Nielsen IQ Homescan TM - previous 4 weeks, WE 25/02/2024

<sup>2</sup> Source: Nielsen IQ Homescan TM - previous 52 weeks, WE 25/02/2024

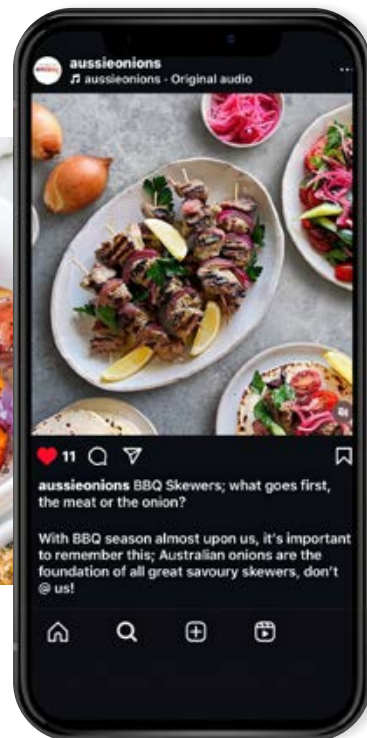
<sup>3</sup> Nielsen CMV 2024

<sup>4</sup> Source: FiftyFive5 consumer tracking, 6 months to Feb 2023, fortnight barriers and month barriers

<sup>5</sup> Source: FiftyFive5 continuous tracking - moving annual total (MAT) as of February 2024

<sup>6</sup> Source: FiftyFive5 consumer tracking, moving annual total (MAT) as of December 2023. Base: each respondent allocated up to 3 categories. Which of the following words would you associate with (onions, mushrooms, potatoes, hard vegetables, leafy vegetables, average (veg)).





Social media will be utilised throughout the campaign to amplify earned media activity.

### Key messaging pillars

Based upon the consumer insights, the core messaging of the campaign will centre around three pillars:

1. **Taste** – encouraging consumers to rediscover the bold, rich flavours onions can deliver.
2. **Versatility** – inspiring Australians to use onions in a variety of dishes, from quick weeknight dinners to family feasts.
3. **Health** – educating consumers on the health benefits of onions, positioning them as a nutritious choice for everyday meals.

### The campaign in action

To spread the message far and wide, the program will leverage a mix of earned media coverage and social media advertising and partner with Mary Kalifatidis, the new Australian Onions Ambassador.

### Earned media

Earned media coverage will be central to keeping onions top of mind throughout the year, with the campaign utilising key cultural calendar moments—such as picnic season, summer sausage sizzle season, autumn comfort food, and winter meals – to create new occasions for consumers to cook with onions. Each moment will highlight a different attribute or ‘layer’ of onions, such as their taste, health benefits, versatility, nostalgia and ability to act as a flavoursome foundation of countless dishes.

Earned media coverage displayed a good return on investment in the FY24 campaign, making it a key focus for the FY25 campaign.

### Australian Onions Ambassador: Mary Kalifatidis

Mary Kalifatidis, a relatable home cook and media personality, will serve as the Australian Onions ambassador. Known for her passion for cooking and engaging social media presence, Mary will share easy, onion-centric recipes that showcase the vegetable’s versatility and flavour. Her engaging content, shared across earned, social media, and owned channels, will help onions maintain a strong presence in Australian kitchens. Mary has 10,300 followers on Instagram and 19,300 on TikTok.

### Social media

Social media will be utilised throughout the campaign to amplify earned media activity and extend the reach of content. Here, the focus will be on making onions relatable and accessible to a broad audience, from seasoned cooks to beginners. Outside of the media moments, Australian Onions will share social content across Meta and TikTok – based on search and cultural trends – to help create relevant messaging. Creative assets will be used to cement Australian onions as the first ingredient in all the best recipes.

### Looking ahead

With a potential reach of over 29m grocery buyers, the FY25 Onions Marketing Program is set to deliver strong results for the industry. By reigniting a love for onions and inspiring more frequent usage, this campaign will drive demand and strengthen the market position of Australian onion growers. With the right mix of emotion, education, and inspiration, onions will be more than just the vegetable in the background – they’ll be the first ingredient to hit the pan, every time.

FY25 Onions Marketing Program is funded by Hort Innovation using the onion industry marketing levy.  
Project: VN24601

**Hort Innovation** **ONION FUND**

# Cultivating success in onions

INSIGHTS FROM THE MUIRS ANNUAL ONION GROWER NIGHT 2024



**The Muirs Annual Onion Grower Night gave attendees the opportunity to hear from industry experts pertaining to onion production.**

In collaboration with Muirs, AUSVEG presented at an informative event in Murray Bridge, bringing together onion growers from across South Australia to hear the latest results on onion research and chemistries that are available to aid in onion production.

The Muirs Annual Onion Grower Night is held every year by Muirs in South Australia. The event on the 11th of July 2024 attracted a record number of growers, drawn in by a number of expert speakers.

Michael Rettke, researcher with the South Australian Research and Development Institute (SARDI), presented his recent findings on fusarium basal rot in onions through the onion-levy funded project *Epidemiology and management of fusarium basal rot in onions* (VN20006).

Michael's project concludes at the end of this year, and aims to develop integrated pest and disease management strategies (IPDM) to reduce the impact of fusarium basal rot in onions.

Michael commented on the ability of fusarium to suppress yield if practices such as irrigation and nitrogen application aren't adequately managed.

**“The trend between the incidence of rotted bulb nitrogen levels is hard to ignore,” said Michael. “It is a part of the story and something that needs to be managed.”**

“The research showed that it is important to manage irrigation— both under and over-irrigated crops can create an optimal environment for fusarium basal rot. The trials found high levels of fusarium basal rot in both high moisture soils and dry soil zones.”

Dr Belinda (Brandy) Rawnsley from Syngenta presented on the company's new Group 30 insecticide, SIMODIS. In bulb vegetables SIMODIS acts to suppress onion thrips and plague thrips.

Onion thrips feed on the leaves of onion plants causing the leaves to turn white or silver. The presence of onion thrips in-crop can lead to several problems, including reduced marketable yield, crop stunting, and decreased bulb weight due to extensive feeding.

**Thrips are known to carry various diseases which can result in the introduction of new pathogens into the crop. It is important to monitor for onion thrips in onion storage facilities as they often enter the bulb post-harvest and breed.**

SIMODIS is a foliar insecticide that affects insect pests either through direct contact or ingestion whilst feeding. The chemical targets the nervous system of insect pest species, inducing involuntary muscle contractions and cramping, inhibiting the insect's ability to move and feed, causing the insect pest species to die.

Syngenta demonstrated that the insecticide has excellent sunlight stability and rainfall resistance properties, ensuring extended residual activity. Dr Rawnsley highlighted the effective nature of the insecticide to manage onion and plague thrips in bulb vegetables, supporting productivity and quality.

Beau White from Campbells Fertilisers presented on both existing and new plant biostimulants, as well as fertilisers in onions, including CoRoN, Talete, MC Extra.

**Above.** Beau White of Campbells Fertilisers outlined the benefits of biostimulants for onion production.



**Above L-R.** Ryegrass herbicide resistance is an issue for South Australian onion growers, Dr Peter Boutsalis of Plant Science Consulting demonstrated a 'quick' ryegrass test for growers. Dr Michael Rettke presented the latest findings on research into fusarium basal rot under project VN21000 at the onion grower event in Murray Bridge.

Timing the release of nitrogen in onion crops is essential, Beau told attendees at the event, as proper timing ensures nitrogen is available when the plant needs it most.

In onion crops nitrogen is particularly important during the bulbing phase, and having a controlled-release nitrogen source readily available during this growth stage can enhance bulb size and yield. Timing nitrogen release can also reduce the risk of nitrogen leaching into the groundwater or running off into nearby water bodies.

Beau introduced CoRoN, a controlled-release nitrogen source in the form of urea. This foliar fertiliser gives plants a consistent stable source of nitrogen which is released according to the plant's nutritional needs. This can lower costs by preventing over-application of nitrogen, leading to better economic returns.

CoRoN has a low burn potential, wash-off tolerance, reduced drift and low surface tension. In onions, CoRoN should be applied at mid set development.

Beau White spoke on Campbells Fertiliser product Talete. Talete aids in improving plant water-use efficiency in conditions of water availability, and in conditions of permanent and temporary water shortages.

### Beau commented on how Talete can aid in onion production.

"By improving the ability of the plant to be more efficient with its water use, we can even out the lags in growth production when we have shortages in available water"

Plant biostimulants are a rapidly growing sector in sustainable agriculture due to the large amount of crop benefits they provide, including enhanced nutrient uptake, improved stress resilience, and improved root development, among other features.

Beau presented on a biostimulant from Campbells Fertilisers called MC Extra.

MC Extra is derived from the algae *Ascophyllum nodosum*. MC Extra supports balanced plant growth, improving vegetative to productive balance, in order to maximise high quality crop yields.

This is beneficial in onions as vegetative growth is essential for photosynthesis and nutrient uptake, however if the vegetative growth is too strong compared to bulb growth, the plant may not produce the desired bulb size and quality. Conversely, if the plant only focuses on productive growth, it may not develop enough foliage leading to reduced yields. Healthy foliage can act as a barrier and can contribute to the plant's overall disease resistance. Additionally, plants that are overly focused on either vegetative or bulb growth may struggle under stress conditions.

Zarmeen Hassan, National Manager for Biosecurity and Extension at AUSVEG, provided an update on the onion extension project, *Accelerating the adoption of best management practices for the Australian onion industry* (VN21000). Zarmeen explained how the project is working to address the key focus areas identified by South Australian onion growers. The focus areas for the state include herbicide resistance, pest and disease management, and mechanisation.

South Australian onion growers attending the Murray Bridge event were also asked to bring along ryegrass samples for complementary herbicide resistance testing.

Ryegrass resistance testing was completed by Dr Peter Boutsalis, Director of Plant Science Consulting. Dr Boutsalis has dedicated his career to managing herbicide resistance in Australia and overseas, extending messages on best practice weed management throughout the industry.

Dr Boutsalis conducted a 'quick test' for the South Australian onion growers present at the event to establish resistance status in the ryegrass samples they had brought along.

Ryegrass resistance testing equips growers with the knowledge needed to make informed decisions on-farm, improving yield and reducing input costs associated with ineffective chemical spraying. Decreasing competition from resistant weeds can further lower on-farm input costs.

The Muirs Annual Onion Grower Night was a well-structured event with delicious food catered by the Murray Bridge Hotel. The event was a great opportunity to engage with industry bodies and growers, fostering a supportive environment for learning and sharing of ideas.

Accelerating the adoption of best management practices for the Australian onion industry is funded by Hort Innovation using the onion industry research and development levy and contributions from the Australian Government.  
Project Number: VN21000

**Hort Innovation** **ONION FUND**

# Developing an integrated pest and disease management strategy for fusarium basal rot

DR MICHAEL RETTKE

SOUTH AUSTRALIAN RESEARCH AND DEVELOPMENT INSTITUTE (SARDI)

**With no fungicides currently registered in Australia for control of fusarium basal rot in onions, controlling soil inoculum levels is crucial for effective management.**

The project *Epidemiology and management of fusarium basal rot in onions* (VN20006) aims to develop an integrated pest and disease management (IPDM) strategy to reduce the impact of fusarium basal rot in onions.

Fusarium basal rot is one of the most significant soilborne disease threats to onion production in warm production regions of Australia. Management of fusarium basal rot requires an integrated approach targeted at reducing the buildup of disease risk in the soil (soil inoculum) and managing the crop to reduce likelihood of disease infection and development.

Conditions that have been associated with increased disease risk of fusarium basal rot include short rotations and previous occurrence of disease, prolonged lower or higher than optimum soil moisture levels, uneven crop growth, high bulb nitrogen levels, salinity issues, growing mid to late season crops, and susceptible varieties.

## Soil inoculum – disease risk

*Fusarium oxysporum* f. sp. cepae (FOC) has been identified as the main pathogen that causes fusarium basal rot of onions in Australia. Spores of FOC produced on infected onions can remain in the soil for at least four years, with the potential to infect the next onion crop. Extending rotation length beyond four years is beneficial to reducing the risk of fusarium basal rot. In paddocks with a high incidence of disease in the previous crop, rotations longer than four years may be required to be of benefit.

Testing as part of this project found root infection by FOC can occur on crops that are grown in rotation with onions (such as cereals and legumes), along with weeds (including annual ryegrass and sow thistle). However, based on quantitative DNA testing of roots, cereal and legume rotation crops do not have the potential to cause the large increase in soil inoculum that occurs when an infected onion crop is grown.

They are sometimes referred to as reservoir hosts, as they help maintain inoculum levels in the soil, rather than build them up. Rotation crops infected by FOC do not show obvious symptoms. These rotation crops are usually, but not always, grown in winter when conditions are less favourable for infection and growth of FOC. Temperatures of 26-28°C are considered optimum for growth of FOC, with minimal growth below 15°C.

Barley used as a nurse crop for late season onions showed higher levels of infection than winter grown crops, and this is likely due to that higher soil temperature. When crops such as barley and faba beans were inoculated with FOC and grown in controlled environment rooms at 26°C, higher levels of root infection were detected than on roots of the same crops collected from winter grown crops in naturally infected fields.

Limited testing of winter grown canola from an infected field site suggested it is a poor host of FOC. However, canola is a good host of the nematode *Pratylenchus neglectus*, which poses a significant yield risk to onion production. Additionally, canola does not support arbuscular mycorrhizal populations that are already present in the soil of some onion production systems and can be beneficial to onions.

Choosing rotation and cover crops that have positive effects on soil condition and microbiology is important prior to planting onions, and this should be considered along with

their potential impact on inoculum levels of soilborne diseases. Other aspects to be considered include their suitability for conditions and time of year to be established, compatibility with weed control strategies and ability to provide ground cover.

Long-term studies are required if we are to more thoroughly understand the impact that specific rotation and cover crop strategies have on the risk of soilborne diseases, including fusarium basal rot, on soil health and on onion productivity more generally.

## Reducing crop risk

Project results indicate the importance of managing irrigation and plant nutrition as part of an integrated program to reduce the risk of fusarium basal rot.

Monitoring of crops and trials in South Australia has identified relationships between soil moisture level and the incidence of fusarium basal rot. Both higher and lower than optimum soil moisture levels can increase the risk of fusarium basal rot, with an example of findings presented in *Figure 1*.

Soil moisture conditions were considered close to optimal at spots five and six, maximising yield and lowering incidence of fusarium basal rot. Prolonged waterlogging which occurred in spot nine was not favourable for either onions to grow or fusarium basal rot to develop. Total yield was reduced by approximately half at spot nine. At spots eight and 10, soil moisture was high but not waterlogged.

These conditions supported high yields but were also conducive to diseases such as bacterial bulb rots, as well as fusarium basal rot. At the other end of the moisture spectrum at spots three and four, where plants suffered prolonged water stress, total yields were reduced by around 25 percent, and had a higher level of fusarium basal rot when compared with spots having optimum moisture conditions.

**Management of both irrigation and nitrogen are a critical part of maintaining even growth of the onion crop, helping protect the basal plate from infection.**

Crop monitoring has revealed an association between higher bulb nitrogen level at harvest and higher incidence of fusarium basal rot, as presented in *Figure 2*. Lower nitrogen level in the harvested bulbs was not related to reduced yield, suggesting nitrogen level was not yield limiting within the range monitored in these commercial crops.

This indicates there is scope to manage nitrogen to reduce risk of fusarium basal rot without jeopardising yield, i.e. applying sufficient but not excessive nitrogen will reduce fusarium basal rot without limiting yield potential.

Other bulb quality attributes need to be considered when adjusting fertiliser programs. The level of nitrogen in the bulb was not solely influenced by the nitrogen application rate, which indicates that other crop management practices and soil conditions are important drivers of bulb nitrogen status and the crops susceptibility to fusarium basal rot.

Management of both irrigation and nitrogen are a critical part of maintaining even growth of the onion crop, helping protect the basal plate from infection. Sudden growth spurts or plant stress may increase risk of fusarium basal rot developing if the pathogen is present and environmental conditions are suitable.

**Treatment options**

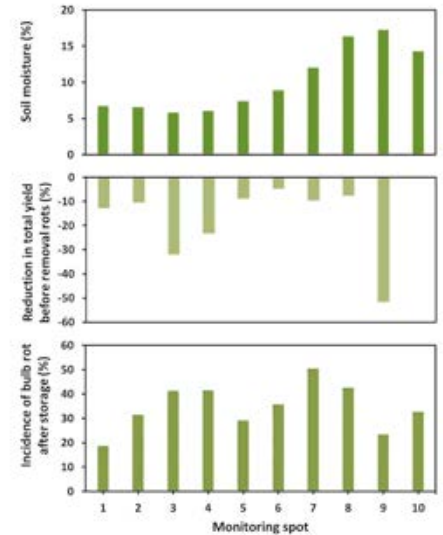
There are currently no fungicides registered in Australia for the control of fusarium basal rot in onion crops. Several active ingredients and formulations have been demonstrated to suppress the disease in trials conducted as part of this project.

These results provide support for progressing some treatments towards commercial availability.

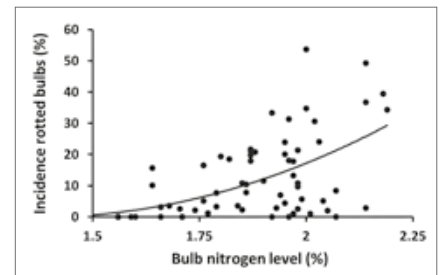
A number of biological products that are available to growers in Australia contain micro-organisms (e.g. *Trichoderma harzianum*, *T. viride*, *Bacillus subtilis*, *Pseudomonas fluorescens*, *Funneliformis mosseae*) for which overseas studies have demonstrated their ability to reduce the incidence of fusarium basal rot in field trials. Achieving meaningful disease reduction depends on the suitability of each biocontrol strain to site-specific field conditions and the level of disease pressure.

Monitoring of crops has shown that infection can be present at the seedling stage, even though symptoms may not be visible until close to harvest. Monitoring in mid to late season grown onions has shown that most infection of plants in the crop appears to have already occurred by the time of bulb initiation. This indicates implementation of control strategies needs to start early in the crop, if not at or prior to planting.

Where inoculum levels of FOC in the soil are high and conditions are favourable for disease development, fusarium basal rot can lead to substantial losses or even crop failure. In these situations, fumigation is an option to reduce the level of inoculum in the soil prior to planting. Such treatments should be followed up with practices to re-establish a favourable soil biology for onions and the implementation of other management practices as part of an integrated strategy to reduce disease risk.



**FIGURE 1.** Impact of prolonged differences in irrigation output and topography on, a) soil moisture as recorded 4 weeks prior to harvest, b) reduction in total bulb yield at harvest (before removal of rots) compared to highest yield recorded at monitoring spot 10 and, c) the cumulative incidence of rotted bulbs caused by fusarium basal rot after two months ambient storage. (Spot nine was waterlogged for prolonged periods, each monitoring spot had three replicates).



**FIGURE 2.** Association between bulb nitrogen level (percent) measured at harvest and the incidence of fusarium basal rot at monitoring locations assessed within 20 crops in two seasons.

Effective management of fusarium basal rot involves reducing the buildup of inoculum or its reduction before planting, coupled with managing the crop in ways that reduce likelihood of disease infection and development, including irrigation, nutrition and soil health management.



Fusarium basal rot (as the name suggests) is typified by the rotting of bulbs starting from the basal plate. Bulb rotting usually starts to become obvious late in the crop, with leaf tipping an indicator of diseased plants. In other cases, bulb rots may only develop after harvest during storage. Infection of onions by FOC can occur at any stage of crop

development, including prior to emergence. The pathogen can also cause seedling damping off, root infection and bulb rot early in the crop. Monitoring data collected from 20 crops indicates that high infection levels of FOC are associated with yield losses of up to 25 percent, over and above the bulb rots observed at harvest.



Scan QR code for access to the Fusarium basal rot guide by Michael Rettke.

**LEARN MORE**

Find out more in the Fusarium Basal Rot guide: [horticulture.com.au/contentassets/32b961e9d8a947618188cdc83f832dfd/fusarium-basal-rot-guide-june-2022.pdf](https://horticulture.com.au/contentassets/32b961e9d8a947618188cdc83f832dfd/fusarium-basal-rot-guide-june-2022.pdf)

*Epidemiology and management of fusarium basal rot in onions* has been funded by Hort Innovation using the onion research and development levy and contributions from the Australian Government.

Project: VN20006



# Fusarium basal rot in onions

## FACTSHEET



Fusarium basal rot (FBR) is a plant disease, most commonly caused by the fungal pathogen *Fusarium oxysporum* forma specialis *cepa*e (FOC). The pathogen can cause basal rot, damping off and root rot in onions. Bulb rot may become evident in the field or develop in storage, crop losses of above 30 percent can occur. Fungus living in the soil infects roots or basal plates, with infection occasionally spreading to the lower parts of the bulb scales, and infection can occur at any stage of plant growth.

### WHAT TO LOOK OUT FOR

#### Developing bulbs

- Yellowing of the leaf tips
- Dieback
- Leaves curl down or collapse
- Plant death (severe cases)
- Decay of the roots and basal plate will have occurred by the time above-ground symptoms are visible.

#### Harvest & post harvest









- Basal plates may have brown discolouration and soft texture
- White cobweb-like fungal growth may be present around / on basal plate
- Pink to purple discolouration on bulb scales.



Scan QR code for access to the Fusarium basal rot guide by Michael Rettke.

# Fusarium basal rot in onions

## FACTORS AFFECTING DEVELOPMENT AND IMPACT OF BASAL ROT

 Amount of disease inoculum and other diseases in soil	 Poor nutrient management (especially nitrogen)
 Tolerance of onion variety	 Excess or inadequate moisture and poor drainage
 Root and basal plate damage, uneven growth	 Summer rainfall
 Warm soil temperatures (>26°C) during development	 Ambient storage



## MANAGEMENT OF FUSARIUM BASAL ROT

### Before planting



#### Crop rotation

**Method**  
Rotation lengths of four or more years are considered good practice in reducing inoculum concentration. In a paddock with high levels of disease, rotations should be extended.



#### Biological & chemical controls

**Method**  
Effectively applied fumigation reduces FBR concentration in soil. If fumigation is chosen, replace beneficial soil organisms as soon as possible as reintroduction of pathogens back into fumigated soil can result in higher disease levels. Biological controls that have been shown to reduce FBR incidence include strains of:

- *Trichoderma harzianum*
- *Trichoderma viride*
- *Bacillus subtilis*
- *Pseudomonas fluorescens*
- *Funneliformis mosseae*.

### In crop



#### Timing of planting

**Method**  
Infection of seedlings is favoured by warm to hot, moist conditions. Particularly in paddocks that are known to be high risk for FBR, aim to plant when soil temperature is cooler.



#### Irrigation & drainage

**Method**  
Over-irrigation, under-irrigation and poor drainage favour infection. Manage irrigation and moisture where possible. Drainage improvements, soil amendments and variable rate irrigation should also be considered as part of management.



#### Plant nutrition

**Method**  
Avoid applying above optimum levels of nitrogen as onions will become more vulnerable to infection.

Images © South Australian Research and Development Institute (SARDI). Michael Rettke / Updated August 2024

# Sowing the seeds of innovation: enhancing onion production through soil and water management

On 18 September 2024, AUSVEG hosted an insightful soil health and irrigation management event near Myalup in Western Australia. The event aimed to support onion growers with vital information on soil health, as well as discuss innovative ways to monitor soil moisture in onion production systems.

AUSVEG collaborated with a diverse range of industry experts to deliver a tailor-made session to address the needs of the region, which were identified through the onion extension project, *Accelerating the adoption of best management practices for the Australian onion industry*.

Bruce Scott, plant nutrition and fertiliser specialist for Campbells Fertilisers, spoke to growers at the workshop and emphasised the critical role that soil health plays in achieving optimal crop yields.

Myalup soil is quite unique; the area's soil is around 94 percent sand and 6 percent silt. Sandy soils are well-known for having low water and nutrient-holding capacity, and are often prone to erosion by wind. This is exacerbated by a lack of organic matter in the soil. This presents a number of challenges for growers in the region.

**Some protective measures to combat soil erosion include minimum tillage, implementing cover crops, strip cropping, rotating crops, and establishing windbreaks.**



The low nutrient-holding capacity of sandy soils means the incorporation of organic amendments is relatively short-term. The use of stubble retention can be a way to retain nutrients and organic matter in the soil. Additionally, humic acids and seaweed-based products can stimulate the roots of the onion crop, this aids in nutrient uptake and the ability of the plant to hold nutrients and moisture in the root zone for longer, improving nutrient use efficiency.

## Bruce highlighted the importance of understanding your soil.

"It is essential to understand the chemical properties of your soil through a soil analysis," he stated. "It is also important to understand the physical and biological properties, which can be done through visual assessment and biological soil analysis."

Bruce passed around an example soil analysis that was conducted on a farm in the region in 2023. The soil analysis showed low levels of nitrogen, potassium, boron, magnesium and iron. These elements are macronutrients and micronutrients essential for onion and vegetable production.

It is crucial to supply these nutrients, and the timing of their application should be based around nutrient uptake patterns in onions across the crop's growth stages.

In the initial stage of planting, compound fertilisers can be utilised to enable a longer lasting release of nutrients to the crop. Additionally, coated compounds are now available on the market, which are much less vulnerable to leaching. To get the best out of your nutrient inputs, fertigation is an ideal way to supply small, frequent doses to meet the requirements of the crop as it develops.

Nitrogen is essential for leafy growth and bulb development, and a lack of nitrogen will severely suppress growth. On the other hand, excessive nitrogen can produce plants that are more susceptible to frost and disease. Additionally, over-application of nitrogen is likely to cause issues in storage and export, as bulb softening and rot can occur.

Bruce Scott, plant nutrition and fertiliser specialist for Campbells Fertilisers.





**Phosphorus is essential for root development, and is therefore required at the establishment stage of onion development.**

Potassium aids in optimal plant to water relations, and crop energy reactions, influencing plant growth and metabolism. Applying potassium during the bulb development stage increases bulb size and quality.

Boron plays a crucial role in root development and in the structural development of the whole plant, in a similar way to calcium. Optimal boron levels promote nutrient uptake, water regulation, and overall plant health. However, it is important not to exceed the recommended level of application as boron can be toxic in onions, Bruce cautioned the workshop attendees.

Magnesium and iron are two of the elements that are most important in chlorophyll production, which aids in the photosynthesis process of the plant and ensures good leaf production and healthy crop development.

The workshop also heard from Ivor Gaylard, Chief Operating Officer and founding director of SWAN Systems, who addressed the importance of optimising water-use efficiency, and the use of irrigation technology to monitor soil-water relations.

**“Good irrigation management has a significant impact on your bottom line,” Ivor stated. “Get the infrastructure right first, then schedule your irrigation applications to get the best results.”**

Ivor explained how proper irrigation management is essential for maximising onion yields, as under-irrigation can hinder photosynthesis and lead to issues such as split or multiple bulbs. Conversely, over-irrigation can lead to disease issues and skin damage, ultimately reducing marketable yield.

Planning irrigation requires careful consideration of various factors, including soil properties, root depth, crop growth stages, weather patterns, water availability, and the timing of fertiliser applications.

Utilising tools such as soil moisture probes can help identify a number of factors, including what happens to soil water during the year, the rooting depth of the crop, the effect of rain events, and the effect uncontrolled weeds can have on stored soil moisture, as well as temporal variations present in stored soil moisture across a paddock. This knowledge allows growers to make informed decisions around irrigation scheduling, in order to match irrigation to crop water demand.

Stephanie Carstairs, project manager of the *National Vegetable and Onion Benchmarking Program* (also known as Level Up Hort) and horticultural consultant for Planfarm, presented findings from the program’s recent benchmark report.

Stephanie provided a snapshot of where the Australian vegetable and onion industries are positioned, and highlighted some of the strengths and challenges facing the industry at present.

**“The most profitable vegetable and onion growing businesses generate higher profits per hectare, despite higher input costs,” Stephanie noted.**

The targets established in this benchmarking report are based on industry standards and are published as a guide to setting industry targets to achieve a profitable and globally-competitive vegetable industry. The report can be downloaded at [leveluphort.com.au](http://leveluphort.com.au).

Camilla Humphries, consultant with RM Consulting Group, discussed the Soil Wealth ICP project, which focusses on integrated crop protection strategies within the vegetable and melon industries.

Camilla shared several strategies for enhancing soil health, such as implementing cover crops, adequate crop rotations, and improving soil structure through compost use.

**Camilla also highlighted the importance of integrated pest and disease management, asserting that these practices not only bolster crop health but also yield economic benefits.**

The soil health and irrigation management event held for the Myalup onion growers was a great opportunity not only for growers to talk with industry bodies and experts but also for growers to talk with other growers. Building grower-to-grower relationships not only benefits the individuals but the entire region.

The onion extension project is also hosting workshops on soil nutrition and onion storage in the Lockyer Valley, and another on ryegrass resistance management and mechanisation in Tasmania, both before the end of 2024. Check the AUSVEG communication channels for more information.



Stephanie Carstairs of Planfarm.

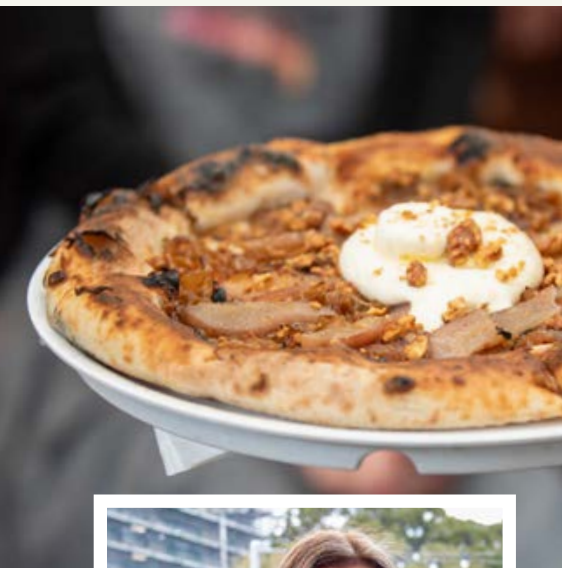
Accelerating the adoption of best management practices for the Australian onion industry is funded by Hort Innovation using the onion industry research and development levy and contributions from the Australian Government.

Project: VN21000

**Hort Innovation** **ONION FUND**



ONIONS



## Onions star at events in Sydney and Melbourne

**Some of Australia's top chefs have demonstrated to the foodservice industry that onions are more versatile than they might have though.**

Ever heard of an onion lamington? Sydney's top chefs were more than intrigued—they were blown away by this quirky creation at a recent Australian Onions foodservice workshop at Camperdown Commons in Sydney.

Eddie Stewart and Min Chai, the creative forces behind the iconic Sydney bakery Tokyo Lamington, introduced their latest innovation – the onion lamington – to 25 top chefs at a workshop designed to inspire them to rethink the ways they can feature onions on foodservice menus. The workshop was held as part of the levy funded Onion Nutrition Education Program.

Eddie's vision for an onion lamington began with the idea of pairing onion with strawberries and balsamic vinegar.

"Strawberries and balsamic seemed like a natural fit with the sweetness of the onion, so we turned that into a jam for the middle layer," Eddie explained.

"We then combined it with mascarpone cream, our traditional sponge, and coated it in an onion-infused white chocolate mix, finished with coconut for a slightly sweet, slightly savory effect.

"People usually associate onions with savoury dishes, but we can break that perception. Salt and caramel used to be unusual too, and now it's normal."

The onion lamington was available at Tokyo Lamington's Newtown store on the day of the event and sold out within hours.

Chefs at the workshop were also treated to a mouth-watering array of creations from Camperdown Commons executive chef Arin Ellis, featuring dishes like burnt onion dip, caramelised onion and poached pear pizza, smoked lamb with onion and citrus, and an onion-infused Bloody Mary.

"Onions are the foundation of every dish, and they can also be the star of the show," said Arin.

The event aimed to educate chefs on the farm-to-table journey of onions. Jim Ertler, an onion producer from Premium Fresh Tasmania, shared insights on how onions are grown, tips on how to select and store onions, and why Aussie onions stand out.

**Above L-R.** The delicious, caramelised onion and poached pear pizza by executive chef Arin Ellis of Camperdown Commons. The group of 25 influential chefs and food service professionals experiencing the delights of Australian Onions. **Inset.** MasterChef Australia winner 2016 Elena Duggan is a fan of Australian onions.



**Above L-R.** The Tokyo Lamington X Australian Onions collab showing how versatile onions can be. Min Chai and Eddie Stewart, the masterminds behind Tokyo Lamington's x Australian onion lamington.

**“Only 7 percent of people are getting their five serves of veggies a week, so there’s a need to make veggies more exciting, especially those that aren’t often the star,” said Jim. “Chefs have the influence to show people how versatile veggies can be.”**



Accredited Practising Dietitian Teri Lichtenstein highlighted the latest health benefits of onions, encouraging chefs to use of the whole onion, including the skins, to make stocks, powders and salts.

“Onions are a nutrition powerhouse, especially in the outer layers,” she said. Lichtenstein also shared insights on how to incorporate onions into low FODMAP diets.

### Onions mastered at a fine food experience

Building on this momentum, a chef’s masterclass at Fine Food Australia was another major highlight of the Onion Nutrition Education Program. Fine Food Australia is the largest food industry event in the southern hemisphere, and the masterclass brought together over 45 chefs and food service professionals to focus on onions’ potential in creative cooking.

Top Melbourne chefs like Telina Menzies from Hotel Esplanade, Dylan Hayes from Tippy Tay, and Supawat ‘Pad’ Chatkaew from Mya Tiger wowed the audience with innovative dishes ranging from Cantonese onion soup dumplings to cappelletti made with onion pasta dough, served in onion broth. Each dish highlighted the versatility of onions, proving their potential in both traditional and modern cuisine.

The masterclass was held at The Source Kitchen, which is the most prominent stage at the show, and hosted by the project’s sub-contractor Tawnya Bahr from Straight to The Source.

“Having a presence at Fine Food Australia allowed us to cement onions as a culinary essential,” said Tawnya. “This masterclass inspired chefs to think differently about how to use this powerful ingredient.”

### Onions wow health experts at dietitian’s conference

The versatility of onions hasn’t just been celebrated by chefs; it also took centre stage at the Dietitians Australia 2024 conference in Brisbane. This event catered specifically to health professionals, reinforcing onions status as a nutritional powerhouse.

Award-winning chef Zac Sykes, known for his inventive use of Australian produce, led interactive tastings that highlighted the distinct flavours of red, brown, and white onions. Through dishes like brown onion jam, quick red onion pickle and white onion dukkah, Sykes showed how onions can elevate everyday meals.

“Onions bring depth and complexity to dishes, and there’s so much potential to explore,” he said.

The event also featured a trade exhibit that educated dietitians on the nutritional benefits of onions, drawing over 500 delegates eager to share practical storage tips and creative meal ideas with their patients.

**Inset.** Producer Jim Ertler from Premium Fresh sharing tips on storing and sourcing the best Australian onions. Right. Food service professionals watching executive chef Arin Ellis of Camperdown Commons smoked lamb with onion and citrus demonstration.

### A strong foundation for growth

These events have advanced the goals of the Onion Nutrition Education Program by communicating the nutritional benefits of onions to health and food service professionals in new and exciting ways. By challenging perceptions and showcasing new culinary possibilities, the program is inspiring creativity and advocacy, ultimately driving greater demand for Australian onions.



### LEARN MORE

For more information on the program visit [australianonions.com.au/health-professionals](http://australianonions.com.au/health-professionals) or contact Bite Communications Project Lead, Penny Eustace at [penny@bitecom.com.au](mailto:penny@bitecom.com.au)

*Onion nutrition education program for health professionals and the food service industry is funded by Hort Innovation using the onion research and development levy and contributions from the Australian Government. Project: VN20002*

**Hort Innovation ONION FUND**

## CASE STUDY

# Benchmarking essential to profitability, sustainability

BY SANDRA GODWIN



**As an award-winning mixed farmer Michael Nichols has his fingers in many pies, and swears by benchmarking as a means of making the most of every part of the business.**

Benchmarking has already helped Michael fine tune seeding rates for optimum grain yield, and lift processing potato yields.

Now he hopes taking part in the national Level Up Hort program will identify further areas for improvement and potential savings in what is a highly diverse enterprise with a focus on profitability and sustainability.

Michael and his wife, Rochelle, farm 385ha at Sisters Creek, in coastal north-west Tasmania, under the Redbank Farming banner.

They produce a long list of vegetable and broadacre crops – processing potatoes and peas, fresh onions, wheat, barley, canola, poppies, mustard and corn – as well as grazing beef cattle, hatching chickens, running radiata pine plantations and maintaining 100ha of pristine native bush on areas that are too steep to farm adjacent to Rocky Cape National Park.

As if that wasn't enough, Redbank Farm also has a grain handling facility and Michael operates a grain pool for local growers who sell to local dairy farmers, as well as his own press for processing oilseeds into oil and meal, and provides contract services for spraying, muck spreading and harvesting grain.

Despite average annual rainfall of 1,200mm, all crops are irrigated and multiple private dams have been built to store the 400 megalitres Redbank Farm is licensed to collect from rain and runoff.

Last year's dry conditions – 30 percent less rain was recorded and the summer electricity bill shot up 40 percent – severely tested the system, which uses a combination of centre pivot, linear and gun irrigators. After an irrigation assessment a decade ago, 50-year-old pipes are in the process of being replaced and pumps progressively added and upgraded with variable speed drives.

The 175ha of cropping land is on an intensive six-year rotation, with potatoes and onions every six years, and the other crops planned around them.

Michael learned the value of keeping records from his father, Andrew, who was using the farm management tool PAM Ultracrop 30 years ago.

"I found it was really valuable to enter the dollars that chemicals cost, the fertiliser, all your applications, and then you can actually do a proper benchmarking of how much you've spent per hectare on your cropping ground," he said.

**Michael said having that data had already enabled them to take part in several pilot projects and compare their operation with other farms in the area.**

**Above.** Aerial view of Redbank Farm, Sisters Creek, which is adjacent to Rocky Cape National Park, in northwest Tasmania. *Image courtesy Landcare Australia.* **Inset.** Redbank Farming owner-manager Michael Nichols has his fingers in many pies and swears by benchmarking for making the most of every part of the business.

It also helped them identify the Russet Burbank potatoes they were growing yielded 20 percent less than they should. They then tried two other processing potato varieties, Ranger Russet and Clearwater, which averaged 80 tonnes per hectare this year.

**“That’s the secret of benchmarking, being able to make informed decisions and acting on them,” he said.**

“Everyone talks about the top yields of all their crops, but if you have spent a fortune getting that yield it’s irrelevant. We aim to sit at the top 20 percent for gross return. I’m happy with that. If you’re down at the lower 20 percent then you know that you’ve got some improvements to do.”

Michael is keen to delve more deeply into whether they’re spending money on the right things, including the irrigation upgrades and contract services they provide to other farmers in the area.

He considers machinery one of their biggest liabilities, because of the size of their fleet and the skyrocketing cost of replacing machines and implements.

“Should we be reducing the contracting because of the cost of upkeep?” he said.

“Is contracting worth doing, for the time it takes us away from the farm, and are we making enough to justify wearing out our machines for that purpose?”

“There’s a whole range of different questions that could be answered, and I guess it just depends on where we see our best return on investment.

“Our aim is to be in the best 20 percent of growers for most of our operations in cost of production.”

**Michael said he was surprised so few farmers kept accurate records, let alone in digital format.**

“We’ve been using Agworld and because I’ve got such good records, I can pull up on my phone now how much I’ve spent on each of my crops, and have all that information at hand,” he said.

Redbank Farm won the national Landcare award for Innovation in Agriculture in 2021, recognised for using precision agriculture techniques to address crop variability and resource use efficiency. It previously won the national Landcare award for Primary Production and Environmental Sustainability in 2004, when it was managed by Michael’s father, Andrew.

#### What is Level Up Hort?

A five-year initiative fully funded through Hort Innovation, the Level Up Hort program provides specialised business reviews with a business consultant from experienced project partners Planfarm or RMCg.

Valued at up to \$10,000 per year, it is open to vegetable and onion growers.

Participants receive two reports – a full business analysis and a benchmarking report, which are 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. No yield data or specific crop line data is reported as part of the benchmarks.

The first national report released at Hort Connections in June 2024 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 \$2,906/ha for the average, and a loss of \$16,827/ha for the least profitable 25 percent.



Planting potatoes at Redbank Farm, Sisters Creek, in northwest Tasmania.

**Level Up Hort program:** valued at up to \$10,000 per year, it is open to vegetable and onion growers.

#### 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 visit [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

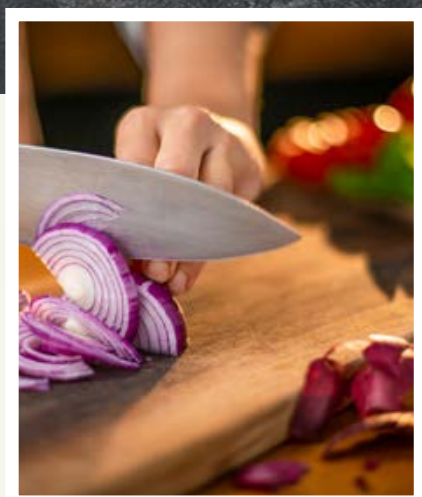
**Hort Innovation** VEGETABLE FUND  
**Hort Innovation** ONION FUND

# Current Projects

HORT INNOVATION ONION 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.



**POVM** The nutritional advantage of fresh produce: a focus on bioactive nutrients and their role in consumer demand  
HN22003

DELIVERY PARTNER: MACQUARIE UNIVERSITY

This program is increasing the knowledge and awareness of bioactive compounds derived from plant-based foods across Australia with a major focus on promoting their health and well-being benefits.

The overarching objective is to ensure improved health, productivity, and market access to plant-based products (particularly from fruits, vegetables, nuts, and mushrooms) by Australians and international consumers, catalysed by a better understanding of evidence-based benefits of bioactives, especially among younger adults and children.

The program will develop and implement a comprehensive communication strategy supported by an analytical understanding of the availability and nutritional benefits of different bioactives.

The research team will develop 'Bioactive Master Files' that will include key information about which bioactives are present in which plant-based foods and include a Relative Dietary Intake where appropriate or Nutrient Reference Values for each bioactive.

**O** 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.

CODE

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

### ○ Epidemiology and management of fusarium basal rot in onions

VN20006

DELIVERY PARTNER: 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.

### ○ Australian Onion Industry Communications

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.

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 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.



### ○ Optimising chemical and cultural control of onion white rot

VN20007

RESEARCH PROVIDER: ARVENISIS

#### What's it all about?

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.



### ○ Onion international study tours – inbound and outbound

VN22000

RESEARCH PROVIDER: AUSVEG

#### What is it all about?

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.

## Structure builds better potato crops through access to phosphorus



Potato growers are reaping the benefits of a liquid phosphorus (P) fertiliser in improving the availability of P and zinc to the root zone, which in turn enhances tuber numbers, size and yield potential.

Potatoes have a low phosphorus uptake efficiency compared to most other crops, with only about five to 25% of fertiliser P taken up in the season it is applied, depending on the crop variety and growing conditions.

Inputs of P fertiliser can be high and costly, but trials conducted in Tasmania, have shown that in some soil types, a more favourable option for growers is to use Loveland Agri Products', Structure, and reduce applications of granular fertiliser.

Nutrien Ag Solutions Crop Nutrition Manager, Michael Darling, said Structure had been specifically developed to provide more readily available phosphorus to the crop, with potential cost savings and efficiencies for growers.

"Structure is one of the few concentrated formulations that can effectively supply higher amounts of plant-available phosphorus to the root zone, which leads to an improvement in fertiliser use efficiency," Mr Darling said.

"Structure goes through a complex manufacturing process whereby leonardite is reacted with phosphorus and zinc under high heat and pressure. This process delivers a mobile and more available phosphorus source to the root zone that remains available for longer, as it is less prone to fixation in the soil.

### Independent research demonstrates improved P performance

A replicated trial on Russet Burbank potatoes in ferrosol soil at the Forthside Vegetable Research Station in Northwest Tasmania showed that by reducing the amount of granular fertiliser and adding

50L/ha of Structure, total applied P could be reduced by 30% without affecting yields.

"We've also had excellent results on the mainland in soils with high P fixation, high iron, high aluminium and acidic soils," Mr Darling said.

### Commercial crops show improved tuber set and yield

Grower field trials conducted in several commercial crops around Ballarat in Victoria and in Northwest Tasmania showed improved tuber set and yield increases in Innovator and Atlantic processing potatoes, when the granular fertiliser program is supplemented with Structure.

A large, healthy root system is the most important plant attribute for effective phosphorus uptake, particularly in P-fixing soils. The Phosphorus Buffering Index, or PBI, is a measure of the soil's ability to bind phosphorus. Soils with a high PBI require more P, because more of what is applied becomes bound or 'fixed' to soil particles and unavailable to the crop, leading to growers applying more fertiliser than necessary to ensure the plant responds.

"A significant proportion of Australia's potato crops are grown in these P-fixing soil types. Structure lends itself to use in these areas as part of a broader fertiliser program to improve conditions in the root zone," Mr Darling said.

"Where it's used in tandem with granular NYPK fertiliser, growers are seeing a consistent increase in tuber numbers per plant, which makes the product particularly attractive to seed growers or growers of processing potatoes."

### Encouraging response to more tailored supply of nutrients

Nutrien Ag Solutions Senior Agronomist, Rob Wilson, has worked closely with potato growers across Tasmania and Victoria, with a particular focus on crop nutrition. He says growers were encouraged by the response of plants to applications of Structure.

"Including Structure in our fertiliser programs enables us to supply the root zone with a phosphorus source that is highly plant-available, thanks to its reacted carbon formulation. It's allowed our customers to set more tubers, achieve more even sizing and contributed to higher yields," Mr Wilson said.

"Many of our soils have lowish soil pH, high PBI and high aluminium, resulting in major phosphorus deficiencies to the plant. Where Structure is used, we see much improved fibrous root growth and overall plant health, due mainly to the increased availability of P.

"We have consistently observed increased tuber numbers and evenness in tuber size and shape, resulting in a better marketable yield of potatoes."

Growers should seek agronomic advice prior to changing their fertiliser practices or mixing Structure with other fertilisers or pesticides.

**Above L-R.** Nutrien Ag Solutions Agronomist, Rob Wilson inspecting a commercial trial in Tasmania. Trial specimens demonstrating more fibrous root systems, four weeks post-planting, grower standard fertiliser program (left) v inclusion of Structure in program (right).

### FIND OUT MORE

For more information on Structure, visit [LovelandAgriProducts.com.au/Structure](http://LovelandAgriProducts.com.au/Structure) or contact your local Nutrien Ag Solutions store. [lovelandagriproducts.com.au](http://lovelandagriproducts.com.au)



# potato update



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)

**Hort  
Innovation**

**POTATO –  
FRESH FUND**

**Hort  
Innovation**

**POTATO –  
PROCESSING FUND**

# Get to know your AUSVEG potato board members

AUSVEG's Board of Directors is made up of growers from around Australia who grow a broad range of crops, including potatoes.



## Renee Pye Deputy Chair

Renee Pye is the Deputy Chair of AUSVEG and General Manager of Zerella Fresh, a leading potato, carrot, and onion packhouse.

As General Manager, Renee oversees all aspects of the business. She has been instrumental in the success of Zerella Fresh's Spud Lite range, which has contributed significantly to the company's recent growth.

In addition to her role at Zerella Fresh, Renee is a dedicated industry representative, sitting on several boards, including the Murraylands Food Alliance and Hort Innovation's Onion and Potato Strategic Investment Advisory Panels, demonstrating her commitment to the growth and development of the local industry.

Renee is also actively involved in political advocacy as the Chair of AUSVEG SA, working closely with state-level politicians to secure key infrastructure investments, and other outcomes for the industry.

She is a respected and influential voice in the industry.



## Pennie Patane Board Member

Pennie Patane is a highly esteemed member of the AUSVEG Board, having been appointed in 2020. With a background in banking, Pennie married into the horticulture sector and, together with her husband Michael, established a vegetable growing business in 1999, starting with potatoes and moving into carrots, onions, and broccoli. The couple's vertically integrated business supplies the retail sector, export markets, and their own wholesale market floor.

Pennie is an active member of the horticulture community, having previously served as a committee member of the Potato Growers Association of Western Australia. She is currently a member of the vegetablesWA Committee of Management and Chair of the Myalup Coast Growers, as well as a member of the Harvey Agricultural College Advisory Panel. Her key interest is encouraging more young people to pursue a career in horticulture. Pennie's valuable insights and experience make her an asset to the AUSVEG Board.

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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 projects currently underway.

## 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.

## Potato Industry Communication and extension program

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.

## Consumer behavioural retail data

MT21004

DELIVERY PARTNER: NIELSEN IQ

This multi-industry investment is tasked with providing regular consumer behaviour data and insight reporting to a range of industries, through the Harvest to Home platform.

The platform has a dedicated dashboard for each commodity, making data and reporting easily accessible for industry participants.

The information is intended to assist growers and supply chain partners in decision-making for their businesses and, for the wider industry, the data and insights will be available to support strategic activities.



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# Grower groups giving back to potato growers



## Third generation potato and onion grower Leigh Elphinstone has found success in a diverse crop rotation.

From a humble 10 acres of potatoes and a few beef cattle, the Elphinstone family farm at Sisters Creek, Tasmania has evolved to around 1,200 acres, historically supplying processors such as Bird's Eye and Edgell now under the Simplot banner. Leigh Elphinstone is the third generation of the family to grow potatoes and onions.

Rotation on the property is typically a seven-to-eight-year program with a grain such as wheat following the potatoes, cycling with poppies, annual pasture, onions and perennial pasture once more. Of that acreage, around 150-160 acres is under potatoes, 15 acres of onions, 50 acres of poppies and grains across 30 acres.

"This year's potato season in Tasmania has been one of the better ones for a few years, with planting occurring on time and harvest happening in record time. Typically, contract growers produce around 240,000 tonnes and a further 80,000 tonnes from Simplot farms, and we slightly exceeded that this year," said Leigh.

A drier than average start to the year has meant that harvesting of potatoes has not been held up with rain events, coupled with Simplot's investment in potato stores enabled the record harvest time to be completed by June. Onion planting began with the spring season hybrid varieties in September, with harvesting occurring in March next year.

**The Elphinstone farm also produces seed potatoes to supply other growers who in turn supply potatoes to Simplot.**

Tasmania is well placed to produce seed potato given that it does not have diseases present on the mainland such as PVY. Seed certification is undertaken through the Tasmanian Institute of Agriculture.

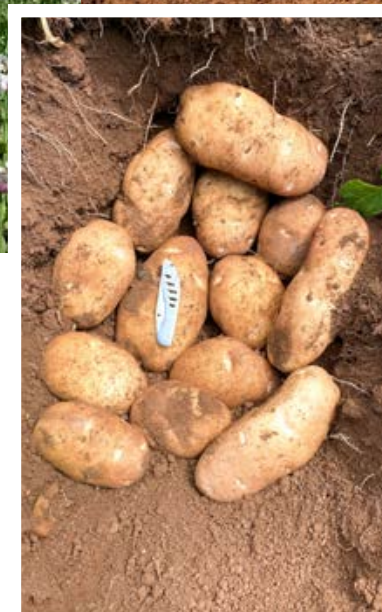
"Russet Burbank is the backbone variety and has been approved by Simplot customers for years. Onions are generally the larger browns that are better suited to processing," said Leigh.

**Inset.** Leigh Elphinstone and his wife, Alana.  
**Above.** Sisters Creek farm potato fields.





**Above L-R.** Leigh Elphinstone’s farm at Sisters Creek. Poppies in flower, destined for the pharmaceutical market. Preparing the field. **Inset.** Russet Burbank is the backbone potato variety for the Elphinstones.



“We are always on the lookout for newer potato varieties that have good resistance attributes to disease – powdery scab and pink rot are the two biggest issues in Tasmania.”

**Leigh is the Chair of the Simplot Growers Group in Tasmania and has been part of the group for more than 15 years. His father was also on the committee for many years.**

The Simplot Growers Group is comprised of members from around Tasmania’s growing regions, and works collaboratively with Simplot to discuss issues and ideas relevant to potato growing for the processor. Discussions may include the forecast for production, seasonal price and what quality Simplot is aiming for. In the past two seasons, with increased cost of production, discussions around base price per tonne has been crucial for growers to achieve a rate that meets production costs.

“One example is that Simplot increased potato storage capacity around the state and took on board the feedback from growers on what that looks like, but also to give growers an opportunity to expand production in the next season.

**“I joined the Growers Group to give back to the industry. Potato growing has been good for our family, so I wanted to be able to contribute to the growth of the industry and make it a good prospect for other grower families.”**

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# Tasmania's Spud Doctor reflects on seed potato progress



**The Tasmanian potato industry has had a long and successful history, due in part to the knowledge and research extension of industry experts such as Frank Mulcahy.**

The Tasmanian potato industry has thrived since the early 1900s, relying on the staple potato varieties of Up to Date, Kennebec and Russell Burbank to supply the ware and processor markets.

Early pioneers recognised that the development of quality seed potatoes depended on isolation and established the Tewkesbury Agricultural Station in 1934. At an altitude of 600m, the theory was that insects such as aphids would not survive the cold environment.

At its height, Tasmanian seed potato growers numbered around 150, many of whom were small landholders that also had other agricultural pursuits such as dairy. Seed certification began in the 1930s, with the aim to check the health of the crop and the occurrence of pest, virus and disease. Today, the state is still free of potato cyst nematode.

The perfect potato will meet the needs of the grower and satisfy the demands of the user (processor or consumer). In essence, the perfect potato is dependent on the quality of the seed potato, and crop management.

Suitable 'clean' land in Tasmania for seed potatoes needs to have been unused by other agricultural systems for several years, have good drainage and freedom from soil borne diseases.

"Tasmania is fortunate to be isolated from many potato pests and diseases, such as tomato potato psyllid," says Frank Mulcahy, affectionally referred to in the potato industry as the Spud Doctor.

"Common scab used to be a major cause of seed potato rejection, anything up to 25 percent of the crop, but we rarely see that today. That is in part because of improved crop management, and seed testing and certification."

As a seed certifier for many years, Frank has welcomed the improved testing systems that are now available, such as PredictaPT, to determine the levels of soil borne disease pathogens.

"Years ago, the buffer used to be around 30 percent seed rejection to ensure we had enough good seed, but with improvements in testing, that is nearer to two percent."

"For the processors, all seed potato grower sites are to be tested – it's not good business sense to lose 30 percent of your seed potatoes."

If a seed potato crop is looking poor, it can be grown out to be potatoes for processing, Frank explained.

"With the benefit of data, I was able to show growers that by planting later and harvesting earlier, the rejection rate was significantly reduced," he said.

Frank Mulcahy reflects on the seed potato certification history in Tasmania.

Frank has spent much of his career communicating his knowledge through extension to guide growers to improve their seed potato yields.



“This is because the plants were not under as much stress from the cold weather that still occurs in October, increasing the rate of common scab. That data showed that early planting had a 60 percent rejection rate, compared to six percent if it was planted in early December.”

Testing techniques such as PredictaPT have increased the awareness for growers of the existence and prevalence of diseases such as powdery scab. A project that Frank worked on for a number of years conducted DNA mapping using GPS locations, with the view to using biofumigants to lower the presence of soil borne diseases.

While the use of biofumigants was not particularly useful, the associated testing did reveal that poppies and pyrethrum, common crops in Tasmania, are hosts for powdery scab, thereby affecting how crop rotations are conducted in relation to seed potatoes.

**The advent of minitubers**

The development of minitubers for seed potatoes heralded an advancement in the production and certification of seed potatoes. In the 1990s Frank worked with Technico, which developed the

Technituber technology that changed how developing potato growing countries fared.

During Frank’s tenure with Technico, the concept of minitubers was introduced to countries such as India, Iran and Algeria. The focus was to ‘put the wheels of seed potatoes into those countries so they could establish their own seed potato industry’.

“When I started introducing minitubers to India, the country produced about 18 million tonnes of potatoes using government supplied seed potatoes that were easily generation seven or eight,” Frank said.

“With the introduction of minitubers, production is now around 50 million tonnes. While the introduction of quality seed certainly improved productivity, we also worked with the local elders to improve crop management.

“A lot of Indian potato growers operate on a few acres – one acre of rice, one acre of potato. A good farmer could achieve 10t/acre, the worst about 6t/acre. With good seed alone, the worst farmer could achieve about 8t/acre – the good farmer with better management could increase to 13-14t/acre.”

**What it demonstrated is that good quality seed potatoes and tubers are only part of the equation.**

Frank has spent much of his career communicating his knowledge through extension to guide growers to improve their seed potato yields.

“Soil management, plant health and nutrition, water and drainage, and integrated pest management are the basics that will improve a good farmer and make a poor farmer better,” Frank said.

“Testing through PredictaPT will guide the grower on what is going on in their soil. By doing that, Tasmania has stayed on top of site selection for minimal crop risk.”

As a boy of Irish heritage growing his first potato crop at 16, there is nothing more satisfying for Frank than walking through a potato crop at sunset to see the plants bounce back from the day’s stresses, looking green and healthy.

**As the Spud Doctor and in Frank’s legacy as a seed certifier and tester and minituber pioneer, that love of the humble potato has served the Tasmanian industry well.**

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INTERNATIONAL TRADE UPDATE

# Australian potato export overview

JULY 2023 - JUNE 2024

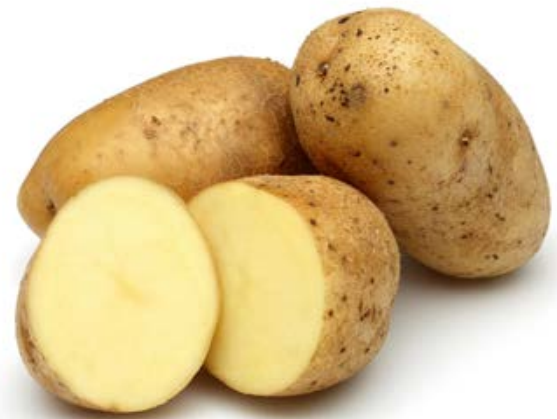
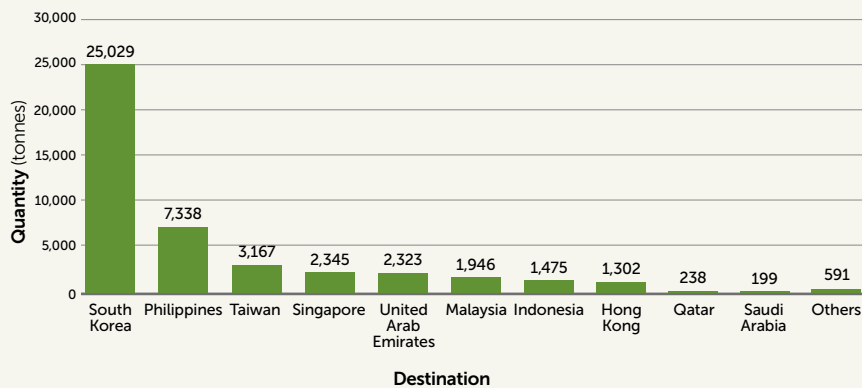
## Fresh potato exports by state

STATE	FY 2023-24	
	QUANTITY (TONNES)	VALUE (\$)
New South Wales	21,554.87	\$15,935,799
South Australia	17,751.27	\$21,352,792
Western Australia	4,215.29	\$6,134,438
Victoria	2,334.86	\$2,760,089
Queensland	90.29	\$239,960
Tasmania	6.85	\$16,764

Potatoes are one of Australia’s largest vegetable exports, primarily made up of fresh potatoes and a smaller amount of seed potatoes. Fresh potato exports in 2023-24 totalled 45,954 tonnes, while seed potato exports hit 4,595 tonnes.

Fresh potatoes are exported from most states, but New South Wales and South Australia are by far the largest exporters. Asia and the Middle East are the primary destinations, with smaller volumes going to Pacific Island nations.

## Top fresh potato export destinations



## Processed potato exports by state

STATE	FY 2023-24	
	QUANTITY (TONNES)	VALUE (\$)
New South Wales	340	5,651,840
Victoria	29	263,754
Queensland	26	169,107
South Australia	4	23,071

Australia’s exports of processed potatoes are minimal, hitting only 400 tonnes in 2023-24, in stark contrast to the 188,339 tonnes of processed potato imports.

Exports in 2023-24 hit their highest point in recent years, but Australia’s potato exports are relatively steady year-on-year, supported by the diversity of exporting growing regions and international markets.

TOP DESTINATIONS	FY 2023-24
	QUANTITY (TONNES)
Indonesia	77.13
China	62.87
Malaysia	35.00
Japan	29.33
New Zealand	26.43
Vanuatu	21.73
Korea Republic of	19.19
Taiwan	17.22
New Caledonia	16.40
Hong Kong	16.00
Fiji	14.18
Papua New Guinea	14.15

Source: ABARES trade data, ABS data, July 2023 - June 2024

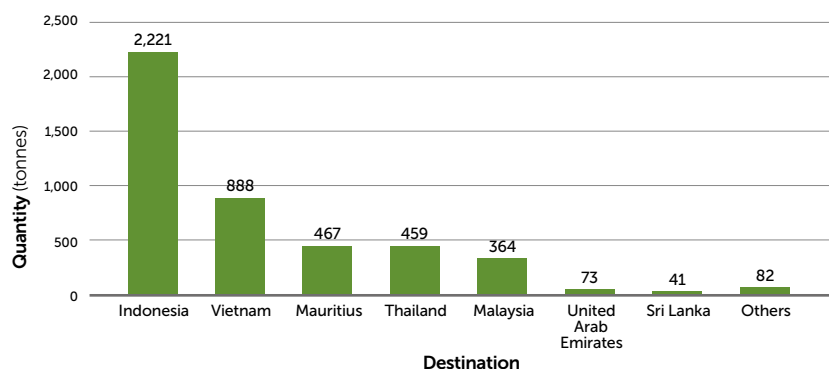
# Australian potato export overview

JULY 2023 - JUNE 2024

## Seed potato exports by state

STATE	FY 2023-24	
	QUANTITY (TONNES)	VALUE (\$)
Western Australia	3,461.35	\$5,048,213
South Australia	873.82	\$1,296,892
Victoria	225.93	\$374,970
Queensland	31.04	\$67,884
Tasmania	2.24	\$5,735

## Top Seed potato export destinations



Source: ABARES trade data, ABS data, July 2023 - June 2024

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FEATURE ARTICLE

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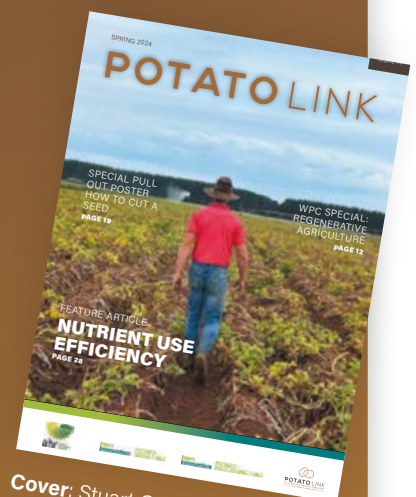
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**Cover:** Stuart Grigg at the Ballarat demonstration site. Photo by S. Thach. **Back page:** Prince Edward Island, photo by R. Barrett





## FROM PETER O'BRIEN ...



*Our spring issue is packed with some of the latest research and innovations in the potato industry. This edition offers a deep dive into some of the groundbreaking developments unveiled at the World Potato Congress (WPC), reflecting progress on research that shapes the future our industry.*

*Highlights include features on 2E-hexenal, a naturally occurring compound gaining attention for its potential in pest control and shelf-life extension, and the latest advancements in potato breeding. Speed in breeding programs has always been crucial to keeping pace with market demands and environmental challenges. This article takes a close look at how cutting-edge techniques are accelerating breeding cycles, bringing new, more resilient varieties to the field faster than ever before.*

*Additionally, we bring you a report on the discussions surrounding regenerative agriculture and how it is shaping practices worldwide, with a perspective from Prince Edward Island in Canada.*

*A PotatoLink demonstration trial from Ballarat into nutrient use efficiency provides detailed and valuable insights into maximising yield while minimising input costs. The results offer practical takeaways for farmers looking to improve their nutrient management strategies.*

*As an added bonus, this edition includes a special pull-out poster with step-by-step instructions on seed cutting. This poster is designed to be an easy reference for growers, ensuring best practices are followed.*

*Spring is a season of innovation, and we hope the articles in this issue inspire you to explore new ways of thinking and working. From the lab to the field, the potato industry is evolving rapidly, and we are pleased to be able to share these exciting developments with you.*

*Enjoy the issue!*

*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

**Advancements in potato breeding**

**Regenerative Agriculture: insights from Prince Edward Island, Canada**

**Exploring the potential of 2E-Hexenal in potato storage management**

**Nutrient use efficiencies in potatoes: A demonstration by PotatoLink**

**PotatoLink on the road:**

**Potatolink's Steph Tabone on a Nuffield adventure**

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# WPC SPECIAL: ADVANCEMENTS IN POTATO BREEDING

Transforming potato genetics from challenging tetraploid tubers to manipulable and predictable diploids

Gregor Mendel, 19th Century Austrian-Czech polymath, might have spent most of his life as a monk in a monastery, but he was still well ahead of his time. The significance of his painstaking experiments with pea plants were not appreciated until more than 30 years after their publication. However, it was these pioneering experiments that established the fundamental laws of genetics. They also proved what farmers had known for millennia, namely that crossbreeding could be used to improve desirable traits.

While Mendel knew nothing of DNA, the discovery of its role and structure confirmed his conclusions. It also revolutionised biology, revealing how genetic information is stored and transmitted.

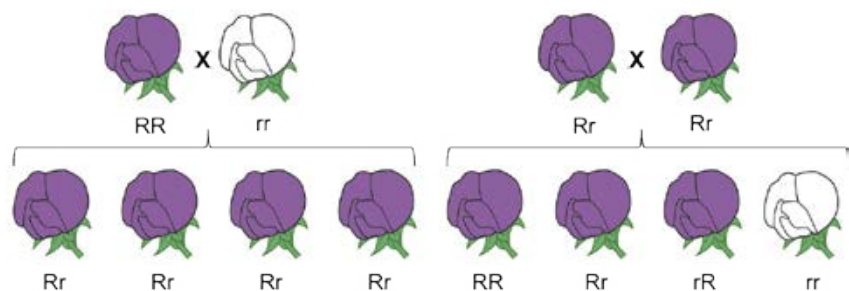
These breakthroughs paved the way for the development of DNA sequencing technologies in the 1970s. For the first time, this allowed us to directly map the entire genetic code of an organism. Modern plant breeding has since harnessed these advances, identifying and incorporating beneficial genes with unprecedented precision. Just as artificial intelligence has transformed computing power, gene sequencing has massively accelerated the development of improved crop varieties.

The potato was genetically unravelled in 2011. Since then, research groups from around the world have been studying the incredible 39,000 genes that it contains. For comparison, humans contain a mere 19,900 genes. In other words, the potato is surprisingly genetically complicated.

## KEY SCIENTIFIC TERMS USED IN THIS ARTICLE

- **Tetraploid:** An organism with four sets of chromosomes, which can lead to complex genetic recombination.
- **Diploid:** An organism with two sets of chromosomes, often used in hybrid breeding for its simpler genetic structure.
- **Diplodisation:** The process of converting a polyploid (for example a tetraploid potato) to a diploid
- **Genome sequencing:** The process of determining the exact order of nucleotides within a DNA molecule.
- **Hybrid vigour (heterosis):** The improved performance of hybrid offspring compared to their parents, often due to the combination of beneficial genes.
- **Inbreeding depression:** Reduced biological fitness in a population due to inbreeding, which can lead to weaker offspring.
- **True seed:** Seeds produced through sexual reproduction, offering a disease-free starting material for propagation.
- **F1 Hybrid:** The first generation of offspring produced by crossing two genetically distinct inbred lines, often exhibiting enhanced traits

## RECESSIVE AND DOMINANT GENES



Gregor Mendel's famous pea experiments revealed the nature of dominant (R) and recessive (r) genes as well as the concepts of genotype (the genes of an organism) and phenotype (how the organism actually looks).

In this example, the pea plant is a diploid. This means there are two genes determining flower colour: purple, which is dominant, and white which is recessive. If white flowers are desirable, then two white-flowered parents are required. The blue (r) and brown (R) eye colours of humans is an often-used example of this phenomenon.

Because traditional tetraploid potatoes have four variations of each gene, it becomes much more complicated to predict the appearance and qualities of offspring - see Figure 1.

While this complexity is one of the reasons for its productivity and adaptability, it also makes breeding better varieties all the more challenging.

## CHALLENGES IN POTATO BREEDING

You, me, and Mendel's pea plants are all heterozygous; we carry both dominant (visible) and recessive (hidden) copies of each gene. This is what makes us all different.

In contrast, modern crop production, whether lettuce, wheat, tomato or soybean, commonly uses F1 hybrids. F1 hybrids are produced by crossing two guaranteed pure breeding lines. These pure lines are generated by repeated inbreeding, producing individuals that are genetically stable with uniform genetics – 'homozygous'.

While we still do not fully understand why F1 hybrids perform so well, they reliably outperform both their parents. Hybridisation appears to overcome any harmful genes or 'bad traits', promoting the beneficial ones. Just like Mendel's hybrid pea plants, F1 plants

are virtually genetically identical, resulting in a uniform crop with consistent quality and yield.

However, it is not always easy to produce a pure breeding line. It is particularly difficult when plants are not self-compatible.

In the case of potatoes, add self-incompatibility to an unusually complex genome, and you have a major challenge.

Most plants and animals have two sets of chromosomes; 'diploid'. These carry dominant and/or recessive traits, combining to make the plant, animal or person that we see.

The ancestors of modern potatoes were diploid, just like other plants. However most of our current commercial potato varieties have four sets of chromosomes; 'tetraploid'. This may be one of the reasons potatoes are the world's most productive food crop. However, it also makes breeding an attribute lucky-dip.

If considering a trait such as blight resistance, there is only one possible outcome in an F1 hybrid, three to four possible outcomes from two

non-uniform diploid parents, but 16 potential outcomes from each cross of tetraploid parents.

Add the multi-generational lead time between producing a seed and growing a potato crop, and it is no wonder that it can take up to 50 years to develop a new potato variety.

It seems somewhat ironic that the new buzz on the block is transforming our modern, clonally propagated tetraploid potatoes back into old school diploids. However, the ability to do this is taking potato breeding by storm, transforming our ability to manipulate the potato genome and massively reducing the lead time in breeding new potato varieties.

However, this is not easy. Most diploids are self-incompatible. If they *can* be self-pollinated, there are often serious mutations that limit the number of generations that the line can be selfed. This makes it difficult to develop the genetically stable, homozygous, lines that are needed, especially as male sterility can be almost 100%.

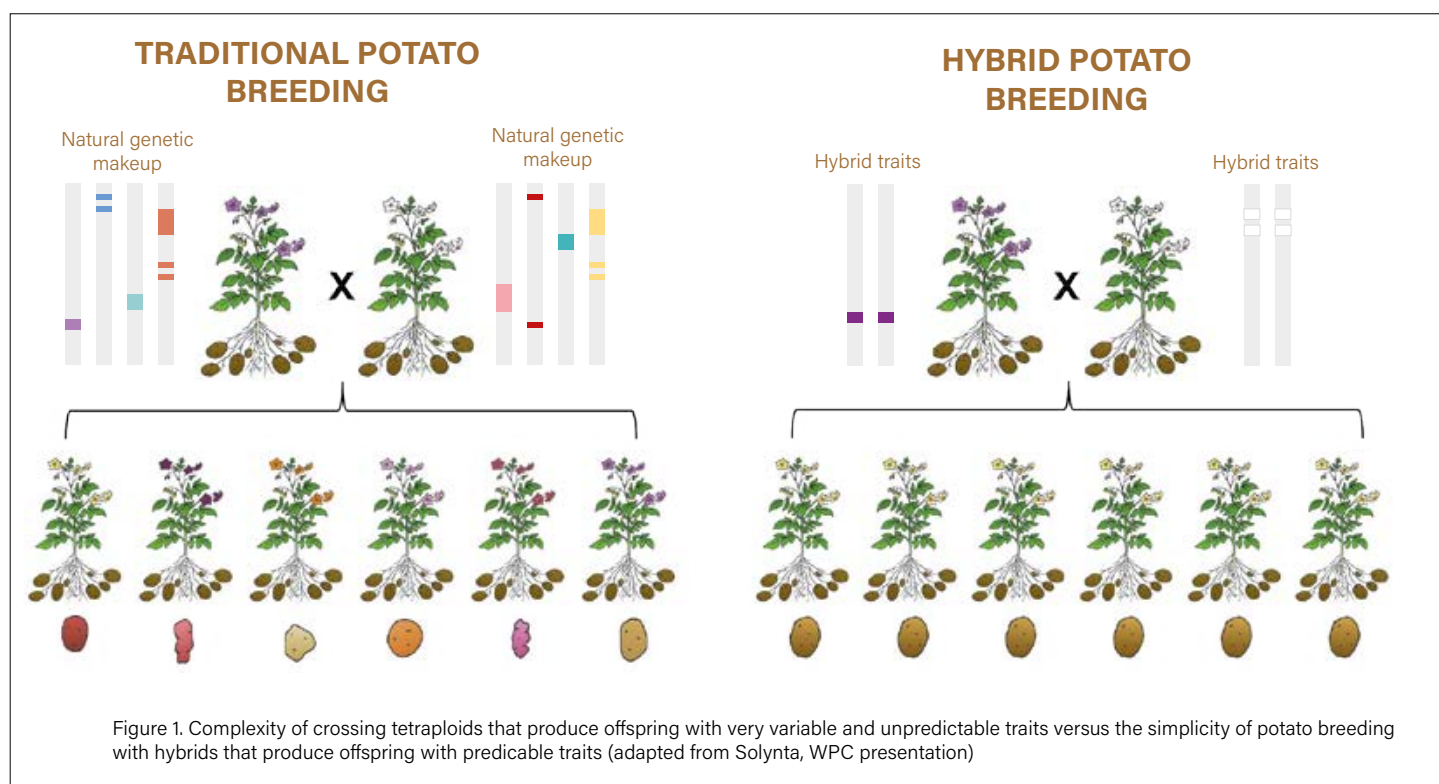


Figure 1. Complexity of crossing tetraploids that produce offspring with very variable and unpredictable traits versus the simplicity of potato breeding with hybrids that produce offspring with predictable traits (adapted from Solynta, WPC presentation)

## ADVANCEMENTS PRESENTED AT THE WPC

### Creating hybrids

Dr Chunzhi Zhang, a leading potato geneticist at the Agricultural Genomics Institute in Shenzhen, China, is at the forefront of efforts to transform potato breeding. Her presentation at the congress highlighted the progress her team has made in producing vigorous F1 hybrid potato lines.

Developing the highly homozygous (genetically uniform) inbred lines necessary for breeding hybrid potatoes has been difficult due to both harmful mutations and issues of self-incompatibility. In a paper published in 2021<sup>1</sup>, Zhang and her team described how they used genome editing to create a generation of pure and fertile potato lines. These could then be crossed, resulting in uniform and vigorous F1 hybrids.

With many advanced molecular techniques at their disposal they could measure several factors, including the percentage of genome homozygosity and the number of harmful mutations in the starting material. They could then separate beneficial and harmful genes.

This approach transforms potato breeding from a slow, random and non-accumulative process into a fast and increasingly targeted one.

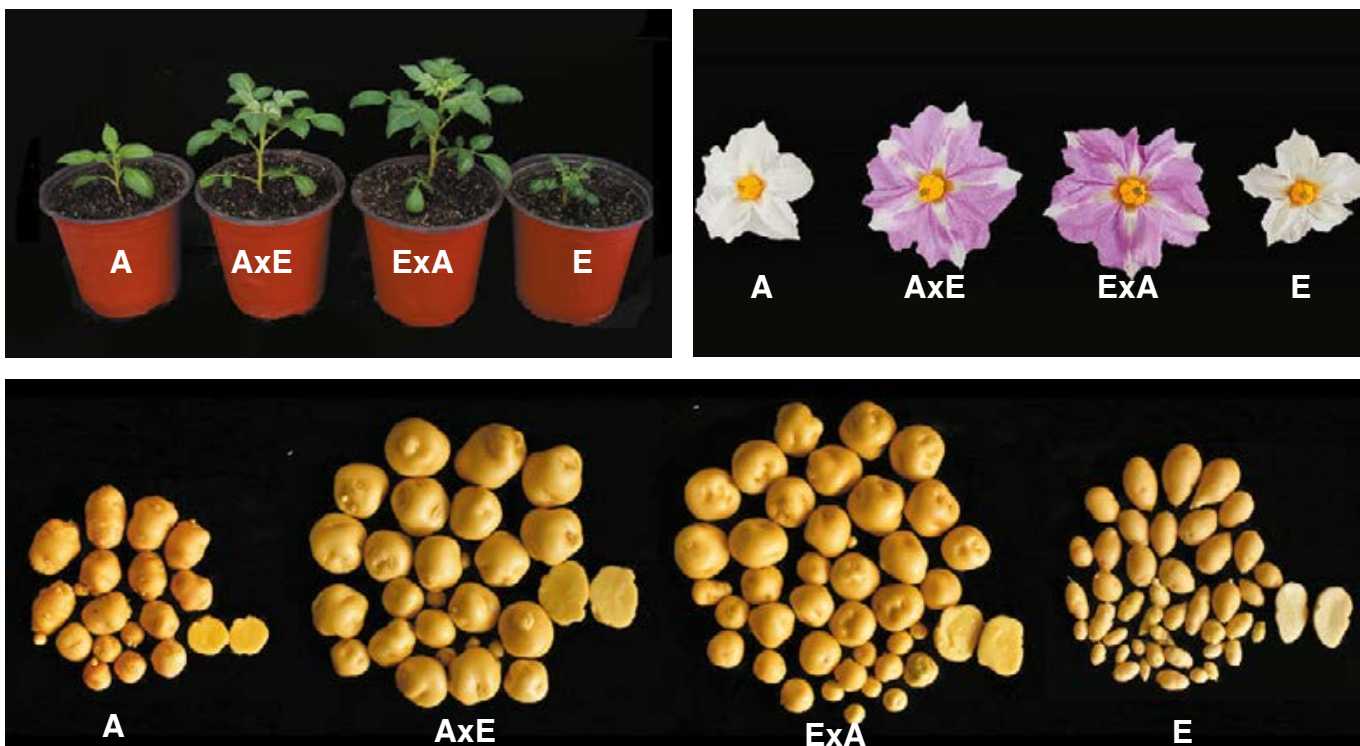


Figure 2. The two highly homozygous (genetically uniform lines) A and E were crossed to produce the F1 hybrids AxE and ExA. The F1 hybrid plants were more vigorous than either of their parents (top left) and produced more and larger tubers (bottom). The F1 flowers were larger and purple (top right), whereas the parental lines were both white. This shows that the parental lines interacted in the hybrids, producing a new flower colour. Images from Li et al., 2021<sup>2</sup>

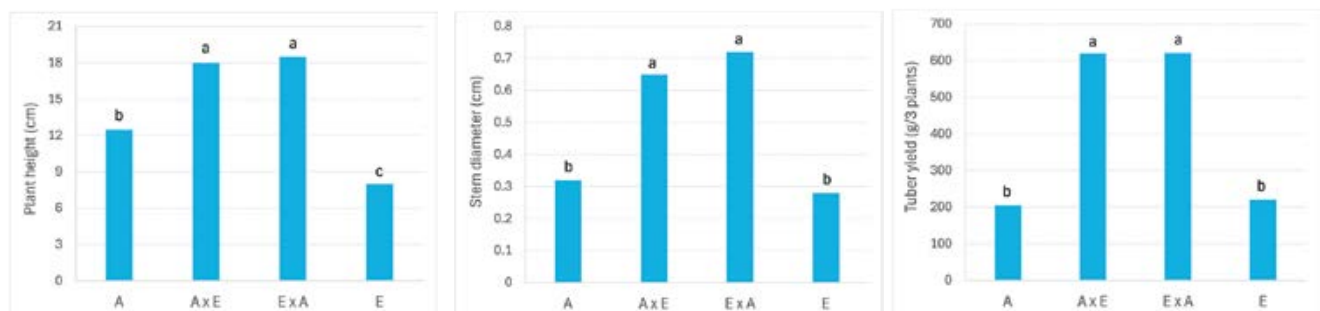


Figure 3. Hybrid plants (AxE and ExA) were significantly taller (left) and had stems more than twice as thick (centre) as either of their parents (A and E). Total yield was approximately tripled compared to the parental lines (right). Derived from Li et al., 2021<sup>2</sup>

### Potatoes with hybrid vigour

Zhang's group are investigating the molecular characteristics of their new varieties using a combination of advanced analysis techniques. These are providing insights into the 'hybrid vigour' created by crossing different potato varieties. This research is crucial for developing new varieties that are both high-yielding and resilient to environmental stresses.

For example, a study from her group in 2022 combined data from multiple analyses to examine the genetic and molecular factors behind hybrid vigour of potatoes at three developmental stages.

They found that the initial boost in growth was mainly due to 'dominant complementation'. This occurs when genes from each parent complement each other and, presumably, reduce any negative traits. Traits like flower colour, male fertility, and starch and sucrose metabolism all benefited from gene complementation. This meant that hybrids used more energy for primary metabolism, promoting faster growth.

The group found about 2,700 genes that are active in different ways at each growth stage. These genes likely help make the hybrids stronger, with specific changes in DNA (Figure 2, 3)<sup>2</sup>.



Figure 4. True F1 hybrid potato plants, produced by crossing *S. verrucosum* with *S. tuberosum*. Image: Presentation by Professor Douches.

### Building a library

Of more than 100 tuber-bearing *Solanum* species, a mere seven are currently cultivated. This points to a huge, virtually untapped, gene pool.

Professor Dave Douches, from Michigan State University (MSU), has already released more than 30 new potato varieties in over 36 years of breeding potatoes.

During the last 10 years his team has focused on reinventing the potato as a diploid, inbred line-based crop. Such lines are propagated from true potato seed using some of the novel genes in different potato species.

Their primary aim is to breed hybrid potatoes with improved resistance to disease and insect attack. Targets include common scab, Potato Virus Y (PVY), late blight, and the Colorado potato beetle. By developing potatoes with natural resistance, breeders aim to reduce the reliance on chemical treatments, reducing costs and improving crop health.

In addition to disease resistance, storability and processing quality, particularly for chip production, are critical traits. Stabilising the potato starch:sugar profile is essential for maintaining potato quality during low temperature storage. Developing varieties which can be stored for eight months or more at low temperatures, without accumulating sugars, is a key breeding target, as is resistance to blackspot bruising.

To support these breeding goals, the MSU research team has been collecting and maintaining a wide range of genetic material. This germplasm base acts like a library, providing a broad pool of genes from which they can select desirable traits. These include resistance to viruses and diseases, but also suitability for processing and high specific gravity.

Diploidisation is a critical part of the process. This reduces the number of damaging copies of genes as well as increasing genetic uniformity. Filtering out less desirable genetic material ensures that only the best traits are passed on.

Ongoing research activities include overcoming self-incompatibility among potato varieties. This is vital for successful breeding and consistent crop production. According to Professor Douches: "*The incredible gains in tomato breeding in the last century are only possible because of its reliable self-compatibility and broad intraspecific compatibility*".

Since 1940, improved breeding of new tomato varieties has increased yield by four to five times, as well as incorporated resistance to at least 42 major diseases.

To overcome self-incompatibility in potato, the MSU team has conducted backcross breeding of *S. tuberosum* dihaploids with *Solanum* species that are self-compatible, such as *S. verrucosum* and *S. chacoense*. With repeated backcrossing, this has produced diploid plants that improve in self-compatibility with each selection cycle.

Using these techniques, the team has established a collection of approximately 1,000 (homozygous) pure breeding lines. These are crossed to produce diploid hybrids, which can be assessed in field trials to measure performance under real-world conditions. Some of the advanced diploid selections have exceeded the yield of current commercial varieties – a very promising result!

### Pest resistant potatoes

One such example is the use of *S. chacoense* hybrids when screening for resistance to Colorado potato beetle. A breeding line susceptible to beetles but self-compatible was repeatedly crossed with a line resistant to beetles which was self-incompatible. After five generations, the team were able to isolate a variety which was both self-compatible AND beetle resistant.

This was then crossed with a diploid selection which had desirable tuber traits to achieve a commercially viable variety (Figure 5).

### Less thirsty potatoes

Another example is selection for drought tolerance genes from wild potato species. Wild potatoes possess unique genetic traits that allow them to survive in harsh, relatively arid conditions. Incorporating drought tolerance genes into cultivated potato varieties can help develop crops less impacted by low water availability. This could potentially improve the resilience of potatoes to climate variability as well as yield and stability in drought-prone regions.

Unfortunately, an effect found with drought tolerance in other crop plants is that these varieties may yield less than water-hungry varieties when conditions are good. Growers therefore have to take a gamble; plant the drought tolerant variety with lower yield, or hope that it rains. However, field trials with drought tolerant potato

lines at MSU from 2019 to 2023 did not find any yield penalty. Rather, both total yield and specific gravity were actually increased in these lines relative to commercial variety Ranger Russet.

### Potatoes that can take the cold

The team at MSU recently achieved a significant milestone in potato breeding with the development of the Kal91.3 potato variety. This breakthrough, which has been in the making for about a decade, is on the fast track to commercialisation, thanks to extensive research and testing.

The Kal91.3, bred from the MSU Kalkaska variety, does not contain active vacuolar invertase – the enzyme that converts starch to sugars. This means it can be stored at cool temperatures for extended periods without accumulating reducing sugars like fructose and glucose. This stability prevents browning when potato crisps are cooked (Figure 6).

From 2016 to 2023, Douches and his team tested the Kal91.3's agronomic characteristics, confirming its good shape, size, and specific gravity. Traditional chipping potatoes are stored at around 10°C, increasing moisture loss and leaving them vulnerable to storage rots. In contrast, Kal91.3 can be stored at 4°C, allowing longer storage as well as better quality.

The Kal91.3 variety is now approved for commercial production by the USDA/APHIS.



Figure 5. A potato plant resistant to Colorado potato beetle. Image: presentation by Professor Douches.

## CONCLUSION

As the challenges of environmental sustainability in a changing climate and food security converge, plant breeding has become a crucial field in the search for solutions. The need to develop crops that can withstand extreme weather conditions, resist pests and diseases, and produce higher yields on less arable land has never been more urgent. Modern plant breeding, using advanced genetic tools and techniques, offers promising pathways to meet these demands.

**Look out for future editions of PotatoLink magazine as we explore the potential of True Potato Seed**



**Kal91.3**



**Kalkaska**

Figure 6. The newly developed Kal91.3 potato can be stored in cool temperatures (4°C) for 6 months without accumulating reducing sugars (left). In contrast, the parental line Kalkaska (right) is chilling sensitive, browning following storage and chipping. Images: presentation by Professor D. Douches.

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2. Li D, Lu X, Zhu Y, Pan J, Zhou S, Zhang X, Zhu G, Shang Y, Huang S, Zhang C. The multi-omics basis of potato heterosis. J Integr Plant Biol. 2022 Mar;64(3):671-687. doi: 10.1111/jipb.13211. Epub 2022 Feb 28. PMID: 34963038.

## EXPLORE THE TOPIC FURTHER



PODCAST: PotatoLink Podcast Episode 5: Potato genetics at the James Hutton Institute



MAGAZINE ARTICLE: Potato breeding and variety selection

# WPC SPECIAL: REGENERATIVE AGRICULTURE: INSIGHTS FROM PRINCE EDWARD ISLAND, CANADA

At the World Potato Congress (WPC), PotatoLink's Dr Kelvin Montagu sat down with Ryan Barrett from the Prince Edward Island (PEI) Potato Board to discuss regenerative agriculture.



PEI is, in some ways Canada's Tasmania – a small island with significant agricultural influence. With approximately 175 potato growers producing 20-25% of the country's potato crop, farms on PEI are deeply integrated into local communities. Many are located close to residential areas, in what can sometimes feel like the neighbour's backyard.

As a result, agricultural practices on the island are closely monitored by local residents. While much of the push for regenerative agriculture in Canada has come from large mainland processing brands with little presence on the Island, the practice is also steadily gaining traction on PEI, driven in part by the PEI Potato Board.

## WHAT IS REGENERATIVE AGRICULTURE?

Regenerative agriculture can feel like an amorphous term, floating around and bandied about but hard to pin down by any strict definition.

Yet, as Dr Montagu points out, this flexibility is precisely what gives it its strength. Rather than adhering to rigid guidelines, regenerative agriculture is guided by principles and desired outcomes, allowing it to be adapted to various conditions and contexts. This adaptability makes it a powerful tool for addressing site-specific challenges, while still working towards overarching goals like improving soil health, enhancing biodiversity, and supporting resilient farming systems.

On Prince Edward Island (PEI), adoption of regenerative practices has grown due to the island's unique circumstances, namely an island with a high population density, farms situated close to residential areas, and significant public scrutiny regarding environmental impacts such as fertiliser and pesticide use.

According to Barrett, this context has pushed the island to be at the forefront of regenerative efforts in Canada.

"Soil health is top of mind here," he says, highlighting how public pressure and a strong sense of environmental responsibility within the community have created favourable conditions for regenerative practices to thrive.

## WHAT'S DRIVING REGENERATIVE AGRICULTURE IN PEI?

Ryan Barrett believes there are several factors, both local and global, driving interest in regenerative agriculture on PEI.

Global corporations like McCain Foods and PepsiCo have integrated regenerative practices into their sustainability strategies. And while McCain's presence is more prominent in other parts of Canada, local processors like Cavendish Farms have also begun supporting regenerative initiatives.

Reiterating the fundamental difference between regenerative and sustainable agriculture, Barrett says that while PEI has long been focused on sustainability, regenerative agriculture represents a shift towards actively enhancing farming systems.

"It's about taking sustainability to the next level – not just maintaining, but actively improving the soil and farming systems."

## KEY REGENERATIVE PRACTICES IN PEI

Through his role at the PEI Potato Board, overseeing research projects, talking to growers and, when he has spare time, helping manage his family's dairy and beef farm, Ryan Barrett has a good overview on the current practices, areas of interest to

growers, and topics they (the board) are looking to invest more research dollars in.

While there are differences in climate – nowhere in Australia experiences a Canadian winter – it is clear that Australia and Canada share some similar challenges.

As in Australia, four key practices are emerging on PEI: cover cropping, nitrogen management, crop rotations, and reduce tillage.

Ryan Barrett notes that cover cropping has grown significantly on PEI as a means of protecting soils during the autumn and winter months.

“Currently, over 60% of farmed hectares have cover crops before potatoes, with 50-55% after harvest, despite the short planting window before frost sets in.”

“This rose from 25% five years ago following a program of research and extension”.

“The focus is on winter-hardy species that can withstand cold temperatures, providing crucial soil protection during critical periods.”

Potatoes are nitrogen-greedy crops regardless of where they are

grown. As such PEI growers are also investigating ways to optimise nitrogen management. Research is underway to better understand the nitrogen credit provided by legumes and organic amendments like manure and compost. By quantifying these credits, farmers can reduce their reliance on synthetic fertilisers, aligning with regenerative principles.

While the cold winters of PEI, with snow cover and extended frosts give their growers some reprieve from pests and diseases, strategic crop rotations play a vital role in managing wireworms, which has limited chemical control options. Growers are experimenting with crops such as buckwheat and brown mustard, which can serve as both harvestable crops and cover crops. Although still in the research stage, crop rotations for pest control have yielded promising results and offer another tool in the regenerative agriculture toolbox.

Gentle tillage is a key principle of regenerative agriculture, but it poses challenges in potato systems. Nevertheless, interest is growing in softer tillage approaches like vertical tillage, which mixes the soil rather

than inverting it. Studies indicate that this method can help maintain organic matter, reduce soil compaction, and slow the decline of soil pH.

Despite PEI's progress in adopting regenerative practices, challenges remain. One difficulty lies in balancing the intensive demands of potato production with the goals of regenerative agriculture. For instance, integrating livestock for rotational grazing is less feasible on the island, where many farms do not include animals.

Reflecting on similar practices in Australia, Kelvin Montagu observes that here cover crops are often seen as a cost, but finding ways to recoup that cost, for example, through grazing or forage harvesting, can make them more attractive.

However, he warns that harvesting cover crops can sometimes be counterproductive – the heavy machinery for harvesting does the ground no favours – a lesson that PEI growers are also considering as they refine their approaches.

## THE FUTURE OF REGENERATIVE AGRICULTURE ON PEI

PEI's approach to regenerative agriculture is pragmatic, emphasising practices that work within the island's unique context. Farmers are encouraged to start small, learn from their peers, and gradually scale up practices that offer both environmental and economic benefits.

The flexibility of regenerative agriculture, which can be adapted to various regions and farming systems, allows growers, whether in Australia or on PEI, to advance sustainability without compromising productivity.



Potato paddock with a view on the beautiful Prince Edward Island in Canada



# WPC PANEL DISCUSSION ON REGENERATIVE AGRICULTURE

At the PotatoLink panel discussion on regenerative agriculture Tika Schellevis (Regenerative Agriculture Agronomist McCain Foods), Terry Buckley (SA Potato Grower), and Miranda Allitt (Sustainable Agriculture PepsiCo) discussed the implementation and challenges of regenerative agriculture in Australia. While the discussion, shared with around 100 attendees, covered the 'usual suspects' of soil health, improved yield, and biodiversity, it was the long-term sustainability of farming, both for fields and families, that really captured the mood of the day.

Speakers shared strategies for improving potato productivity, including enhancing seed quality, promoting minimal tillage, and integrating crop rotations. Discussions also touched on certification and the need for transparent frameworks for data collection and water management.

Concerns on financial barriers and the need to value farmers as key contributors within the supply

chain were voiced, with growers suggesting more guidance would encourage broader uptake. Effectively communicating practice changes to consumers, and the need for incentives to embrace regenerative practices was also a theme.

Action items proposed included increasing feedback from processing companies on desired outcomes, exploring opportunities for de-risking regenerative practices, and continuing engagement to build confidence in these approaches. Overcoming challenges like high costs and limited livestock integration options were also highlighted.

In the end, Miranda Allitt perhaps said it best, stating PepsiCo's very simple but compelling motivation for investing in regenerative agriculture – *they want to be working with farmers in 20, 50,100 years' time*. The only way to ensure this is through regenerative practices.



From left, Miranda Allitt, Kelvin Montagu, Terry Buckley, and Tika Schellevis

## TOP TIPS FOR GETTING STARTED WITH REGEN AG

- Focus on foundational regenerative practices like cover cropping, nitrogen management, and crop rotations.
- Prioritise improving soil health and managing nitrogen more effectively with organic amendments and legumes.
- Experiment (start with a small patch) with crop rotations to manage pests.
- Consider reducing tillage intensity or frequency. Techniques like vertical tillage, which mix the soil without inverting it, can help maintain organic matter and reduce compaction.
- Start small, build your knowledge by learning from local experts and other growers. Gradually scale up practices that work well in your specific context, focusing on both environmental and economic benefits.

## EXPLORE THE TOPIC FURTHER

WEBINAR: Regenerative Agriculture – Foundations and First Steps <https://soilwealth.com.au/2024/09/regen-ag-webinar/>

PODCAST: Regenerative Potatoes at the World Potato Congress <https://potatolink.com.au/resources/regenerative-potatoes-at-the-world-potato-congress?rq=regen>

# WPC SPECIAL: EXPLORING THE POTENTIAL OF 2E-HEXENAL IN POTATO STORAGE MANAGEMENT

How do you control diseases in stored potatoes when fungicide options are limited? Associate Professor Phillip Wharton from the University of Idaho has been exploring alternative methods to control storage diseases for over ten years, with some highly promising results.

The potato industry is big in Idaho. The state produces approximately 7 million tons of potatoes annually, valued at \$1 billion. However, 0.5 million tonnes of the potatoes placed in storage are lost due to disease and shrinkage, translating to a financial loss of around \$73 million each year. This substantial loss underscores the need for effective storage management solutions.

Dr Wharton and his team have been examining the potential of plant-derived volatile organic compounds (VOCs). VOCs are usually produced by plants in response to physical damage or insect feeding. These compounds contribute to plant defences, as well as signalling danger to other plants. Some are already well known for their antimicrobial properties. However, the rapid diffusion of these compounds in air has restricted practical application.

Among the various plant-derived VOCs, 2E-Hexenal has emerged as a highly effective agent when tested in vitro against potato pathogens. 2E-Hexenal is part of the green leaf volatiles, contributing to the characteristic smell of freshly cut grass and leaves, and possesses strong antimicrobial properties.

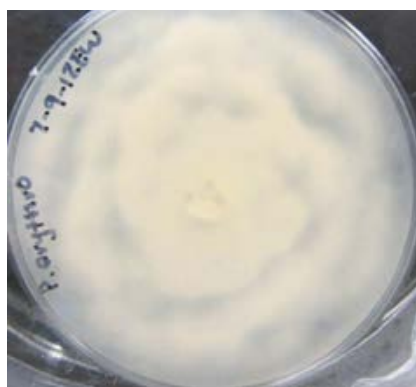
Dr Wharton presented his team's work on the application of 2E-Hexenal to stored potatoes at the World Potato Congress in Adelaide.

## STORAGE DISEASES

Preliminary research in 2013 examined the effects of 2E-Hexenal on in-vitro growth of soft rot bacteria, pink rot, pythium leak, late blight, fusarium dry rot, black dot or silver scurf. Fumigation with 2.5ppm 2E-Hexenal was enough to either slow or stop growth of all these pathogens on culture plates (Figure 1).

A preliminary large-scale trial confirmed 2E-Hexenals' excellent disinfectant properties, reducing bacterial populations in contaminated soil by 90%.

Encouraged by these promising results, Dr Wharton and his colleagues embarked on extensive storage trials between 2015 and 2023. These evaluated the efficacy of 2E-Hexenal against these pathogens under conditions more analogous to normal storage, with some impressive results.



## Storage trial methods

Potatoes cv. Vermillion (a highly susceptible variety) were inoculated with fusarium dry rot by soaking in a spore suspension. For the trials on pythium and pink rot, one inoculated tuber cv. Russet Burbank was placed among 25 healthy tubers, to simulate spread in storage.

The bags of inoculated tubers were then placed in large barrels and fumigated with 2E-Hexenal for 16 hours (Figure 2). Fumigation rates



Figure 2. Fumigation of tubers with 2E-Hexenal. Source: presentation by P. Wharton.

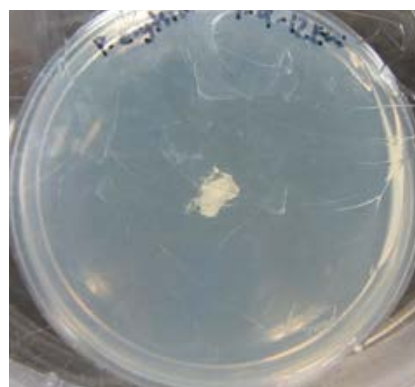


Figure 1. Growth of pink rot (*Phytophthora erythroseptica*) on plates left untreated or fumigated with 2.5 µL/L 2E-Hexenal. Source: presentation by P. Wharton.

ranged from 8 to 65ml 2E-Hexenal/ton potatoes.

All potatoes were stored at 16°C for three weeks before assessment of rot severity and incidence.

### Pink rot

All concentrations of 2E-Hexenal reduced pink rot incidence and severity relative to the untreated control (Figures 3, 4), including the lowest treatment concentration (8 ml/ton).

The lowest levels of disease were observed at 65ml/ton.

### Pythium

2E-Hexenal was effective in reducing both the incidence and severity of pythium in tubers, with mid-range concentrations (16ml/ton and 32ml/ton) providing the best results, being significantly different to the control (Figures 5, 6).

In this case, increasing the concentration to 65 ml/ton did not improve results, yielding infection rates not significantly different to the controls.

### Fusarium dry rot results

Nearly 90% of the untreated controls developed fusarium dry rot, with 20% developing severe symptoms.

In contrast, disease was significantly reduced by all 2E-Hexenal treatment concentrations, with disease incidence ranging from 12% to 32% (Figures 7, 8). The fumigant proved very effective against fusarium dry rot, with doses greater than 8 ml/ton failing to further increase effectiveness.

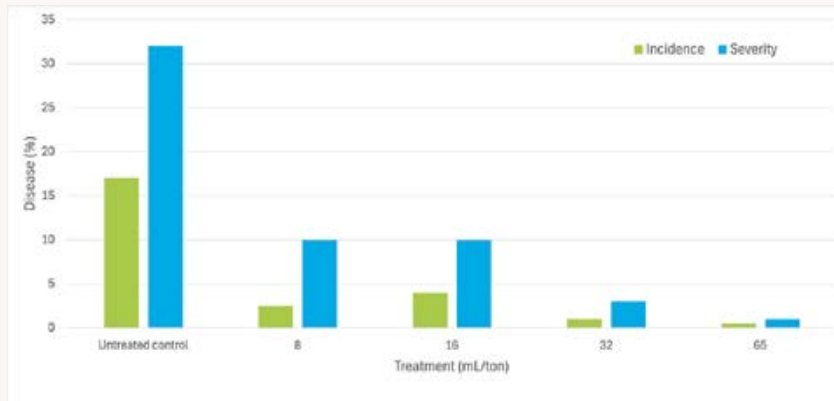


Figure 3. Incidence and severity of pink rot in cv. Russet Burbank tubers left untreated or fumigated with 8, 16, 32 or 65 ml/ton 2E-Hexenal then stored for 3 weeks. Derived from presentation by P. Wharton.



Figure 4. Tubers cv. Russet Burbank that were exposed to pink rot, then left untreated (left) or fumigated with 32 ml/ton 2E-Hexenal (right) following 3 weeks storage. Source: presentation by P. Wharton

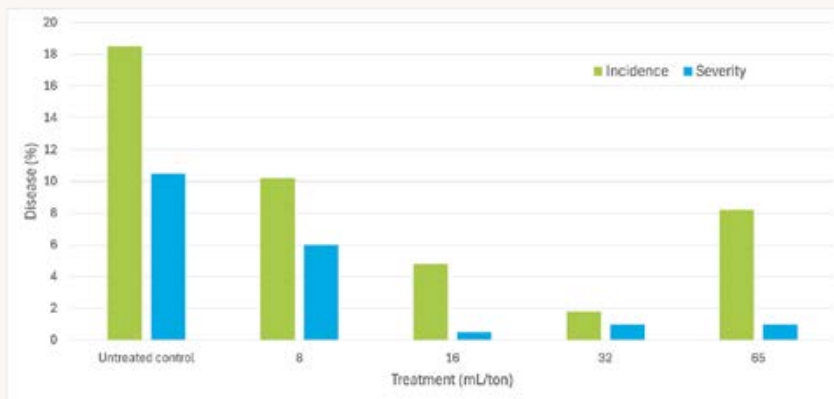


Figure 5. Incidence and severity of pythium in cv. Russet Burbank tubers left untreated or fumigated with 8, 16, 32 or 65ml/ton 2E-Hexenal then stored for 3 weeks. Derived from presentation by P. Wharton.



Figure 6. Tubers cv. Russet Burbank that were exposed to pythium, then left untreated (left) or fumigated with 16 ml/ton 2E-Hexenal (right) following 3 weeks storage. Source: presentation by P. Wharton

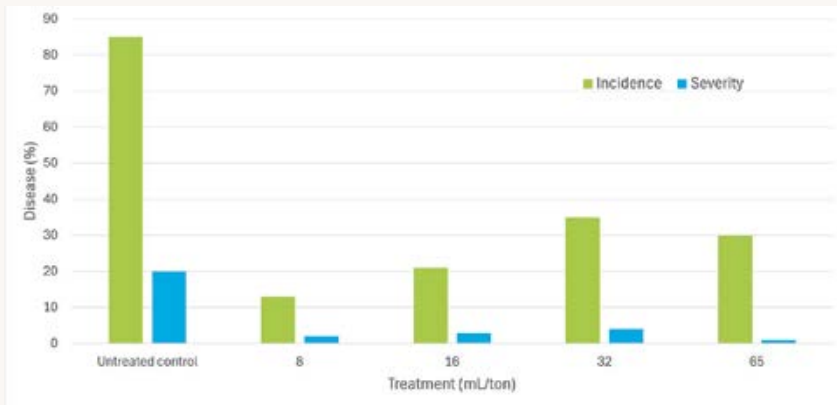


Figure 7. Incidence and severity of fusarium dry rot in cv. Vermillion tubers left untreated or fumigated with 8, 16, 32 or 65 ml/ton 2E-Hexanal then stored for 3 weeks. Derived from presentation by P. Wharton.



Figure 8. Tubers cv. Vermillion that were inoculated with fusarium dry rot, then left untreated (top) or fumigated with 8mL/ton 2E-Hexanal (bottom), following 3 weeks storage. Source: presentation by P. Wharton

## BLEMISH DISEASES

The team also studied the effect of fumigation on blemish diseases. In this trial, tubers cv. Melody that were naturally infected with black dot or silver scurf were fumigated as previously.

Following fumigation, the tubers were stored at 12°C for up to 12 weeks. Rather than examining skin symptoms - which are difficult to measure objectively - the team quantified levels of pathogen DNA on the tubers every two weeks using qPCR.

Levels of black dot were low at the start of the trial, and declined to almost zero within two weeks of storage, regardless of the treatment used. As a result, there was no significant effect of 2E-Hexanal on levels of black dot disease.

However, results were clear for silver scurf. Levels of silver scurf DNA on untreated tubers doubled after two weeks, remaining between around 27 to 37ng/g tuber tissue over 8 weeks of storage.

In contrast, all doses of 2E-Hexanal significantly reduced the levels of pathogen DNA (figure 9). With a single exception after 8 weeks storage, all treatments suppressed the quantity of pathogen DNA to below 5ng/g tuber tissue.

This suggests that fumigation with only 4ml/ton 2E-Hexanal can virtually eliminate blemish caused by the silver scurf pathogen.

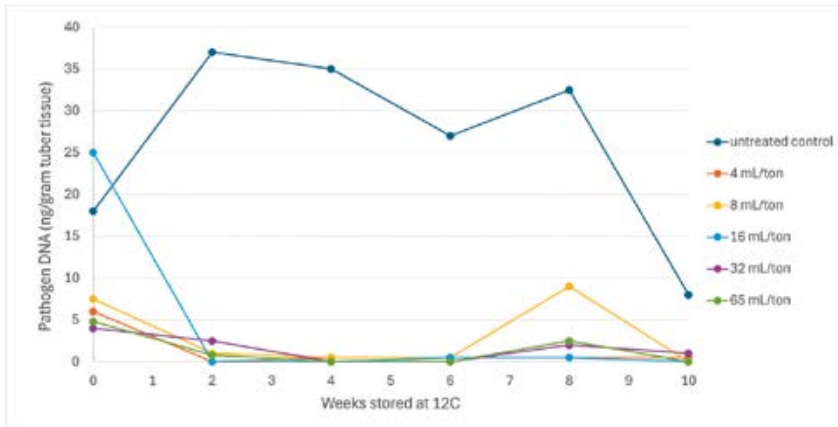


Figure 9. Amount of pathogen DNA detected per gram tuber tissue on potatoes naturally infected with silver scurf, measured during 10 weeks storage. Derived from presentation by P. Wharton.

## KEY CONCLUSIONS FROM DR WHARTON'S RESEARCH:

- Concentrations of 2E-hexenal as low as 2.5µL/L inhibited or prevented the growth of all tested potato storage pathogens during in-vitro laboratory tests.
- Fumigation with 2E-Hexenal before storage significantly reduced both disease incidence and severity in tubers that were stored alongside a tuber inoculated with pink rot or pythium.
- Fumigation with 2E-Hexenal before storage almost completely suppressed disease development in highly susceptible tubers inoculated with fusarium dry rot.
- Over 10 weeks of storage, the levels of silver scurf DNA in naturally infected tubers were significantly lower in those treated with 2E-Hexenal.
- However, for black dot, no significant difference was observed between treated and untreated tubers.
- On average, treatment with 2E-Hexenal reduced the incidence of major storage diseases by 85%.

## 2E-HEXENAL - AN OVERVIEW

The organic volatile 2E-Hexenal works through multiple mechanisms to protect stored potatoes from disease.

The fumigant doesn't just inhibit the growth of bacteria and fungi, but can kill bacterial cells and fungal spores on contact. Thus, just one treatment with 2E-hexenal can greatly reduce the pathogen load during storage.

The compound is also thought to trigger the production of natural plant defence compounds within the potatoes, increasing their resistance to pathogens.

2E-Hexenal would be applied to potatoes in storage using commercial fogging equipment at a low temperature. It is anticipated that one treatment at the beginning of storage should provide protection of tubers in storage for up to 3 months. As the product can be applied to tubers through the ventilation system, 'top up' applications could be applied later in the storage season.

Using 2E-Hexenal offers several advantages compared to traditional fungicides:

- As a naturally occurring compound, 2E-Hexenal is considered safe for use in food products, minimising concerns about residue levels.
- There are no fungicides currently registered for direct application to tubers in storage in the US. All products are postharvest, pre-storage fungicides which are applied as the tubers are being placed in storage.
- Tubers treated with a liquid fungicide need to be dried before storage.
- 2E-hexenal can be applied to tubers after they have been placed in storage.
- Its application reduces the dependency on synthetic fungicides.

**Note: 2E-hexenal is not yet commercially available. However, Dr Wharton has been working closely with AMVAC Chemical Company LLC over the past 5 years as they complete all the research necessary to submit the required documentation to the US EPA for registration of 2E-hexenal as a fungicide for use on potato.**

# NUTRIENT USE EFFICIENCIES IN POTATOES

## A demonstration by PotatoLink

The rising cost of inputs has growers searching for ways to enhance nutrient use efficiency and understand its impact on pack-out and yield. A previous trial (read more here or scan the QR code at the end of the article) at the PotatoLink demonstration site in Springbank (Victoria) explored how farm practices impact the effectiveness of biologicals, including fungicide application, soil nutrient availability, and fertiliser use. The positive results from that trial, including improvements in tuber size, quantity, and specific gravity, shaped the objectives for this new trial.

This trial (carried out between November 2023 and March 2024) focused on the impact of specific inputs on yield and quality (Figure 1). The study was divided into three trials using the processing variety, Innovator.

Note that this was an observational study only—not a fully replicated and randomised trial. It was simply intended to provide an indication of whether the treatments were likely to impact yield or quality. Further replicated trials are required to confirm these results.

### The three trials examined:

1. Impact of nitrification inhibitors
2. Effect of potassium sources - Sulphate of Potash (SOP) vs Muriate of Potash (MOP)
3. Impact of humic acid

Figure 1: Field treatments applied. Standard grower practice was treatment 3.

### THE TREATMENTS

A standard NPKS fertiliser blend was applied as a base fertiliser, with either Muriate of Potash (MOP) or Sulphate of Potash (SOP), with or without humic acid and with or without a nitrification inhibitor. The following treatments were tested:

1. Base fertiliser + MOP
2. Base fertiliser +MOP + nitrification inhibitor
3. Base fertiliser +MOP + humate (**grower practice**)
4. Base fertiliser + MOP +humate + nitrification inhibitor
5. Base fertiliser + SOP + humate

### ASSESSMENTS

Sap tests were conducted on:

- December 13, 2023 – Pre-tuber stage
- January 6, 2024 – Tuber development stage
- February 7, 2024 – Late tuber bulking stage

Tissue tests were conducted at late tuber bulking.

After vine-kill, five plots measuring three meters each were dug, harvested and assessed from within each treatment block (Figure 3). Within these plot areas, data was collected on the number of plants and stems, as well as the number and weight of marketable and unmarketable (due to defects and size) tubers. Tubers were categorised into size grades: less than 50mm (considered out of specification for processing and therefore also unmarketable), 50-100mm (medium), 100-150mm (large), and 150-200mm (extra-large). Specific gravity was measured on marketable tubers.

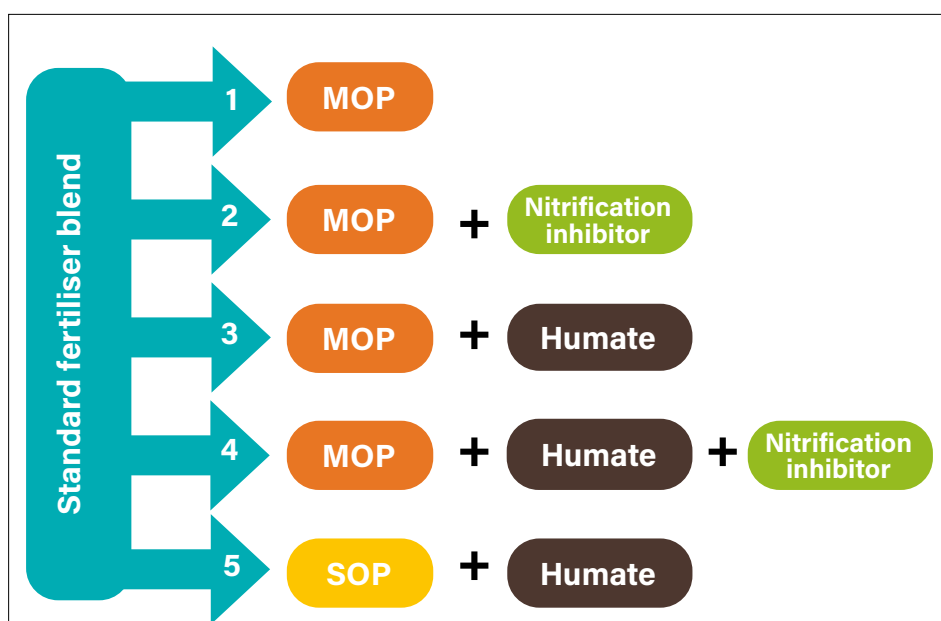




Figure 2. The trial site; potatoes in these rows were treated with the nitrification inhibitor



Figure 3. Meg the kelpie supervises digging at one of the 5 x 3m sampling sites per treatment



Figure 4. Potatoes were graded into extra-large, large, medium and small sizes, then defective tubers removed to determine total marketable yield.

## PRODUCTS AND INPUTS USED

Product	What is it?	Purpose
Fertiliser	An NPKS fertiliser blend	Base fertiliser
Sulphate of Potash (SOP)	Potassium sulphate ( $K_2SO_4$ ) provides both potassium and sulphur. Contains 41.5% potassium and 17% sulphur with no chloride.	Potassium and sulphur are both essential plant nutrients. Important for yield and quality while avoiding chloride-related issues.
Muriate of Potash (MOP)	Potassium chloride (KCl) contains 50% potassium. Normally cheaper than sulphate of potash, but also contains 50% chloride which can add to soil salinity issues.	Potassium is an essential nutrient, required for healthy plant growth and improve crop yields
Humate	Organic compounds derived from humus, which is decomposed organic matter in soil. Contain humic acid.	Used as a soil amendment claimed to promote root growth, improve soil nutrient holding capacity, stimulate microbial activity etc.
Nitrification inhibitor	Chemicals or substances used in to slow down nitrification – i.e. the conversion of ammonium ( $NH_4^+$ ) to nitrate ( $NO_3^-$ ) in the soil.	By inhibiting nitrification, these nitrogen remains in the ammonium form in the soil for longer, which is less prone to leaching than nitrate.

## TRIAL 1: NITRIFICATION INHIBITORS FOR IMPROVED CROP PERFORMANCE

Trial 1 addressed the question:

*Does the increased ammonium-N associated with nitrification inhibitors affect potato quality, size and yield?*

Plants grown with the nitrification inhibitor yielded the same amount as those without the inhibitor, however they had fewer stems and tubers (Figure 5), which resulted in more large tubers (Figure 6). The effect on tuber size could be especially useful for chipping potatoes.

The percentage of small and defective tubers was significantly reduced by addition of the nitrification inhibitor, suggesting that this product had a positive impact on overall nitrogen use efficiency. There was also a trend to higher specific gravity in tubers grown with the nitrification inhibitor, but this difference was not statistically significant.

Sap tests did not reveal significant differences in NO<sub>3</sub> during growth, however potassium levels were slightly higher in plants treated with the nitrification inhibitor at tuber bulking. It may have been that nitrification inhibitors slowed uptake of potassium by potato plants, possibly due to slightly reduced initial growth.

Tubers and stems per plant

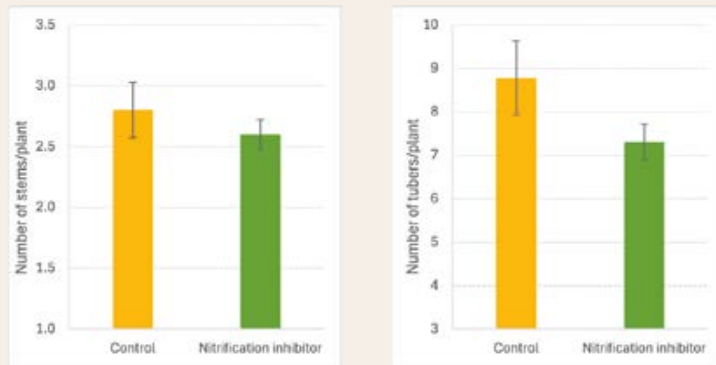


Figure 5. The average number of stems / plant and tubers / plant for potatoes grown with and without the addition of a nitrification inhibitor to fertiliser at planting. Error bars indicate the standard error of each mean value (n=10).

Tuber size distribution

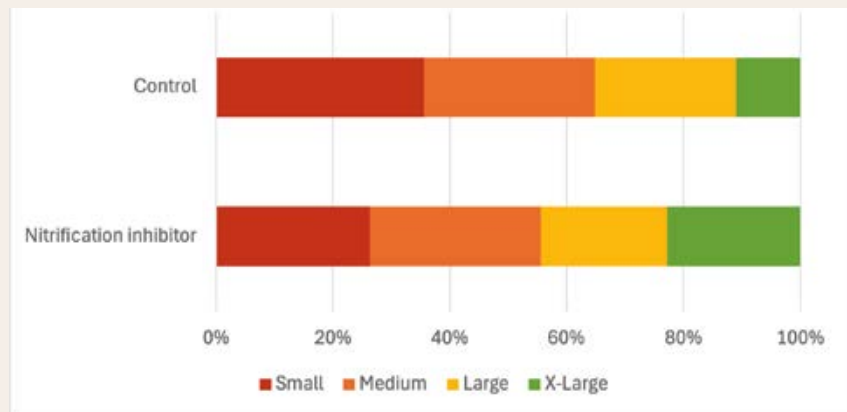


Figure 6. Size grades of potatoes grown with and without the addition of a nitrification inhibitor to fertiliser at planting.

Total yield including defective, small and marketable

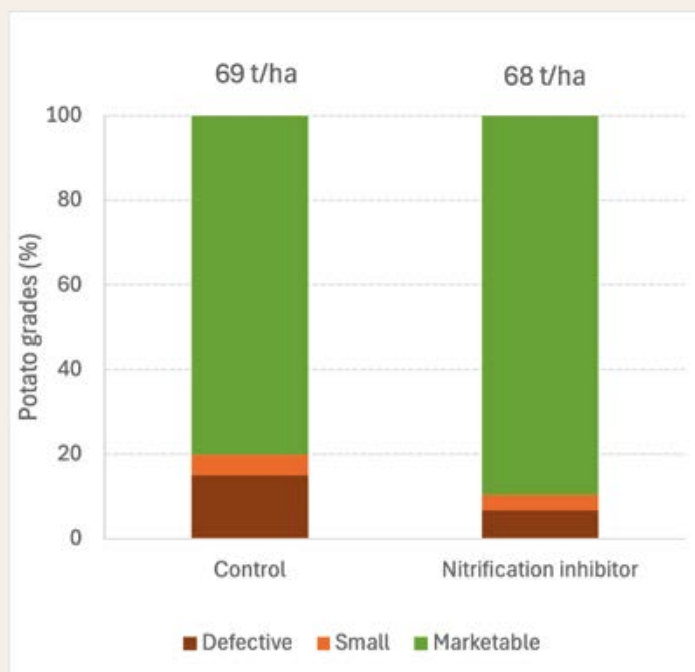


Figure 7. The average number of stems/plant and tubers/plant for potatoes grown with and without the addition of a nitrification inhibitor to fertiliser at planting. Error bars indicate the standard error of each mean value (n=10).



## TRIAL 2: THE IMPACT OF POTASSIUM FERTILISER FORMULATIONS

Trial 2 posed the question – *does application of sulphate of potash (SOP) instead of muriate of potash (MOP) affect potassium use efficiency, yield or quality?*

Application of SOP avoids the issues with chloride toxicity that can occur with long term use of MOP, while also potentially increasing soil sulphur. While this was only a single cropping cycle, the sap tests showed clear differences in take up of sulphur and chloride by the plants.

The desirable ranges for sulphur and chloride in potato crop sap are 70 to 125ppm and 100 to 3,000ppm respectively. While all measurements were within this range, the chloride levels in potatoes fertilised with MOP at tuber bulking approached the upper limit.

In this trial neither sap analysis or tissue analysis detected any difference between MOP and SOP in terms of potassium nutrition.

There was a trend to a higher number of stems/plant and more tubers/plant when plants were fertilised with MOP compared to SOP. Although this difference was not statistically significant, it is consistent with the larger proportion of small tubers harvested from the MOP treatment. While this suggests that use of SOP could potentially be a positive for processing, the results by plot were quite variable (note the large error bar on Figure 10), so this result should be treated with caution.

There was no significant difference in either the percentage of defective tubers or the total yield between the MOP and SOP treatments.

In summary, the key difference between MOP and SOP in this trial was in the concentrations of chloride and sulphur in plant sap. There were less effects on yield and quality, with a marginal potential benefit from SOP in terms of tuber size.

Sulphur and chloride (ppm) at different growth stages

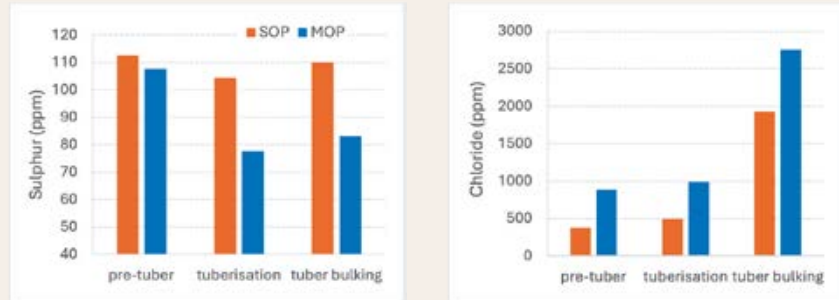


Figure 8. Results of sap tests for sulphur and chloride at different growth stages of plants fertilised with either sulphate of potash (SOP) or muriate of potash (MOP) at planting.

Tubers and stems per plant

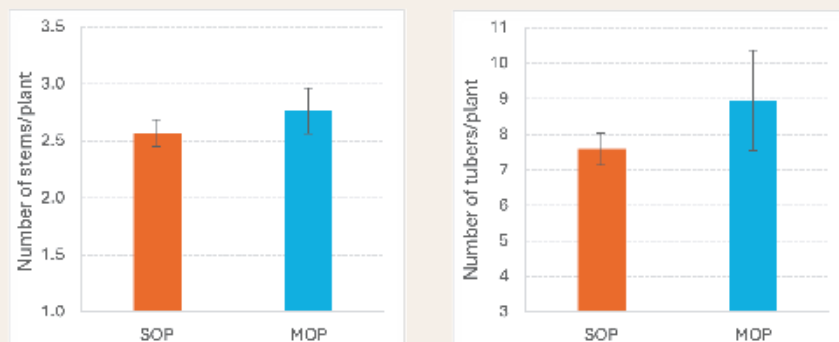


Figure 9. The average number of stems / plant and tubers / plant for potatoes fertilised with either sulphate of potash (SOP) or muriate of potash (MOP) at planting. Error bars indicate the standard error of each mean value (n=10).

Total yield including defective, small and marketable

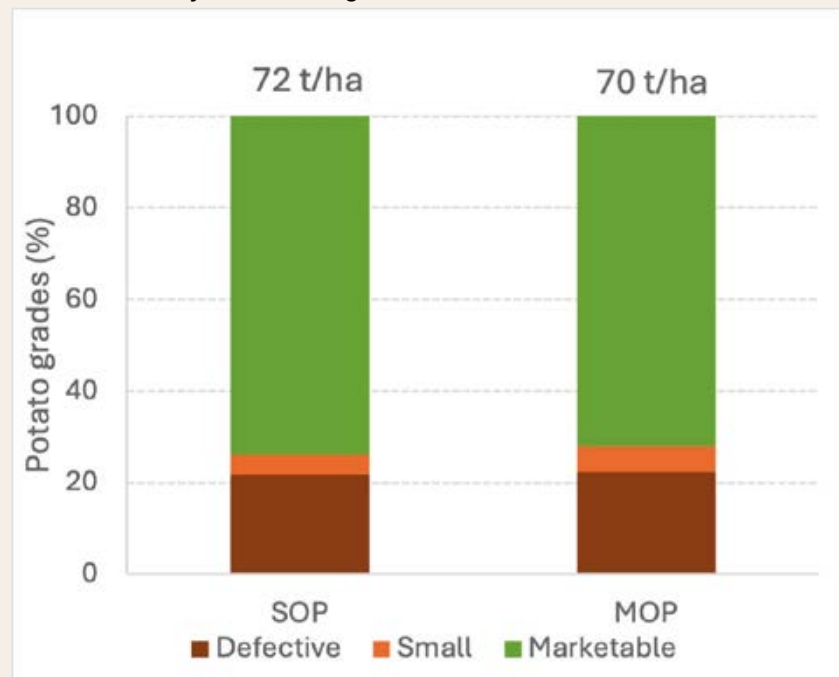


Figure 10. The percentages of defective and small tubers from potatoes grown with either sulphate of potash (SOP) or muriate of potash (MOP) at planting. Total yield is shown above each column.

Tuber size distribution

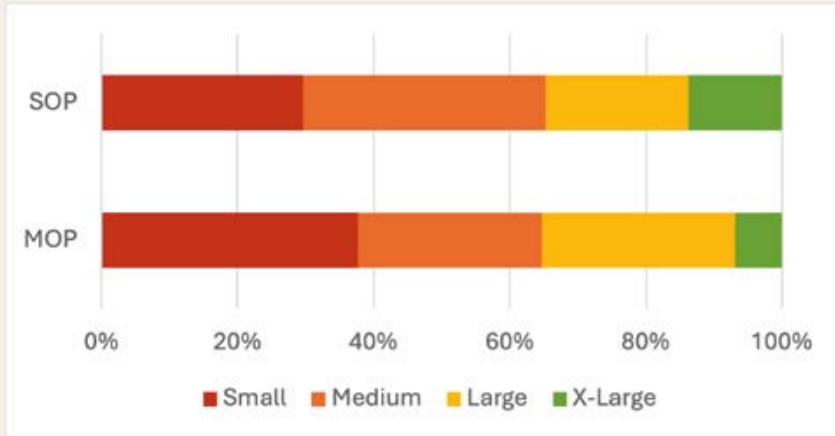


Figure 11. Size grades of potatoes fertilised with either sulphate of potash (SOP) or muriate of potash (MOP) at planting.

### TRIAL 3: EFFECT OF HUMATE ADDITION ON NITROGEN USE EFFICIENCY

Our final trial examined the question – *does the addition of humate improve crop performance through more efficient utilisation of nitrogen?*

There were no differences in nitrate and potassium levels within either sap or leaf tissue between the humate treated and untreated potatoes. Interestingly, there was a trend to increased sap boron levels in the plants which had received the humate booster. The optimum level for boron

in potato plant sap is 0.2 to 0.5ppm. In this trial, sap boron levels increased to an average of 0.76ppm in the humate treated plants.

However, all tissue tests at tuber bulking were within the normal range for boron. Moreover, no symptoms of boron toxicity (leaf edge necrosis, interveinal necrosis) were observed on the potato plants themselves. Potatoes are far more likely to suffer issues from boron deficiency than excess, suggesting that this increase in sap levels is unlikely to negatively impact tuber growth or development.

In this trial, the addition of humate did not affect either the average number

of stems or the number of tubers per plant. There was also no significant effect on the percentage of defected potatoes, marketable yield or the percentages of small, medium or large, or extra-large potatoes.

There was a small, but significant improvement in specific gravity (from 1.06 to 1.08) associated with humate application. There was also a significant interaction between humate and nitrification inhibitors, with a trend to increased marketable yield when the two were combined. However, variability was high, so such results need to be confirmed through larger scale trials.

Previous work has found positive effects on yield and quality from application of humate. This was not confirmed in the current trials, with little effect on either. A likely explanation for this result is that a large amount of old hay was mulched into the field prior to planting. This increase in soil organic matter may have limited the benefits of adding additional humate, the soil already being high in this compounds.

The key conclusion from this trial is that benefits of humate addition are likely to vary according to soil type, health and condition. Growers need to do their own tests in order to determine whether the benefits of this treatment justify costs for their farm.

Boron (ppm) at different growth stages

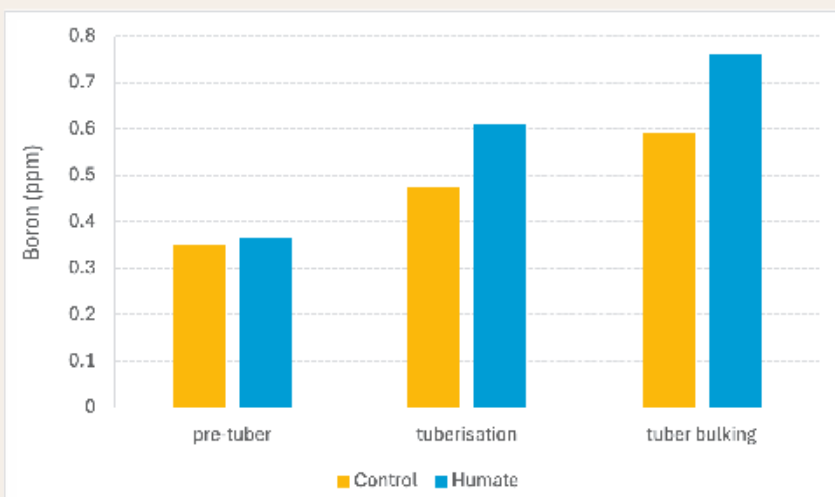


Figure 12. Sap boron levels in plants that had humate added at planting or were left untreated.

## SUMMARY OF KEY OBSERVATIONS

- Application of nitrification inhibitors reduced the total tuber count but did not affect total yield
- The number of defective potatoes was reduced and percentage of large and extra-large potatoes increased with use of nitrification inhibitors
- Application of sulphate of potash (SOP) instead of muriate of potash (MOP) increased sulphur content and decreased chloride content in plant sap during the cropping period
- SOP had a slight advantage over MOP in terms of the percentage of large tubers, but otherwise yield and quality was generally unaffected
- Addition of humate did not affect yield or quality; this is likely due to the addition of organic material to the soil before planting, increasing the naturally occurring levels of humate.

## EXPLORE FURTHER



CASE STUDY: PotatoLink demonstration: Using biologicals in a commercial farm setting



FACTSHEET: The changing nutrition needs of a growing crop



MAGAZINE ARTICLE: Petiole testing for nutrient analysis



FACTSHEET: Interpreting soil test reports



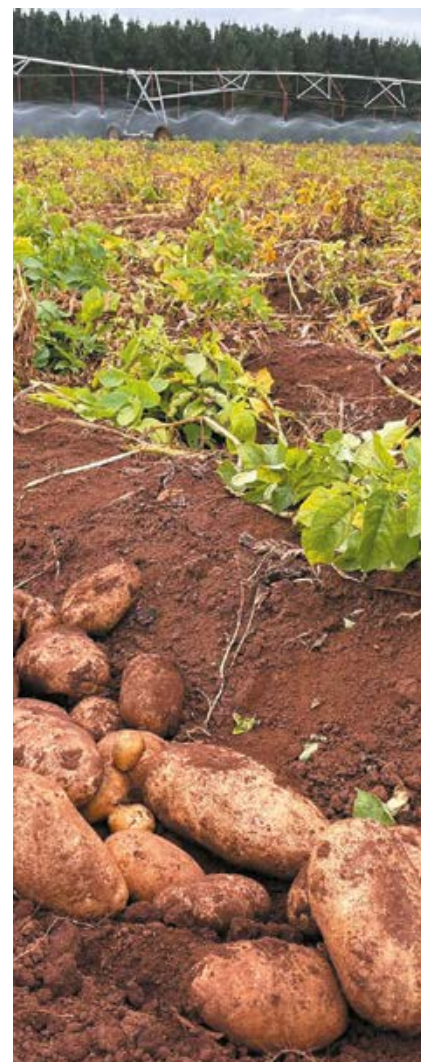
MAGAZINE ARTICLE: Potassium, specific gravity and getting the balance right, magazine article

**Read more on nutrition management on the PotatoLink website:**  
[www.potatolink.com.au/nutrition](http://www.potatolink.com.au/nutrition)

## ACKNOWLEDGMENT AND DISCLAIMER

The PotatoLink team would like to thank grower Neville Quinlan for access to his farm and assistance in the trial, and PotatoLink regional representative Stuart Grigg who has worked with us to carry out the trial and interpret the results.

**Disclaimer:** The results reported in these trials are from an observational study only, and the information presented here should not be used to inform any management decisions. Applied Horticultural Research (AHR) make no representations and expressly disclaims all warranties (to the extent permitted by law) about the accuracy, completeness, or currency of information in this article, and reliance on any information is entirely at your own risk. Applied Horticultural Research (AHR) are not responsible for, and will not be liable for, any loss, damage, claim, expense, cost (including legal costs) or other liability arising in any way from the use of information contained in this article.





# POTATOLINK ON THE ROAD

## On tour with the PotatoLink roadshow

The recent tour of Australia's key potato-growing regions brought a series of impactful workshops to Ballarat (Vic), the Lockyer Valley (Qld), Ulverstone (Tas), and multiple locations across South Australia (SA). Almost 190 attendees (growers, agronomists, suppliers and others) took time out of their busy schedules to network, share insights, and dive into the latest developments in growing spuds. These workshops offered an invaluable opportunity for hands-on learning and collaboration, strengthening the growing community and driving the industry forward.

The roadshow, an ambitious tour covering over 4,000 kilometres, featured American potato pathologists Professor Amy Charkowski from Colorado State University and Associate Professor Phillip Wharton from the University of Idaho. Alongside local experts and representatives from Hort Innovation, AUSVEG, and QDAF, this dynamic team hit the road to empower growers with the latest strategies for boosting potato quality and yield.

Starting in Ballarat, 60 local growers, agronomists, suppliers, industry reps and processors, attended a workshop facilitated by PotatoLink regional representative Stuart Grigg.

The session delved into common potato diseases like blackleg, soft rot, powdery scab, and both early and late blight. Dr Charkowski and Dr Wharton focused on pathogen identification and the impact of environmental factors on disease development.

Local expert Phil Hoult discussed soil nutrition essentials, and Stuart Grigg presented findings from the PotatoLink demonstration sites, showcasing the benefits of mycorrhizal fungi and strategies for nutrient efficiency.

From there the roadshow headed south to Ulverstone in Tasmania, where over 80 people joined host and regional representative Tim Walker, to hear from Dr Charkowski, Dr Wharton, and Dr Doris Blaesing from RMCG who shared information on the Tas Resilient Farming project.

Disease management, including identifying and implementing preventative measures to safeguard crops was the focus, including blackleg and soft rots, diseases



Clockwise from top, Amy Charkowski delivering a talk in Ballarat; Phillip Wharton, Aaron Haby, Jason Hingston and Peter O'Brien in South Australia; Tasmanian regional rep Tim Walker. TOP OF PAGE: Phillip Wharton and Aaron Haby.



From the Lockyer Valley event, from left, Shakira Johnson, Jason Hingston, Praise Tadle, Ryan Hall, Amy Charkowski, Darren Brown

## PotatoLink out west

Early September, PotatoLink headed west to the beautiful Busselton region to co-host a workshop in collaboration with WA Potatoes, DPIRD, and AuSPICA. The event brought together growers, researchers, and industry experts to discuss crucial topics affecting the Australian potato industry.

The workshop kicked off with a networking lunch, which was then followed by a series of presentations on emerging challenges and updates in the potato industry.

Dr Nigel Crump from AuSPICA began the discussions with a comprehensive presentation on PVY NTN and Potato Spindle Tuber Viroid (PSTVd), key issues impacting potato health and productivity.

Simon Moltoni from WA Potatoes followed with an important update on the APVMA permit review concerning Chlorpyrifos and Reglone® and DPIRD's Neil Lantzke and Dr Wossen Mengesha provided an update on the Predicta Pt validation study, which continues to offer valuable data on soil-borne pathogens. The study's findings are critical for improving disease management strategies.

Rachel Lancaster from PotatoLink rounded off the presentations with an update on PotatoLink's recent activities, sharing information on upcoming projects and new resources available to growers.

The event concluded with an open discussion session, where attendees were able to engage directly with the presenters and their peers, deepening their understanding of the challenges and opportunities ahead.

## EXPLORE FURTHER

WEBINAR: *Growing Healthy Spuds: Cultural Strategies for Disease-Free Seed Potatoes* ([potatolink.com.au/resources/growing-healthy-spuds-cultural-strategies-for-disease-free-seed-potatoes](http://potatolink.com.au/resources/growing-healthy-spuds-cultural-strategies-for-disease-free-seed-potatoes))

caused by *Pectobacterium* and *Dickeya* pathogens, powdery scab and pink rot. Dr Wharton also led discussions on seed handling and storage best practices to minimise postharvest diseases.

From the cool climates of Tasmania, the roadshow headed north, where, despite extreme September heat in Gatton, 20 local growers and agronomists, and industry reps joined hosts Ryan Hall (PotatoLink, AHR) and Darren Brown (VegNET's Regional Development Officer) for sessions on biosecurity, biological control, and disease management.

Shakira Johnson (AUSVEG) presented tools and practices for enhancing biosecurity, including the latest research on high-priority plant pests and a new app (*Onside*) designed for biosecurity planning. Dr Praise Tadle (QDAF) led an interactive session on biological control options for managing the Serpentine leaf miner, providing insights into beneficial species and strategies for monitoring and sustaining these populations. Dr Charkowski concluded with a session on managing and identifying potato diseases, discussing US practices and management strategies for diseases like blackleg, soft rots, Rhizoctonia, early blight, and late blight.

In South Australia's Murray Bridge, Mt Gambier, Loxton, and Parilla, Dr Wharton presented his work on the

potential of 2E-hexenal in potato storage, which offers a promising alternative to conventional fungicides.

The session also covered diseases like black dot, *Verticillium*, early blight, powdery scab and the threats posed by *Pectobacterium*. Additionally, discussions included the changing landscape of the Australian potato industry, including the use of CIPC and 1,4SIGHT® Maleic Hydrazide (MH), with a focus on insights from Europe and the US. In addition, Peter Philp (regional representative, PotatoLink), Peter O'Brien (national coordinator, PotatoLink) and Dr Wharton visited growers one on one, including Terry Buckley, Dowling Ag, Ben Warner, and Aaron Haby.

Hort Innovation's Jason Hingston followed the roadshow and took the opportunity to share updates and gather grower priorities for an Australian R&D research program. We look forward to reporting on Jason's discoveries and the direction of the R&D program in future editions.

## ACKNOWLEDGEMENT

We thank Amy and Phil for their exceptional efforts, travelling around Australian and sharing their expertise with our community. Very big thanks also to each of our regional reps for hosting our international guests and organising the events. Special thanks Peter O'Brien for his overarching support, which made all of this possible.

# POTATOLINK'S STEPH TABONE ON A NUFFIELD ADVENTURE

From the halls of Parliament House in Canberra, to the crystal-clear waters of Bonito in Brazil, and learning about the rich cultural traditions of Georgian winemaking, the introduction to my Nuffield year set the tone for an extraordinary learning journey. Along the way, I've discovered the shared challenges, diverse solutions, and common aspirations that unite farmers and food systems worldwide.



The program kicked off in March with the Contemporary Scholars Conference, first in Canberra and then in Brazil. This brought together all of the 2024 scholars from around the world.

The trip to Brazil was not just a deep dive into Brazilian agriculture, but also a chance to reflect on how historical forces have shaped this industry. Field tours showcased everything from dairy farms and corn and soybean cropping systems, to meat processing plants, renewable energy projects, ecotourism initiatives, and regional specialties like apple orchards, wine production, seed breeding, and food processing facilities.

One thing that struck me in Brazil was the country's strong commitment to environmental sustainability. It was surprising to learn that 66% of Brazil's land is dedicated to preserved areas, with stringent legal requirements to protect up to 80% of land in the Amazon region. On the farms we visited, best practices like no-till cropping and the inoculation of soybeans with bacteria to enhance nitrogen fixation were common. I was also impressed by how renewable energy sources are integrated into agricultural practices.

One of the key takeaways from both Canberra and Brazil was how, across the globe, we are united by a shared goal: producing more food, more efficiently and sustainably. Environmental sustainability was a recurring theme, with discussions ranging from the implications of climate change to practical strategies like plastics recycling, reduced tillage, and biogas production. The broader question that loomed over many conversations was how we ensure food security in a world where access, not availability, is often the main challenge.

Part two of my Nuffield year took me on the Global Focus Program, an intense five-week tour spanning five countries: Western Australia, Zimbabwe, England, the Netherlands, and Georgia. This tour was designed to push us out of our comfort zones, exposing us to different cultures, political systems, and agricultural practices, while also helping us develop the skills needed for deeper analytical thinking.

Each country left a unique impression. In Kununurra, Western Australia, I witnessed the stark contrast between large greenfield sites being prepped for future cropping and a small, niche distillery growing its own grain. Zimbabwe was a striking mix of awe-inspiring wildlife and the sobering realisation of the immense resources needed for conservation. I had the privilege of seeing rhinos, lions, giraffes, and other incredible creatures up close, while also learning about the complexities of preserving these species.

In England, meeting Jill, a 97-year-old scholar who was the first female recipient of the scholarship, was both inspiring and humbling. Her advice to always "look up and out" has stayed with me. The Netherlands offered an in-depth look at agricultural innovation, from companion cropping with legumes and potatoes to high-tech greenhouses, and wash down stations for tractors to avoid chemical runoff.

But what struck me most in the Netherlands was a visit to a traditional windmill, where I learned about the vital role these structures, alongside canals, still play in keeping reclaimed land dry.

Georgia offered incredible hospitality, where food, wine, and culture are intricately intertwined. The warmth and generosity of the people made every meal a celebration of togetherness, reinforcing the idea that food is not just sustenance but a connection to the land and community.

These experiences deepened my understanding of global agricultural trends and raised pressing questions about sustainability and the ethical responsibilities of farmers. For example, what share of responsibility, if any, should tobacco farmers hold?

The balance between environmental stewardship and profitable production was a recurring theme, as was the role of subsidies in shaping farming practices. I found myself questioning whether consumers are truly willing to pay a premium for sustainably produced goods, and what that means for the future of agriculture.



Top Left - Nuffield 2024 Global Focus Program group visiting a functional windpump in the Netherlands, used for maintaining reclaimed land. Bottom Left - Nuffield 2024 Global Focus Program group visiting a winery in Georgia to learn about the traditional Georgian wine making process which dates back to 8000 BC. The group is photographed with a qvevri, a large egg shaped clay vessel, used for fermentation, maturation and storage of wine. Right - Steph Tabone and fellow Nuffield scholars in the Netherlands, inspecting a potato crop trial investigating companion planting potatoes with a mixed species cover crop. The trial will see if the companion crop can help to reduce inputs by providing competition with weeds, reducing N fertilisers and attracting natural enemies.

In terms of innovative policies, I was particularly impressed by the range of subsidies available in the UK and EU to support sustainable farming practices and the adoption of new technologies like robotic milking systems. These insights have motivated me to stay curious and to continue asking questions that challenge conventional thinking.

Looking ahead, I am excited for the final phase of my journey, which involves individual travel focused on my research topic. Over the next few months, I'll be visiting the UK, France, the Netherlands, Germany, Canada, and the USA to explore how farmers are using legumes to supply nitrogen in vegetable farming systems. My goal is to understand not just the methods they use but also the agronomic strategies that help synchronise nitrogen release from legume

residues with the needs of subsequent crops. I'm eager to dive deep into these conversations and to apply what I learn to improve practices back home.

This scholarship journey has been transformative, simultaneously broadening my perspective and sharpening my approach to agricultural challenges.

I can't wait to see what happens next!

### ACKNOWLEDGEMENTS

My thanks and appreciation to the Hort Innovation Vegetable Levy for sponsoring my scholarship and to AHR for ongoing sponsorship and support.

### ABOUT THE NUFFIELD SCHOLARSHIP

Nuffield is an international farming scholarship program that offers a global network for current and alumni scholars, aimed at fostering agricultural knowledge and leadership. The scholarship involves traveling abroad to connect with industry professionals, gain diverse insights, and bring back learnings to one's home country. Scholars engage in experiential development, honing skills such as time management, communication, and research.

**Learn more at [nuffield.com.au](https://nuffield.com.au)**

# HORT INNOVATION PROJECTS

Project name	Code	Lead organisation	Description	Fund	Start and end date
Potato industry minor use program	PT16005	Hort Innovation	Used to submit renewals and applications for new minor use permits for the potato industry	Fresh & Processing	Ongoing
Australian potato industry communication and extension project (PotatoLink)	PT20000	Applied Horticultural Research	Supports growers in adopting improved practices on-farm and communicating new information, research and technology	Fresh & Processing	8/12/2020 to 30/11/2025
Consumer Behavioural data program	MT21004	Nielsen	Provides regular consumer behaviour data and insights. Through the Harvest to Home platform ( <a href="http://www.harvesttohome.net.au">www.harvesttohome.net.au</a> )	Multi fund including Fresh	20/01/2022 to 20/11/2026
Generation of data for pesticide permit applications in horticulture 2022	ST22001, ST22003 and ST22004	Agreco, Eurofins Agroscience Services and Kalyx	The generation of pesticide residue, efficacy and crop safety data to support label registration and minor use permit applications and renewals made to the APVMA	Multi fund including Fresh	16/05/2022 to 15/12/2025
Feasibility/scoping study: Surveillance and diagnostic framework for detecting soil-borne pathogens in vegetable industries	MT21016	NSW Department of Primary Industries	Examining the potential to develop a national surveillance and diagnostic framework for soilborne pathogens of vegetable crops including potatoes	Multi fund including Fresh & Processing	11/10/2022 to 31/08/2023
Horticulture Statistics Handbook 2021/22 to 2023/24	MT21006	Freshlogic	This whole-of-horticulture investment is responsible for producing Hort Innovation's annual Australian Horticulture Statistics Handbook	Multi fund including Fresh & Processing	29/04/2022 to 25/02/2025
People development strategy for the vegetable, potato, onion, and banana industries	MT22002	RMCG	Building a People Development Strategy to guide future investment in building capacity and capability within a range of industries including potatoes	Multi fund including Fresh & Processing	12/12/2022 to 1/07/2023
Horticulture trade data	MT22005	IHS Global	Provides Hort Innovation with a subscription to the Global Trade Atlas Database. Access to this trade data is used to validate export performance and assist with forming ongoing strategy and focus areas in the area of international trade. This information is shared with relevant industry bodies and delivery partners	Multi fund including Fresh & Processing	14/12/2022 to 1/12/2025
Industry preparedness for exotic root knot nematode	MT22012	CSIRO	This research will use the latest advancements in molecular screening to provide a better understanding of root-knot nematodes occurring in Australia from a historic perspective and provide a cost effective identification tool	Multi fund including Fresh & Processing	9/27/2023 to 11/7/2025
World Potato Congress 2024	PT23000	Potatoes Australia Ltd	To support grower attendance at the 2024 World Potato Congress in Adelaide.	Fresh and processing Potato	31/05/2024 to 30/08/2024
Consumer usage and attitude tracking 2023/24	MT23201	Fifty-Five Five	This investment provides a category tracking service to allow various horticultural categories to better understand consumer usage and attitudes and the effectiveness of marketing campaigns	Multi fund including Fresh	21/11/23 to 15/11/2024
Chemical Residue Report to Support Australia's Country Recognition Arrangement (CRA) with Indonesia (2024-2029)	MT24007	Fresh Markets Australia (FMA)	This project will provide a report of national residue testing data to the Department of Agriculture, Fisheries and Forestry (DAFF) for their utilisation in renewal of Australia's Country Recognition Arrangement (CRA) with Indonesia.	Multi fund including Fresh	21/08/2024 to 7/09/2028









## SIMODIS® insecticide wins the west

SIMODIS® insecticide from Syngenta has been exceeding expectations across the country. While it has a novel mode of action (Group 30) to manage a range of insect pests in fruiting vegetable, cucurbit, bulb and brassica vegetable crops, SIMODIS® insecticide also provides flexibility in application timing, sunlight stability and rain-resistant qualities, making it highly desirable among users who have had some spectacular results.

### We've never seen a result like this

Agronomist Des May, from Delta Ag, said he received a phone call from a Carnarvon grower about a month after their capsicum crop was planted.

"We went and had a look and the damage was significant. It had affected 80-90% of the planted crop."

There was a spectrum of pests identified, including western flower thrips. SIMODIS® insecticide, from Syngenta, had recently been released targeting mites, thrips and heliothis and so Mr May thought it might be a good option.

"We introduced SIMODIS® and had two sprays back-to-back – eight or nine days apart and it virtually took out 95% of the pest," he said.

### "We've never seen a result like this before, it was fantastic."

"The thrips tear the growing tips apart. It looks like they've been hit by herbicide or a virus. After we put the two lots of SIMODIS® on, the capsicums regenerated, they were back in action, which is fantastic."

The damage to the crop had been of great concern to the grower.

"They were at their wits end, to be honest," Mr May said. "They tried a couple of things, but they were unsuccessful. When you spray stuff that doesn't work, it gets very expensive so they were open for any input we could give."

### "It was a great result with SIMODIS® and they were very, very happy."

### My new 'go-to' insecticide

Further south, in Manjimup, Muirs agronomist Ryan Bradshaw, said diamondback moth (DBM) was a constant threat throughout the summer in the region's broccoli, cabbages and cauliflower crops.

"Once we start cutting hay the DBM pressure goes right up. We get halfway through the first planting and then you're on."

Last season there was continuous pressure from DBM and a wide range of chemistries were used in an attempt to control the pest.

"We used our normal chemistry up very quickly and started to get less and less of a result," Mr Bradshaw said.

"We put in SIMODIS® and I came back three days later and couldn't find anything moving. It was a good result."

A major benefit of SIMODIS® is its classification as a Group 30 insecticide, which can be used as an alternative to the suite of other chemical groups currently being used.

"A lot of the other products are aging and there seems to be a lot of resistance everywhere," Mr Bradshaw said.

"Trying to find, and use, the right products at the right stage, is really tricky. That's why SIMODIS® was really good. We can place it at any point and have really good results."

"Last year it was my go-to."

He said other chemistries, such as the Group 28s, were a vital part of growing vegetables and should be protected.

"A new group is always well received. It is very important. New groups really make the difference."

### Going forward, SIMODIS® insecticide will play a critical role in controlling DBM and rotating chemistry to extend the life of other groups.

"I will use SIMODIS® as a break for the other chemistries and I see a fit for it in the middle and towards the end of the program," Mr Bradshaw said. "It really cleans up and we don't see any problems at harvest. You're not finding DBM alive in broccoli, cabbages, or cauliflower - it's just not there."

The lack of pests in the produce at harvest reduces the labour needed to prepare the vegetables for market.

### "If we can keep it clean towards the end, we don't need to spend time peeling leaves off the outside of the heads because the residual control of SIMODIS® has kept on top of it the whole way through."

**Above L-R.** Muirs agronomist, Ryan Bradshaw, Manjimup, WA, introduced SIMODIS® insecticide into brassica vegetables, last season, with some fantastic results. Agronomist Des May, of Delta Ag, in WA, used SIMODIS® insecticide in capsicums last summer.

#### FIND OUT MORE

For more information on SIMODIS® insecticide, please visit [Syngenta.com.au/simodis](http://Syngenta.com.au/simodis) or speak with your local Syngenta representative.

<sup>®</sup>Registered trademark of a Syngenta Group Company.  
<sup>™</sup>Registered trademark.

# R&D + biosecurity update



## EXOTIC PLANT PEST PROFILE

# Carrot rust fly



**Carrot rust fly is thankfully absent in Australia, but the High Priority Plant Pest poses a significant threat to root crops and the industry must be prepared for potential incursions.**

Imagine a field of vibrant carrots, their orange hues promising a bountiful harvest. But beneath the surface, a hidden menace lurks. The carrot rust fly, a Dipteran (true fly) insect, lays its eggs near the base of these plants. When the eggs hatch, the resulting larvae, or maggots, burrow into the roots, causing them to rot and become unmarketable.

Carrot rust fly (CRF; *Chamaepsila rosae*, formerly *Psila rosae*), also known as carrot root fly, can devastate entire crops, leaving growers with significant financial losses. It targets vegetables such as carrots, parsnips, celery, celeriac, caraway, dill, fennel and parsley crops (CABI 2009).

Fortunately, Australia is currently free from this destructive insect, thanks to our commitment to the best biosecurity practices.

### Carrot rust fly: a root rot menace

This pest rears its ugly self from tunnels that it burrows through carrots. The tunnels can be seen on the surface of the root vegetables and are rusty in colour due to the maggot's excrement – hence the name 'carrot rust fly'. The tunnels created by the maggots can lead to secondary infection with soft rot bacteria or soil-borne fungal diseases. The yellowish maggot is the larva of the adult fly.

In spring, the fly lays its eggs on the ground at the base of the carrot. The young larvae burrow into the soil and feed on the plant's young root system. On older plants, the older larvae will feed on the taproot, mining

their way to the nutritional cortex of the root. When the larvae mature, they leave the taproot and pupate in the soil before emerging as the adult fly and starting the cycle again.

As winter approaches, the larvae can over-winter as pupae and emerge in spring when conditions are suitable. These infestations cause economic crop damage; while the plant will survive, the taproot becomes unmarketable due to larval damage and secondary infections that may occur (Poole 2009:21).

### What to look out for

This pest is best recognised not by its appearance, but by the type of damage it causes to the crop. The first signs of CRF infestation are a red or yellow discoloration of the foliage, potentially followed by wilting and plant stunting or death. Infestation might also lead to distortion or forking of roots.

In New Zealand, where CRF was first detected in 1931, there may be up to four generations of CRF annually. Both larvae and pupae can survive the winter in the soil and roots. In the Netherlands, two to three generations per year are often observed, sometimes four if unseasonably warm. Frost kills larvae/pupae.

In Australia, due to the absence of frost in many places where our carrots are produced, we could potentially see year-round infestations.

**Above.** A mature carrot rust fly, *Chamaepsila rosae*.

### Carrot rust flies have four life stages:

- **Adult flies** have a shining black body, yellow legs and a reddish-brown head. They are small; about 6-8mm in size and a wingspan of roughly 12mm (CABI 2019). Adults may be found on the foliage of both host and non-host plants, and around field margins (Poole 2009:22).
- **Eggs** are ovoid, white and <1mm in length. Adult female flies will be attracted to Apiaceae crops to deposit their eggs at the base of the plant (Poole 2009:22).
- **Larvae** (maggots) are initially colourless, with dark mouth-hooks. The maggot gradually grows through three instars, with the mature larvae reaching about 8-10mm in size with a creamy-white to white colour. Young larvae feed on smaller roots, like lateral and side roots. This may cause crop damage, like leaf discolouration, wilting and plant death. The older larvae, however, will feed on the taproot, creating mines to get to the root cortex. While the plant often survives this damage, it is this larval stage that causes economic damage as it renders the carrots unmarketable. It also leaves the crop prone to secondary infections.
- **Pupae** are 4.5-6mm long, with a yellowish-brown colour. Pupation occurs in the soil (Poole 2009:22).

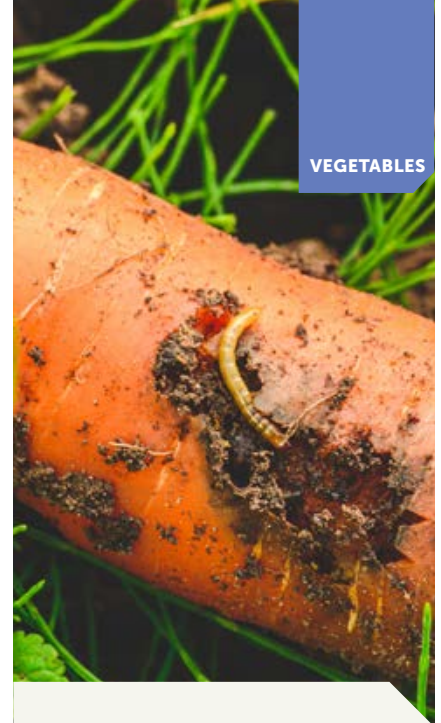
### Prepare and protect your crops

A strong monitoring program that includes record keeping of observations made during crop monitoring activities, coupled with routine yellow sticky trapping at high-risk periods is key to early detection.

At the first sign of unusual symptoms, yellow sticky traps can be inspected for signs of the adult flies followed by targeting plants with symptoms to inspect the root for signs of maggot damage. At this stage, take photos of the plant and any maggots or flies present, record the coordinates of the observations and call Plant Health Australia's Exotic Plant Pest Hotline (1800 084 881) for further advice.

**The pest may travel as pupae on infected host plants, therefore the importance of adopting a 'come clean, go clean' approach is key to reducing the risk of introduction to your property and/or spread beyond.**

Like *Liriomyza* leafminers, CRF is a notoriously difficult pest to manage. Chemical management options are increasingly limited. Most management relies on cultural practices and prevention of (high load) population establishment. Adult flies are weak fliers but are attracted to Apiaceae crops through smell, and this knowledge is used to prevent populations from establishing through site selection decisions (Andrews 2009; van Rozen & van den Broek 2011).



### Key messages

- CRF is a native European pest that has spread globally.
- It causes significant physiological and economic damage to root crops.
- Australia is currently free from CRF.
- The temperate climate of Australia's carrot-growing regions may favour CRF's establishment.
- Early detection is key to managing CRF infestations.
- Inspecting plants for symptoms and root damage is essential.
- Biosecurity measures are vital to prevent the introduction and spread of CRF.

Carrot rust fly damage on carrots.



**EXOTIC PLANT PEST HOTLINE**  
**1800 084 881**

#### FOR MORE INFORMATION

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.

A national industry pest-specific incursion management plan for carrot rust fly (*Psila rosae*) was funded by Hort Innovation using the vegetable research and development levy and contributions from the Australian Government. Project: VG06114

**Hort Innovation** VEGETABLE FUND

# Gippsland farmers primed to spot an advancing fall armyworm invasion

A workshop gave Gippsland growers the latest information on fall armyworm as the voracious pest advances across Victoria.



Gippsland growers and agronomists caught the weather on a sunny day in early September 2024 that was perfect for a workshop on the latest updates and strategies to spot and manage fall armyworm, a voracious caterpillar that has been spreading around the country since it was first detected in northern Australia in early 2020.

Growers are on alert for the incursion that has been advancing southwards, leaving a trail of destruction in its wake.

The invasive pest has recently been sighted in Gippsland, and the workshop gave local growers and agronomists information on the international, national, and local experience for growers on spotting and managing fall armyworm.

The event was hosted by Agriculture Victoria, in partnership with the Queensland Department of Agriculture and Fisheries and VegNET Gippsland.

'Be prepared' was the biggest message of the day.

"We've got low numbers currently that are not having much of an impact in the region, and it's just helping growers be prepared for when we do get larger numbers in the region," said Scott Botten, Horticulture Industry Coordinator Gippsland with Agriculture Victoria, who organised the workshop.

**"Giving them information on the latest research, including pheromone trapping, resistance profiles, economics, impacts on the crop and best practice management."**

Fall armyworm has caused serious damage in Queensland and is a threat to more than 350 plant species, including maize, sweetcorn, cotton, rice, sorghum, sugarcane, wheat, and many other vegetable and fruit crops.

Attendees heard from four speakers passing along what they have learnt from the Queensland infestations. The session included information on pheromone blends, host plant preferences, identification, resistance surveillance, and more.

Dr Ramesh Puri, Extension Officer at Department of Agriculture and Fisheries Queensland, was one of those speakers.

"Early this year in January, February there was high influx of fall armyworm in Bowen," he said. "There were lots of egg lays and infestations on our early sweetcorn crops. But as the days went on, in June and July fall armyworm incidents were very low and we caught less numbers of fall armyworm in our traps.

"But now as the warmer season is starting up, we have started looking into the increased number of fall armyworm. The growers are also informed about these, and they are aware of the managing practices that need to be taken."

Attendees also heard from Dr Melina Miles, Principal Entomologist at the Queensland Department of Agriculture and Fisheries.

Tracking the pest is critical to understanding how it spreads, such as which crops and weed populations it can survive in, and whether it can survive the cooler Victorian winter.

"We put together a crop calendar that focuses on both crops and cover crops, as well as weed risks," said Dr Miles.

**Above.** A fall armyworm. **Inset.** Scott Botten, Horticulture Industry Coordinator Gippsland with Agriculture Victoria. Dr Melina Miles, Principal Entomologist at the Queensland Department of Agriculture and Fisheries.

Fall armyworm insecticide resistance is caused by genetic changes that result directly from insecticide use, also known as selection pressure.

And what that told us was really that there is an opportunity for fall armyworm to establish and to build up all year round. And it highlighted the need to monitor things like cover crops prior to the summer cropping period.”

In response to fall armyworm’s initial detection, government and industry launched a major collaborative project to coordinate research and monitor and manage the pest.

That research has resulted in innovations such as RapidAIM, a network of low-cost, automated pest detection devices that provide real-time data on the spread of fall armyworm, which are now being rolled out across Gippsland.

“One of the things that is important is understanding what the patterns of fall armyworm activity are locally,” said Dr Miles.

“And to persist with monitoring, using pheromones traps and the Rapid Aim network will help with that so that we can get a continuous picture over a number of years of when fall armyworm’s active, when fall armyworm isn’t active, and how quickly it builds up over summer. And that will really help agronomists and growers to better assess the risk for crops at different times of the year.”

Dr Doung Nguyen, Research Scientist at NSW Department of Primary Industries and Regional Development, spoke on insecticide resistance surveillance for sustainable management of fall armyworm using phenotypic and genomic approaches.

Fall armyworm insecticide resistance is caused by genetic changes that result directly from insecticide use, also known as selection pressure. Selection pressure causes resistance to build up in the next generation as resilient parents produce offspring.



**Repeated application of the same insecticide groups, improper spray techniques, and inappropriate chemical choices all contribute to this development of resistance.**

Dr Vivian Mendez, Research Group Leader at Macquarie University, spoke on fall armyworm pheromone blends for improved monitoring and population estimation in Australia.

Female moths are the ones who release the pheromones to attract males. The male moths have a very high sensitivity to the pheromone of the females, so the females don’t need to produce high amounts. Just a few molecules will trigger the male to find the female. Because of this, it is female fall armyworm pheromones that are used in traps to lure the males.

There are geographical variations in pheromone blends. An example Dr Mendez provided was that the pheromone blend that the females produce in Florida, has different compounds to the females in Brazil.

In Brazil, one of the compounds that is part of their pheromones is not found in any other population of fall armyworm. This is taken into account when creating lures in different areas. To increase the effectiveness of your lures, mimicking the pheromones found in the local population is important. This knowledge from overseas was used and applied when it came to creating the traps in Australia.

To begin the session, attendees also heard from Shakira Johnson from AUSVEG who provided a grower biosecurity project update from Onside to introduce growers and agronomists to how the platform works in checking employees and visitors in and out of locations to assist in biosecurity measures.

**Top.** A fall armyworm. **Left.** Dr Melina Miles presenting at the Gippsland growers workshop.

#### MORE INFORMATION

Learn more and find resources in combatting fall armyworm online at the fall armyworm hub from Queensland Department of Agriculture and Fisheries. [business.qld.gov.au](https://business.qld.gov.au)

National fall armyworm innovation system for the Australian vegetable industry is funded by Hort Innovation using the vegetable research and development levy and contributions from the Australian Government.

Project: VG22006

VegNET 3.0 is 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**

## New tech, new hope: fighting FAW with RapidAIM traps



The Bowen Gumlu Growers Association (BGGGA) is leading a groundbreaking project exploring the use of RapidAIM traps to combat the fall armyworm (FAW), a significant threat to Australian agriculture.

This project, funded by the VegNET Innovation Fund, aims to provide growers with real-time data on FAW populations, empowering them to make informed decisions about pest management strategies.

### The power of RapidAIM traps

The technology used in RapidAIM's groundbreaking traps were developed as part of a CSIRO project, before being spun off as a startup company in 2020. The company initially focused on fruit fly traps before branching into detection of other pests, including FAW.

RapidAIM traps are connected to the internet and upload real-time data on pest detections. The traps use low-powered smart sensors to detect insects and identify them using cutting-edge AI technology as they exit the trap.

By providing accurate and timely information on pest populations, these traps empower growers to:

- Implement targeted control measures, reducing the overuse of pesticides by focusing efforts on areas with high FAW infestations.
- Make informed decisions by gaining a better understanding of pest dynamics so they can respond proactively to emerging threats.
- Improve overall pest management, thereby enhancing efficiency and reducing economic losses caused by FAW.

### National trap rollout

The VegNET RapidAIM project is seeing the new traps rolled out region by region across parts of the country affected by FAW. Each VegNET Regional Development Officer is working with local growers to drive the rollout in their area of responsibility.

Located in one of the areas hardest hit by the pest, the Bowen Gumlu Growers Association is playing a pivotal role in understanding how RapidAIM trap technology can be added to the toolbox of management options for FAW.

The Association proposed the initial idea for the project, and now acts as the project coordinator, in partnership with VegNET's Regional Development Officers.

### Challenges and opportunities

While the adoption of RapidAIM traps offers significant benefits, there are also challenges to consider, such as initial costs, training requirements, and potential variations in trap effectiveness across different conditions.

The project is offering free trials of RapidAIM traps to help growers evaluate their benefits and encourage adoption. By experiencing the value of real-time pest monitoring firsthand, growers can make informed decisions about investing in this technology.

However, the potential rewards far outweigh the challenges. By overcoming these obstacles, growers can harness the power of RapidAIM traps to gain real-time insights into FAW populations, make informed management decisions, and protect their crops. This technology has the potential to revolutionise pest control practices and drive a more sustainable and resilient agricultural industry.

To understand the value of new technology such as the FAW RapidAIM traps, it is crucial to address data-sharing challenges and explore opportunities for industry-wide collaboration. By working together, growers and researchers can accelerate the development of effective area-wide management strategies and maximise the benefits of this innovative technology.

**Inset.** The traps are being rolled out regionally by the VegNET RDOs. **Below L-R.** The technology used in the RapidAIM trap was developed by CSIRO. The RapidAIM team discusses trap locations.

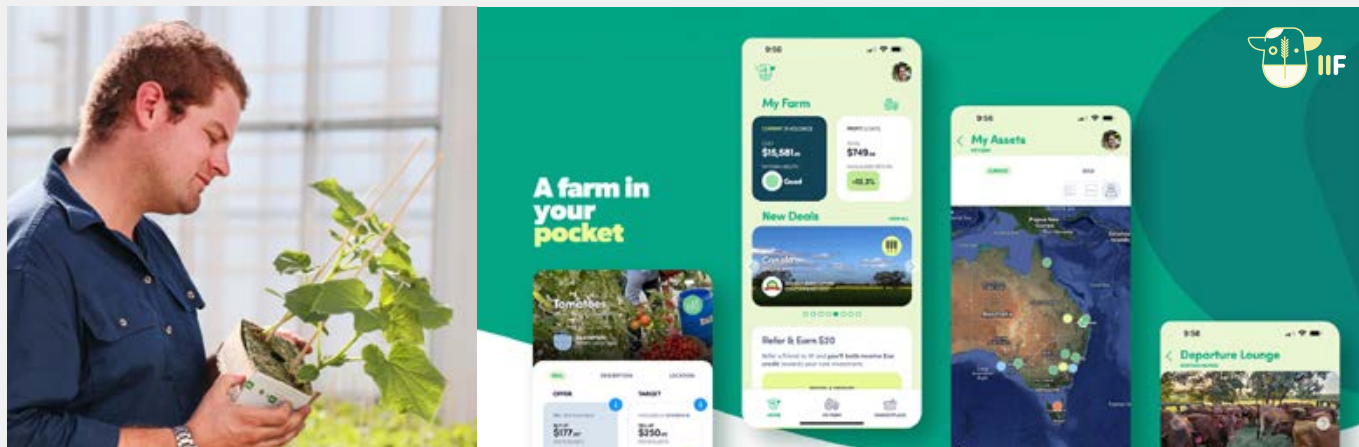


VegNET 3.0 is a strategic levy investment under the Hort Innovation Vegetable and Onion Funds. This project has been funded by Hort Innovation using the vegetable and onion research and development levies and contributions from the Australian Government.

Project: VG21000

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## A game-changing initiative is connecting growers like Jack with a new type of farm investor - consumers

As challenges in the horticultural landscape intensify - from rising production costs to evolving consumer preferences - innovative growers like Provenance Propagation's Jack Mooney are forging direct partnerships with consumers to reduce risk and fast-track new opportunities.

Established in July 2023, Provenance Propagation has become the largest independent vegetable propagation facility in the Eastern states. Located on the NSW mid-north coast, its 5700m<sup>2</sup> greenhouse supplies top-quality grafted seedlings of tomatoes, cucumbers, zucchinis, capsicums and melons to commercial growers and research centres across Australia.

Recently, the company was approached to cultivate kiwifruit - a crop that, unlike their usual quick-turnaround varieties, has a 12-month growing period.

'I've been in the industry for over 10 years, and if I have to look at a plant for more than 60 days, I start getting nervous,' Jack joked.

Eager to begin kiwifruit production, Jack faced the challenge of having cashflow tied up in existing operations and was reluctant to tap into those resources to cover the costs of substrate, pots and other necessary supplies.

'Kiwifruit posed a manageable risk, but we wanted to mitigate some of that risk by essentially seeking crop funding,' he explained.

Jack was intrigued when a friend from university, an agronomist, introduced him to a Victorian-based startup called IIF (Invest In Farming Co-operative).

'It's essentially a mechanism where you can fund your production and growing costs upfront before you've received final payment from the client,' Jack said.

### Helping growers do more with less risk

The IIF platform allows farmers to pre-sell a portion of their production to co-op members, giving them early access to capital to use as they wish. At the end of the

growing season, when the produce is sold, the farmer shares in any profit - effectively getting paid again.

The key advantage? Unlike a bank loan, there's no risk: if the crop doesn't make a profit the investor doesn't either. Any losses are shared.

Jack had seen broadacre and beef farmers using IIF but wasn't sure the model would suit his operation. However after learning that melon grower Shaun Jackson from Daintree Fresh had successfully used the platform he was inspired to take a closer look.

After reviewing the numbers with his accountant and realising IIF could make the kiwifruit venture viable, Jack listed his vines on the platform and was stunned by the response.

'Our investment sold out in two or three hours. It was incredible. We launched it and within less than a day it was fully subscribed. We had funds in our account within a week.'

The process was seamless, and the upfront capital gave Provenance Propagation the confidence to proceed with the new crop.

Jack also enjoyed sharing monthly crop updates with his investors.

'You get a bit emotional because so many people have put their money and faith in you succeeding. I'm extremely grateful.'

### Sowing the seeds for future growth

Since launching in 2021, IIF has invested millions in agricultural production across Australia including melons, pineapples, apples, ginger, tomatoes and blackberries. While the model may not suit every grower,

Jack believes it can be a game-changer for others.

'We wouldn't be able to take on these new ventures without access to this funding,' Jack said. 'I think it's a great initiative.'

Jack has clear ambitions for Provenance Propagation's future growth.

'Our goal in the next five years is to have 2.5 hectares under glass to support our core clients with tomato and cucumber crops. But if there are niche crops that fit our business model we're happy to explore those and open up investment opportunities on the IIF platform.'

### Jack might even become an investor himself.

'So many crops come up on that platform and I think "Wow I should support that". Farming's hard and I'm happy to support [other farmers]. For me, it's more interesting than just throwing some money behind shares on the stock market.'

### FIND OUT MORE

Learn more about how IIF has partnered with farmers across Australia visit [iif.today](http://iif.today)

Above L-R. Provenance Propagation's Jack Mooney. IIF platform interface samples.



# From boardroom to frontline: empowering industry leaders for business beyond the usual



## Key points

- AUSVEG Board Members and State Member Organisation leaders learnt about the Australian Biosecurity System and how emergency plant pest responses are managed.
- AUSVEG is a signatory to the EPPRD and member of Plant Health Australia on behalf of growers of 32 vegetable crops.
- Biosecurity is inextricably linked to trade and market access so is a cornerstone of any industry that aims to be profitable and sustainable. A biosecurity focus operating throughout the industry also provides a strong basis for market access negotiations and prioritisation.
- If you see anything unusual, report it as soon as possible to the **Exotic Plant Pest Hotline 1800 084 881**. Your call will automatically be directed to the relevant state or territory biosecurity agency.

## Australia's biosecurity system is robust, but relies on prompt reporting of possible incursions and the engagement of industry.

As a signatory to the Emergency Plant Pest Response Deed (EPPRD) and member of Plant Health Australia on behalf of vegetable growers, AUSVEG has a number of obligations that it needs to fulfil. Included in these are ensuring staff are trained in biosecurity matters around the EPPRD and able to participate in decision-making and response activities when a new pest arrives.

### Plant Health Australia provides AUSVEG preparedness training for emergency plant pests

In October 2024, AUSVEG Board Directors and State Member Organisation leaders undertook a training session on the Australian biosecurity system and how emergency plant pest responses are managed under the Emergency Plant Pest Response Deed (EPPRD).

Led by Lily McDonald, A/Coordinator Emergency Plant Pest Response Deed at Plant Health Australia, attendees discussed the importance of reporting suspect exotic pests and diseases early, who is involved in decision making before and during a response, how costs are calculated and shared amongst affected parties, and the importance of communicating with industry.

The exotic pest brown marmorated stink bug (BMSB) was used as an example of what happens when a pest is found. This article provides an overview of the training that was delivered, and links to where you can find more information and training.

### What are the arrangements when a new plant pest or pathogen is found?

Australia's biosecurity system is robust, but not infallible. When a new plant pest or pathogen is found, the activities that follow are managed through a partnership agreement between the Australian government, state and territory governments, national plant industry bodies and Plant Health Australia. These parties are signatories to the Emergency Plant Pest Response Deed. Plant Health Australia is the custodian.

The EPPRD outlines the decision-making and cost-sharing arrangements to enable a coordinated, effective and efficient response when exotic insects, mites, pathogens (disease), nematodes and snails that have potential to impact on our crop, bee, and edible fungi industries arrive in Australia. It also ensures accountability and transparency in decision making. As a signatory to the EPPRD, AUSVEG can take part in the decision-making when a pest or pathogen that impacts on vegetables, potatoes or onions is reported.

### What is an Emergency Plant Pest?

An Emergency Plant Pest (EPP) is any pest or pathogen that is not established in Australia with the potential to cause significant damage across Australia's primary production, environmental or amenity landscapes. This is also relevant for pests and diseases that may affect European honey bees (*Apis mellifera*), which many of Australia's plant industries rely on for pollination of different plants.

Determining whether a pest or disease is an EPP is important, as the EPPRD is only applied where the pest or disease has been identified as an EPP. If an exotic pest doesn't meet the criteria of an EPP it doesn't signify inaction, allowing it to become established.

The state or territory where the pest is detected may work with their industries to eradicate the pest in order to retain their proof of freedom for market access. However, this work is not carried out under a nationally coordinated response plan.

Want to learn more yourself? PHA offers free online courses - just like the one AUSVEG's Lucy Gregg (pictured above) completed: [planthealthaustralia.com.au/training/biosecurity-online-training-bolt](https://planthealthaustralia.com.au/training/biosecurity-online-training-bolt).



AUSVEG Board members and State Member Organisation undertook Emergency Plant Pest Response training, led by PHA. **Top.** Close up of an exotic pest, brown marmorated stink bug.

For an exotic pest or disease to be identified as an EPP, it must have a nationally significant impact, whether economically or environmentally, and must also meet one or more of the following criteria:

- a. A known plant pest not previously detected (or previously eradicated) in Australia.
- b. A variant form of an established plant pest that can be distinguished by appropriate investigative and diagnostic methods.
- c. A newly identified plant pest of unknown or uncertain origin.
- d. A plant pest already found in Australia that:
  - is restricted to a defined area through regulatory measures to prevent further spread of the pest; and
  - has been detected outside the defined area; and
  - is not a native of Australia; and
  - is not the subject of any instrument for management which is agreed to be effective risk mitigation and management at a national level.

**Report anything unusual**

All states and territories have a legal obligation requiring potential biosecurity risks to be reported as soon as possible. The Exotic Plant Pest Hotline (1800 084 881) will link you directly to the state or territory agriculture department in the region you are calling from and they will advise you on the next steps. These steps may include submitting photos, details of the site where the pest was found and a sample to the laboratory for diagnostics. Reporting early is critical in increasing our chance of eradication and supporting a return to business as usual as quickly as possible.

**What happens when you call the Exotic Plant Pest Hotline**

When you call the hotline, your report will generally be categorised based on the information you provide. You may receive a follow-up call to provide further details, or biosecurity staff may request to visit your property. All reports are investigated, and it is far better to have a false alarm than a failure to identify a serious plant pest or disease.

If there is a reasonable suspicion that the plant pest or disease you reported is of concern, the lead agency will:

- In consultation with the property owner, conduct trace forward and trace back to determine where the pest came from and where it may have travelled to.
- Engage with their state counterparts and peak plant industry bodies, to keep them updated and seek their advice.

**WHAT HAPPENS WHEN YOU MAKE A REPORT**

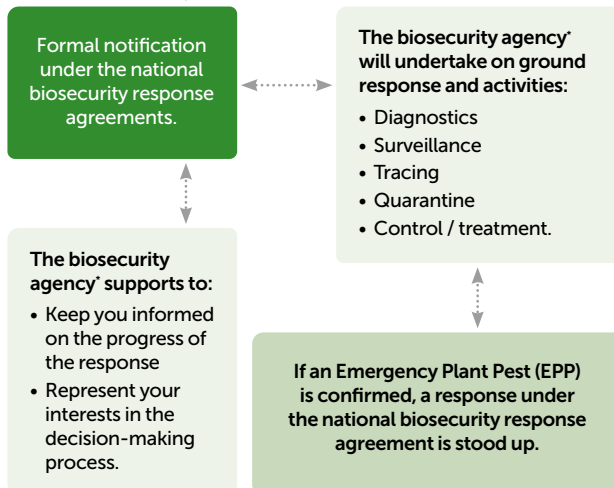
**Spotted something unusual**

- Mark the area where you found it and take clear photos
- Restrict movement in the area
- Don't touch, move or transport affected plant material
- Wash clothes, shoes material correctly.

**Collect information**

- What you found
- When you found it
- Where you found it
- How many saw or the impact
- How widespread is it
- Anything else you notice.

**EXOTIC PLANT PEST HOTLINE  
1800 084 881**



\*The relevant biosecurity agency in your state or territory.

**Every report to the Exotic Plant Pest Hotline is taken seriously and treated confidentially.**

It may take time to correctly diagnose the pest or disease and determine whether control actions are needed and this may cause some uncertainty and angst, but the biosecurity agency will work with you to minimise disruption. Throughout these investigations (and the duration of a response) your personal information, including your address, remains confidential.

**What you can do now:**

- Familiarise yourself with the high-priority pests for the crops that you grow.
- Visit the Biosecurity page on the AUSVEG website: [ausveg.com.au/biosecurity-agricultural/biosecurity](http://ausveg.com.au/biosecurity-agricultural/biosecurity)
- Visit Plant Health Australia's resource centre at [planthealthaustralia.com.au](http://planthealthaustralia.com.au)
- Prepare a biosecurity plan for your property from [farmbiosecurity.com.au/toolkit/planner](http://farmbiosecurity.com.au/toolkit/planner).

# Addressing the root of the problem

BY WAYNE O'NEILL AND ROSALIE DANIEL

Guava root-knot nematode (GRKN; *Meloidogyne enterolobii*) was first reported in Australia in 2022. Guava root-knot nematode is a microscopic plant parasite that invades the roots of a wide range of vegetable crops including cucumbers, pumpkins, zucchini, capsicum and sweetpotato.

It stunts plant growth by damaging their roots and disrupting uptake of water and nutrients. Tuber crops may also be damaged or blemished, impacting on their saleability. GRKN likes warm weather and is well suited to the northern regions of Australia. One of the bigger challenges in managing GRKN is that it can infect and damage crop cultivars that are resistant to the other major species of root-knot nematode.

To date, GRKN has been found in the Northern Territory and Queensland, but its full distribution and potential range remains uncertain. Tools to support rapid identification, and to distinguish this from other root-knot nematodes, need further development and uptake.

## Building Australia's capacity for GRKN management and preparedness

Led by the Queensland Department of Agriculture and Fisheries (QDAF), Hort Innovation is funding a project aimed at improving the management of GRKN in the Australian vegetable industry.

The project will survey and sample to better understand the current distribution of root-knot nematode species, including GRKN, in vegetable production regions around Australia. This will help to inform management options for different geographic and climatic regions. Improved diagnostic assays will provide confidence in accurate and more rapid identification of root-knot nematode species from root and soil samples to support farm management decisions.

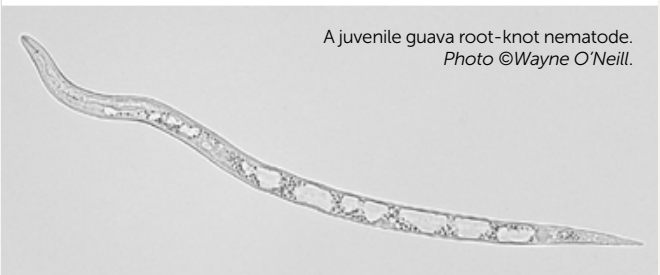
The project will also evaluate a range of management options under greenhouse conditions, including assessing the resistance to GRKN of a range of cover crop plants and available nematostatic options suitable for commercial use. The project will run until July 2026.

**Above.** GRKN galls on tomato roots. **Inset.** Members of the QDAF and AUSVEG Biosecurity teams with Dr Johan Desaegeer visiting a sweet potato grower in Bundaberg, QLD. L-R. Shakira Johnson, Dylan Corner, Wayne O'Neill, Ethan Zunker, Dr Johan Desaegeer.



## Key points

- Guava root-knot nematode was first reported in the Northern Territory in 2022.
- New research, funded by Hort Innovation using the vegetable grower R&D levy, is set to develop better diagnostic capacity and identify options for management of GRKN.
- Growers, agronomists and researchers learnt from the US experience in managing GRKN.
- **Five pillars to managing root-knot nematodes:** crop rotation, cultivar choice and establishment, soil management, targeted control, monitoring and evaluation.



A juvenile guava root-knot nematode.  
Photo ©Wayne O'Neill.

### US expert shares GRKN management insights

Dr Johan Desaeger, Associate Professor of Entomology and Nematology at the University of Florida, recently visited Australia to share valuable experiences in management of GRKN based on his research in Florida and other regions impacted by the nematode. Farmers in the US have been managing GRKN for more than 20 years.

Dr Desaeger presented at the Bundaberg Fruit and Vegetable Growers Multipest info session in August 2024, providing local growers, agronomists and researchers with a unique opportunity to better understand this emerging pest and its potential impacts on local horticulture.

At the Australasian Soilborne Diseases Symposium in Kingscliff, NSW, Dr Desaeger delivered a talk on integrated nematode management (INM) and FindMe – a US program to support growers to manage the pest in their vegetable crops through understanding the distribution of the nematode and the options for breeding, chemical, biological and cultural control of the pathogen. He also participated in a nematology workshop for Australian researchers, held as part of the symposium.

Dr Desaeger's visit facilitated direct engagement between Australian growers, agronomists, researchers and allowed for in-depth discussions and knowledge sharing with real-life experience of the nematode in the US. This knowledge exchange is crucial for developing effective strategies to mitigate the potential impact of GRKN on Australian horticulture, underscoring the importance of international collaboration in addressing agricultural challenges.

### Learnings from the US

Guava root knot nematode infection can result in losses in yield and quality. The FindMe project surveyed the distribution and management of GRKN in the vegetable growing regions of the southeastern US (Florida, Georgia, South Carolina and North Carolina) and found that the nematode was most common in central and south Florida (in Asian vegetables, pepper, tomato), and in North Carolina (sweetpotato).

FindMe researchers continue to work on developing GRKN resistant germplasm in sweetpotato, cucurbit crops and capsicum. The project is also assessing a range of chemical and biological nematicides, cover crops and rotations. Learnings from this project are part of the knowledge exchange benefits from Dr Desaeger's visit to Australia.

### Good biosecurity practices

To reduce the risk of GRKN from entering your farm or property, growers are encouraged to implement good farm biosecurity practices which include:

- Visibly inspecting plant material arriving on your property to ensure it is healthy and is free of pest and pathogen symptoms.
- Sourcing clean planting material and growing medium from reputable suppliers.
- Keeping records of where plants/planting material are sourced from, and where and when they are planted on your property.
- Ensure all visitors and staff disinfect equipment, vehicles, and footwear to reduce spread from infected properties.

If you suspect your property may be affected, phone the Exotic Plant Pest Hotline on 1800 084 881. This will put you in touch with your state or territory's biosecurity agency.

## Five pillars for integrated nematode management

At the ASDS meeting, Dr Desaeger presented five pillars for integrated nematode management (INM), noting that there is no 'one-size-fits-all'. Different options will suit for different situations and different farms.

**1. Crop rotation** was described as the foundation of any nematode management program. Crop rotation with a cash crop is not always an option, but cover crops are a form of crop rotation. For plant parasites with a wide host range (like root-knot nematodes), it is critical to rotate with non-host species to reduce pest numbers between susceptible crops.

Benefits also include improvements in physical, biological and chemical soil properties and water holding capacity. Adding diversity to rotation crops can further increase these benefits, but to maintain nematode control care has to be taken to ensure all rotations are resistant. Studies in maize have shown that increasing rotational diversity in maize-based North American cropping systems improved maize yields over time and across all growing conditions, including during droughts (*Bowles T.M. et al. One Earth, 2, 284 – 293*).

**2. Cultivar choice and establishment** – selecting cultivars that are tolerant or resistant to the target nematode, where available, is an important element of an effective nematode management program. Planting/harvesting dates can also be varied to assist with crop establishment and to help avoid conditions that favour rapid nematode build-up.

**3. Soil management** or soil health management harvests the soil's capacity to suppress the nematode, for example by building up beneficial organisms such as nematode trapping fungi. Strong and healthy plants are also more resilient to pests, diseases and stress.

**4. Targeted control** – most farmers in Florida still fumigate before planting, but this kills a huge range of beneficial organisms, including the natural enemies of the pests being controlled. Targeted chemical application is becoming more common as newer, more selective and safer nematicides are becoming available (e.g. Nimitz – fluensulfone). Dr Desaeger was impressed by the targeted chemical usage he observed on farms he visited in the Bundaberg region.

**5. Monitoring and evaluation** should be included in a management system as good practice. Knowing which nematode species are present helps with management as host ranges differ. Different nematode pests (even different root-knot species) may damage different crops and also require varying rotation crops for management.

Pre-plant nematode counts can help make management decisions, e.g. for chemical application. Every time soil, roots or tubers are moved, there is the potential to move nematodes (and other soilborne pathogens), so on-farm monitoring and biosecurity is critical!

Guava root knot nematode identification and management is funded by Hort Innovation using the vegetable industry research and development levy and contributions from the Australian Government.

Project: VG23007

**Hort Innovation** VEGETABLE FUND



FIGURE 1

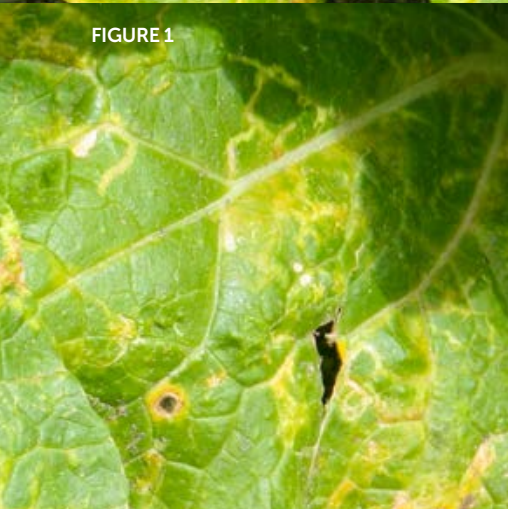


FIGURE 2



**Above.** Figure 1. Leafmining damage caused by Serpentine leafminer (*Liriomyza huidobrensis*). Image courtesy John Duff, Queensland Department of Agriculture and Fisheries.

Figure 2. Yellow sticky trap deployed in-field of leafy vegetables as a part of the industry-led surveillance program. Image courtesy AUSVEG SA.

## Protecting our produce: industry takes charge in serpentine leafminer surveillance

A South Australian serpentine leafminer surveillance plan is aiming to keep the West Australian market open for SA's produce.

South Australia's vegetable industry is taking a proactive approach against a potential threat to its valuable trade with Western Australia. AUSVEG SA, in partnership with the AUSVEG Farm Biosecurity project, is spearheading an industry-led surveillance plan to demonstrate area freedom from the serpentine leafminer (SLM), *Liriomyza huidobrensis*.

The tiny pest poses a significant risk to crops, and this initiative is vital to ensure continued market access to Western Australia under WA condition 98.

### What is serpentine leafminer?

The SLM is a small leaf-mining fly whose larvae burrow into leaves, creating distinctive serpentine tunnels (Figure 1). These tunnels disrupt the plant's ability to photosynthesise, impacting growth and yield. Early detection is crucial to prevent the pest from establishing and spreading, causing significant damage to a wide range of vegetable crops.

### Industry-led surveillance: a collaborative approach

Recognising the importance of protecting South Australia's vegetable industry, AUSVEG SA has developed a comprehensive surveillance plan. This plan involves a two-pronged approach:

- **Yellow sticky traps:** AUSVEG SA is deploying yellow sticky traps on participating properties (Figure 2). These traps capture the adult SLM, allowing for early detection of the pest. Collected traps are sent to South Australia's Research and Development Institute (SARDI) for diagnostics and results reporting.
- **Visual surveillance:** growers and agronomists play a key role in the plan, conducting regular visual inspections of their crops. This involves looking for the characteristic leaf mines created by the SLM larvae.

### Empowering growers through workshops

To support the visual surveillance component, AUSVEG SA delivered workshops in collaboration with AUSVEG Biosecurity Coordinator Shakira Johnson. These workshops aimed to:

- **Educate:** provide detailed information about the SLM surveillance plan, its importance, and the biology of the pest.
- **Train:** equip growers and advisers with the knowledge and skills to effectively conduct visual monitoring, identify SLM damage, and collect samples if necessary.
- **Collaborate:** facilitate discussions on current crop monitoring practices and data collection, fostering a unified approach to surveillance.
- **Standardise:** establish a consistent process for collecting and reporting visual observations data, ensuring accuracy and efficiency.

### Safeguarding our future

This industry-led initiative demonstrates the commitment of South Australian growers to protect their livelihoods and maintain access to crucial markets. By working together, AUSVEG SA, AUSVEG Biosecurity, PIRSA and growers are creating a robust defence against the SLM, safeguarding the future of the state's vegetable industry.

### Get involved

Growers and industry stakeholders are encouraged to actively participate in the SLM surveillance plan and attend the workshops. For more information, contact Peta Coughlin at AUSVEG SA or Shakira Johnson at AUSVEG.

The AUSVEG Farm Biosecurity Project is funded by Plant Health Australia using the Plant Health Levy.





## Tomato brown rugose fruit virus

**A new virus of tomato, capsicum and chilli has been reported for the first time in Australia. What does this mean for growers?**

In August 2024, tomato brown rugose fruit virus (*Tobamovirus fructirugosum*, or ToBRFV) was confirmed to be present in commercial production sites in South Australia.

Seed tracing investigations have led to a positive result for tomato brown rugose fruit virus in two seedlines which were imported into Australia from Türkiye in late May 2024. These seedlines had offshore testing certification, with negative results for this virus. To date, the Türkiye seeds have not been confirmed as the source of the outbreak, and further testing is in progress.

As a precautionary measure, seed testing certification issued by laboratories in Türkiye has been suspended by DAFF and the import pathway is being reviewed. Tracing activities are also being conducted on imported seedlots.

### Tomato brown rugose fruit virus

Tomato brown rugose fruit virus is on the National Priority Plant Pest list and regarded as a considerable threat to Australia's vegetable and nursery industries due to reduced yield and quality of produce.

Marketable yield losses of between 5-55 percent have been reported. The number of fruits per branch may also be reduced.

It is a highly contagious plant virus that is known to infect tomato, capsicum and chilli. A number of weeds, such as night-shades, fat hen, quinoa (*Chenopodium*) and buffalo bur are also known to be infected. Potatoes are not known to host or be affected by the virus.

### How do I know if there is ToBRFV in my crop?

ToBRFV is named after the characteristic brown wrinkled (rugose) patches that can develop on infected fruit or plants. Symptoms may vary depending on the variety, time of infection, plant age and environmental conditions, in particular temperature and photoperiod (day length).

#### Common symptoms include:

- Mosaics (chlorotic or pale patches) developing on younger leaves in the head and side shoots.
- Leaves may be crumpled (puckered) and deformed; in some cases, leaves may be narrowed.
- Brown (necrotic) streaks may develop on stems (*Figure 1*).
- Fruit can develop chlorotic marbling, which can appear similar to infection with Pepino mosaic virus (*Figure 2*).
- Fruit may develop brown wrinkled (rugose) patches (*Figure 3*).

A reduction in root biomass in the early stages of infection has also been reported as hormone imbalances impact on lateral root development. Note that foliar symptoms may be confused with other tomato viruses that result in similar symptoms.

### Minimising the risk

ToBRFV spreads easily through contaminated tools, hands, clothing and direct plant to plant contact, including grafting and cuttings. The virus can spread easily to all plants in a crop.

It can also be transmitted in seeds and irrigation water. ToBRFV is highly stable and can remain viable in seed, plant waste and contaminated soil for several months.

Below are some recommendations to reduce the risk of entry and spread of ToBRFV.

- Restrict access to production sites to staff, and limit movement between facilities. Growers can sign up to Onside for free to manage farm visitors: [getonside.com/au/ausveg](https://getonside.com/au/ausveg)
- Train staff to recognise plant disease symptoms and pests and hygiene measures.
- Monitor your crop regularly for symptoms. If you're not sure, send a sample to a diagnostic laboratory to confirm.
- Prohibit consumption of susceptible hosts (tomato, capsicum, chilli) on site.
- Remove wild tomato plants and other weed hosts that could act as reservoirs for the virus.
- Change or wash clothing and footwear when entering the production site or use disposable clothes and booties. Wash your hands or change gloves regularly.
- Disinfect tools and equipment.
- Contact your seed suppliers to seek their assurance about what specific testing has been applied to batches of seeds.

### What to do if you see unusual symptoms

**Report any unusual plant pest or disease by calling the Exotic Plant Pest Hotline on 1800 084 881.**

**Above, L-R. Figure 1:** Stem necrosis on capsicum. Photo *gd.eppo.int*. **Figure 2:** Chlorotic marbling on capsicum. Photo *gd.eppo.int*. **Figure 3:** Brown wrinkled patches on tomatoes. Photo *Yorgos Kontosfyris*



Scan QR code to learn more about ToBRFV and the current outbreak visit PIRSA website [pir.sa.gov.au](https://pir.sa.gov.au)

# vegnet update





# 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.

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VEGNET  
National  
UPDATE

## Innovation from the ground up

**The VegNET Innovation Fund is delivering ground-up, regionally relevant projects that directly address grower needs.**

The VegNET Innovation Fund is available to support innovative projects across Australia's vegetable-growing regions. Over the past two and a half years our steering committee, the National Extension Advisory Group (NEAG), approved over \$1 million dollars in funding. These funds are set to empower the horticultural sector by enabling VegNET Regional Development Officers (RDOs) to drive ground-up projects that directly address grower needs.

The strength of the VegNET Innovation Fund lies in its regional approach. RDOs work closely with growers in their respective regions to identify local priorities and opportunities. The ground-up approach ensures that projects funded are directly relevant to you the grower and your needs. It also supports the development of tailored solutions, often allowing regional voices to drive national outcomes.

Our largest project to date is the National Surveillance Program for Fall Armyworm (FAW) designed to give all our vegetable growers and stakeholders much needed data. FAW poses a significant threat to the vegetable industry, and early detection is critical for effective management. Through this initiative, RDOs are collaborating with growers to set up traps in strategic locations across different regions, providing critical data that informs both regional and national pest management strategies.

The VegNET Innovation Fund has also funded a series of study tours for growers. These tours provide vegetable producers with opportunities to explore cutting-edge farming practices, and advanced technologies in various regions. By learning from other growers and agricultural experts, participants gain invaluable insights that they can take back to their own farms, driving the adoption of best practices and innovation in their own businesses. These tours are not just about seeing new ideas but about fostering collaboration and knowledge sharing across the industry.

At Hort Connections this year, the Corteva Agriscience Young Grower of the Year Award went to an inspiring young man from Western Australia, Zeke Zalsman. Zeke was part of an Innovation

Project, Evaluation of heat pumps in horticultural greenhouses. The project aimed to assess the financial, physical, and social readiness of growers to embrace this technology, which had seen limited exposure in the local market.

By accelerating the adoption of modern, environmentally friendly heating systems, the project supported the long-term financial and environmental sustainability of the protected cropping industry. It also sought to reduce reliance on costly and harmful fossil fuels, ensuring the sector can thrive in a changing landscape. Zeke was the first grower in the country to commercially adopt heat pump technology for greenhouse heating.

In addition, there has been funds utilised to bring growers from interstate to an AgTech Field Day, which delivered the latest agricultural technologies directly to growers. These field days serve as a platform for growers to engage with technology providers, explore practical demonstrations, and learn about new tools that can enhance productivity, improve crop management, and increase sustainability.

VegNET's commitment to innovation through the RDO network has been vital in ensuring that growers across Australia can access the tools, knowledge, and technologies they need to thrive. By empowering RDOs to lead these initiatives from the ground up, the fund is helping to create a more resilient, forward-thinking vegetable industry. The flexibility of the fund means that projects can range from small, localised interventions to larger, national collaborations, but the common thread is the direct involvement of growers in shaping the future of their industry.

**By empowering RDOs to lead these initiatives from the ground up, the fund is helping to create a more resilient, forward-thinking vegetable industry.**

**Above.** Multi Region – Grower study tour participants in the Lockyer Valley.



The support of the VegNET RDO network has been key to this success, and their deep connections within regional grower communities ensure that every project funded delivers tangible benefits at the farm level. Whether it's through cutting-edge pest surveillance, knowledge-sharing study tours, or the adoption of advanced agtech.

By focusing on growers' needs and working in collaboration with industry partners, the VegNET Innovation Fund is not only addressing some of the challenges as growers you experience but, also working 'from the ground up' an opportunity when a project may be too large for the Innovation Fund. A solid foundation has been laid to progress it to the next level.

Would you like to know more about what projects have been funded and their outcomes? Do you have an innovative idea for your region? Call or phone myself or your Regional Development Officer!

**Above L-R.** Fall army worm trap install. AgTech in field demonstration.

#### 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  
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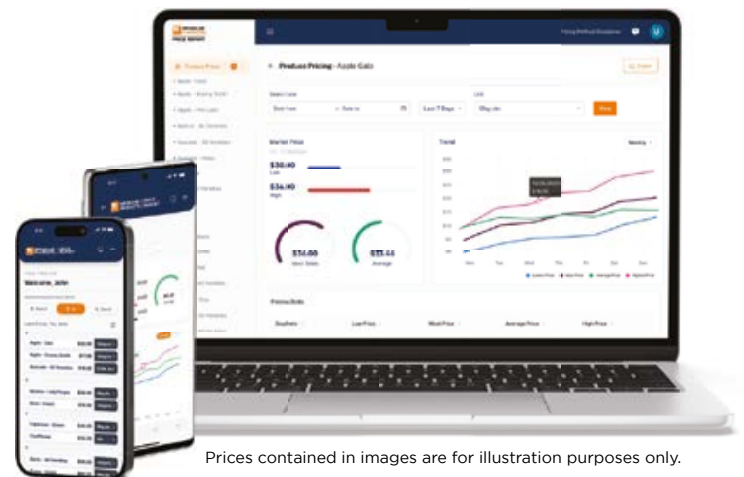
## Get the latest wholesale produce sales data

### Do you want access to real wholesale produce sales data from the Brisbane Markets trading floor?

The Brisbane Markets Price Report is based on actual weekday wholesale fresh produce trading transactions recorded through Brisbane Markets Wholesalers, and provides a transparent (and verifiable) source of data for growers, buyers, and industry. Available as both a mobile and web application, the Report provides easy access to low, average, high, and most sales prices at the Brisbane Markets through a range of competitively priced subscription options.



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VEGNET  
**Western Australia**  
REGIONAL UPDATE

## Producing potentials in protected cropping in Western Australia

**Linking opportunities for updating business and technical decision-making, and response to regional challenges is helping to growing WA's protected cropping interest network.**

The Protected Cropping Series delivered workshops, farm consults and outreach activities during 2024, capturing more than 30 vegetable and cross-sector horticultural businesses across WA of varying stages of growth potential, resource needs, technical skills level and motivations.

The VegNET project was initiated in response to the growing interest amongst vegetable and other producers in the potential benefits of protected cropping as a means to improve business profitability and efficiency whilst addressing increasing regional and climate challenges.

There is a notable shortage of protected cropping specialists and independent horticultural agronomists in WA. As a result, growers often rely on external resources from other states or countries to stay informed, which can be both costly and inefficient.

WA vegetable producers have seen limited government initiatives for resource efficiency in horticulture. Research and development tailored to WA's agricultural needs, particularly in protected cropping production systems, is limited. This lack of investment has inhibited growth potentials of the industry or accelerated industry innovation.

Recently, new grants, incentives, and national projects have emerged, offering growers the opportunity to enhance their positioning and prepare to capitalise on funding for identified farm projects and improving on production efficiencies.

**These gaps highlighted an opportunity for the vegetable innovation-funded project Protected Cropping Starter Pack to spark fresh interest in growing communities, and hopes to provide a continuity and momentum for targeted support, specialised accessible resources and advocacy.**

VegNET WA partnered with Berries Australia to offer initial workshops aimed at enhancing decision-making for businesses evaluating a transition to protected cropping systems. The series started with an introduction to protected cropping, followed by two technical training sessions in irrigation and fertigation delivered by Levi Nupponen of Agrolgy Pty Limited.

This was complemented by one-on-one farm consultations with Protected Cropping Australia's (PCA) Tony Bundock, and concluded with a completely subsidised 4.5-day masterclass delivered by Graeme Smith Consulting, providing advanced technical theory sessions and on-farm technical training for vegetable growers, berry growers and wider industry.

By providing an adaptable and flexible delivery approach which recognised the diverse needs of individual enterprises, the project was able to enable a wide-ranging reach of participation of farms and industry into the program series by offering various options for applied learning for their business.

Keeping the momentum moving forward VegNET will continue to join forces with wider industry, bringing relevant resources and opportunities to the PC Grower Interest Group. This group will connect existing and aspiring growers, regional and industry development officers, and industry organisations together, facilitating information sharing within a platform for members to exchange insights and best practices.

### Current opportunities with VegNET WA

VegNET WA's Input Use efficiency Project is offering another vegetable trial site for a Biomineral Production system (see case study on page 148).

**VegNET WA PC Innovation Fund - WA Grower Outreach still available including lab packs.**

**Above L-R.** Vince Ngo with Tony Bundock PCA project officer and Katrina Hill VegNET RDO. Farm consults with PCA's Tony Bundock and vegetable and berry grower Vince Ngo. *Photo courtesy Helen Newman Berries Australia.*

### 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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Project: VG21000

**Hort Innovation** VEGETABLE FUND  
**Hort Innovation** ONION FUND



## New APVMA approvals for Verpixo® offer growers more flexibility

Corteva Agriscience's Group 21 product Verpixo® Adavelt® active has achieved APVMA approval for new crop registrations, further boosting its reputation as a highly effective fungicide that delivers on the broad-spectrum control of ascomycete diseases.

Verpixo has become the go-to option for vegetable growers seeking a new mode of action as well as flexibility in resistance programs, in the battle to control damaging diseases like botrytis, powdery mildew, alternaria and septoria.

Trialled extensively under Australian field conditions, Verpixo has been proven to have no known cross-resistance to other fungicide groups, is IPM-friendly and can be used across a wide range of crops at multiple growth stages.

In August 2024, the fungicide was approved by the APVMA for additional diseases:

- **Cucurbits** – powdery mildew and gummy stem blight (NEW)
- **Fruiting vegetables** – powdery mildew, target spot, anthracnose (NEW) and botrytis (NEW)
- **Leafy vegetables** – sclerotinia, septoria (NEW), botrytis (NEW) and anthracnose (NEW).

In addition to the new diseases, a NEW crop registration:

- Wine grapes and Table grapes for control of both botrytis and powdery mildew.

### Custom fungicide programs 'redefined' by flexible product

Corteva Agriscience Territory Manager for Central Queensland and Wide Bay Burnett, Matt Kunde, said it was exciting to have Verpixo® available for use on a broader range of crops and diseases.

"In many cases, existing chemistries are under threat of resistance, so this product will redefine custom fungicide programs," Mr Kunde said.

### "It gives growers the flexibility to successfully manage diseases strategically throughout the year.

"Being a single Group 21, Verpixo is stand-alone. It can be added to the existing disease control programs to lengthen the life of existing mode of action products, or farmers can substitute it where products are not working well, to provide a strong new treatment to maximise production.

"Verpixo is naturally inspired, broad spectrum, safe to crops, safe to beneficial insects, has a short pre-harvest interval of one day for most crops, flexible timing and tank mixes are possible, and it has a rain-fast period of three hours."

### Trials across Australia show product versatility

Since its commercial release in January 2024, following APVMA approval for use in strawberries, fruiting vegetables, leafy vegetables and cucurbits, Corteva Principal Biologist, Rob Annetts, said Verpixo has become the 'Rolls Royce treatment' for powdery mildew, with control achieved at rates of 1.25L/ha-1.5L/ha.

### "Verpixo is derived from a naturally occurring compound found in soil bacteria and produced synthetically," Mr Annetts said.

"It builds on new chemistry first established by Corteva Agriscience, with some tweaks to provide better UV stability, broader spectrum and a lower use rate to make it ideally suited to Australian conditions.

"It's a very useful tool as a rotation partner where pathogen resistance to SDHIs, strobilurins and triazoles is a concern."

### New trials test impact on gummy stem blight

Ongoing replicated trials testing Verpixo on gummy stem blight in watermelons, rockmelons, honeydew and pumpkins in Queensland and Western Australia have also produced impressive results, achieving suppression at rates of 1.5L/ha that still allow growers to get a crop off.

Verpixo proved to have very good efficacy against anthracnose and grey mould in 11 trials on tomatoes, capsicums, eggplants and chillies in Tasmania, South Australia, Queensland and WA, at rates of 1.5L/ha in the field and 150ml/100L in the glasshouse.

Originally registered to control sclerotinia on leafy vegetables at 1.5L/ha, Verpixo has since produced excellent results on grey mould, septoria and anthracnose in 16 trials in Queensland and WA.

Growers can expect to see QR stickers applied to the caps of existing inventory that direct them to the most recent updates and APVMA-approved new label changes for Verpixo can be found on the Corteva Agriscience website.

**Above L-R.** Verpixo is naturally inspired, broad spectrum, safe to crops, safe to beneficial insects, and has a short pre-harvest interval of one day for most crops. Corteva's Matt Kunde said new label registrations for Verpixo will redefine custom fungicide programs.

**FIND OUT MORE**  
Visit [corteva.com.au](https://corteva.com.au)



VEGNET  
**Northern Territory**  
 REGIONAL UPDATE



NORTHERN  
 TERRITORY

## Trialling industry-leading lasers to control bird pest pressures

Produce damage due to birds is a significant issue for vegetable and tropical fruit growers in the Northern Territory (NT). Previously, the VegNET project in the NT has had a strong focus on management of insect pests through an IPM trial site, however the project has now broadened its focus to larger pests in 2024 with a farm trial exploring bird control through an automatic laser device.

In June 2024, NT Farmers partnered with both Bird Control Group and a local vegetable and mango grower to set up a farm trial, trialling a laser to control cockatoo populations in snake bean and mango crops.

The laser was provided and installed by Bird Control Group on an 8m high pole and programmed specifically for that area. The laser was installed for a trial period of three months to observe its success in managing cockatoo damage to the crops. During these months the grower and VegNET collected several observations of the system to share with those considering lasers as a bird management tool for their vegetable and fruit farms in the NT.

### About the laser

The AVIX Autonomic Mark II is a fully automated laser that birds perceive as a physical threat, causing them to flee when the beam passes by. The system can be programmed and monitored through iOS and Android apps, connected through Bluetooth. The laser bulb needs to be replaced every three to five years depending on the use and can be replaced by the grower. The laser can be programmed with 16 different patterns and 10 different time slots. Each pattern can be assigned to specific timeslot, allowing a variety of bird-repelling patterns at different times of the day.

### Farm trial observations

NT growers had previously raised concerns that high UV levels on most days might reduce the laser's effectiveness from mid-morning to mid-afternoon. However, the on-farm trial demonstrated that, although the laser was less visible during peak UV periods, it still performed effectively at all times and was not limited by time of day or UV levels.

### About the installation

Assessment of the area that requires bird control is essential in getting the best outcomes from the laser. It is essential to work with the company you are purchasing from to ensure crop height and density, area and flatness of the land is considered. This will then influence where the laser will be stationed and the height the laser will need to sit at. For a large area of mangoes, the laser would need to be on a much higher pole than a smaller area of ground vegetables.

The limiting factor in how much area the laser can cover is often not the distance the laser can travel but the time it takes for the laser to finish its area and return to the start again. Ideally the laser should complete the area in under 20 minutes meaning no section is left more than 20 minutes without the laser passing over it. Putting the laser in a corner will minimise the angle it needs to work at, allowing it to travel across the area in quicker time than if it had to work across a 180-360 angle. Taking all this into account, a rough estimate to go off is that one laser will protect 2-5ha.

### Farm trial observations

The importance of placement and height of the laser was one of the largest learning curves of this trial. The trial looked to use current infrastructure instead of installing a pole as the installation was temporary.

The laser was able to adequately cover the snake bean area, which was the main priority of the trial, however due to the positioning and height of the laser, it was not able to adequately cover the desired section of mangoes. The assessment of the area to cover took place over the phone and by using satellite maps which did lead to some miscommunication on laser limitation and expectations.

The farm trial highlighted the importance of both grower and the laser provider having a sound understanding of the area you want to cover and the importance of positioning to do so, whether done online or in person.

Above R. The AVIX Autonomic Mark II laser unit.



### About the bird reduction

The laser is expected to provide a 70 percent reduction in bird activity for a large variety of crops and birds. The programming and laser abilities reportedly also ensures the birds do not get accustomed to the device.

### Farm trial observations

The farm trial tracked the estimated reduction in birds. In the snake bean crop the grower reported no birds in month one due to crop establishment, and an 80 percent reduction in birds from previous season in months two to three once the crop had developed beans. The grower found the laser was effective on the snake bean crop, and he could see on occasions where birds stood on the trellis, the laser would cause them to move on.

The only hesitation the grower had was that when speaking to other farms in the area, they felt there was less bird activity this season and so the grower feels the laser would need to be assessed over several seasons for him to get a confident understanding of the reduction.

Once the snake bean block was adequately covered, the laser was also programmed to loosely cover the mango block. In the first two months of the trial the grower saw less birds in the mango block near the laser, however he could see that the mango area would ideally require a second laser to cover it effectively.

After the second month the grower decided to change the program to focus solely on the snake beans to achieve maximum effectiveness in that area. Upon reflection, for the laser to work effectively in the mango crop it needs to be higher and situated in a different area. That is not to say the laser does not work in mango orchards, but the laser positioning and height would need to have been different to get the best results.

**Above.** The height the laser was mounted at played a critical role in its effectiveness.

### But is it cost effective?

Good quality lasers can be a significant upfront cost. When working out if a laser is financially beneficial to your business there are a few areas to consider.

1. What is the estimated annual percentage of crop loss/income loss from produce damage from birds?
2. Do you currently pay staff to drive around and scare the birds, and if so what is the estimated annual cost of this?
3. What are the maintenance requirements and costs of the laser? Often this is just changing a globe every few years, however if the laser has further issues what services are available to fix it and what are the costs associated with this?
4. The cost of the laser including installation, solar panels and batteries.
5. The expected lifespan of the laser.

**Once you have factored in these costs and savings you are in a much better position to evaluate if the purchase of the laser is the right decision for your business.**

### 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.

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## Wide Bay Burnett

REGIONAL UPDATE

# On farm trial of connectivity solutions ahead of the 3G shutdown

A vegetable farm down in the Gympie region has taken a significant step toward ensuring smooth operations by addressing a lack of mobile phone coverage inside its pack shed. With the imminent shutdown of the 3G network, the farm owner with support from their local agronomist and the entire staff faced potential disruptions. The absence of reliable connectivity not only posed risks to productivity, but also to employee health and safety.

This issue was investigated by Joe Prelc from Internet Innovations and through collaboration with engagement lead VegNET Regional Development Officer Jessy Logan, the farm successfully implemented improvements to its mobile coverage. Now, workers can make phone calls, access apps, and handle critical tasks, allowing the farm to maintain productivity and better safeguard its employees in case of emergencies.

### The impact of the 3G shutdown

The looming closure of the 3G network presented a significant challenge for many farmers who have limited connectivity currently. Turned off on 28 October 2024, the shutdown means any farm still relying on 3G infrastructure will face major connectivity issues. In the case of this trial farm, several operations were at risk due to the lack of mobile signal inside the pack shed. These impacts included:

- Limited communication:** Workers were unable to make mobile calls inside the pack shed, leaving them isolated from vital communication channels. Whether for personal, professional, or emergency use, the lack of mobile signal meant employees had to leave the area to make a simple phone call. This created delays in work and increased safety concerns, especially in emergencies where every second matters.
- No access to apps or wi-fi:** Without access to Wi-Fi, workers couldn't use essential applications that support farming operations. Apps used for business communication, tracking tasks, and personal use were rendered ineffective within the pack shed. Additionally, the lack of internet prevented the farm from utilising the full potential of new agricultural technologies that require constant data connections.

### Installation process and technology

The installation process to improve connectivity began with engaging the grower to assess their needs and priority locations. The following steps were then taken by Joe Prelc from Internet Innovations in collaboration with Jessy Logan to ensure a smooth transition.

- **Desktop design and assessment:** Two weeks before installation, we conduct a desktop assessment to identify the best Telstra towers for the site.
- **On-site validation:** One week before installation, we verify the performance of the selected Telstra tower on-site and confirm our findings with Telstra engineers.
- **Pre-configuration:** We pre-configure Cel-Fi and Ericsson modems to match the Telstra site bands to ensure seamless integration upon installation.
- **Custom equipment selection:** We select the appropriate antennas and cables for optimal performance.
- **Coordination with electricians:** We pre-brief the grower's electrician and supervise their work on-site to ensure proper setup.
- **Mounting and alignment:** We install high-gain external antennas at the highest feasible location and align them for the best signal from the selected Telstra tower.

**Above R.** Installation of hardware on top of farm pack shed.



- **Performance verification:** After installation, we use diagnostic tools and gather grower feedback to verify the system's performance.
- **Post-installation monitoring:** We continuously monitor the system post-installation and address any issues, such as staff accidentally switching off services, with the grower.

By combining proven technology with the expert installation techniques, Internet Innovations ensured that the network operates at peak performance both immediately and long-term.

### Benefits of improved connectivity

By addressing these connectivity gaps, the trial farm has experienced several key improvements that will position them for future success as 3G technology phases out. The key benefits include:

- Enhanced efficiency and productivity
- Improved health and safety
- Increased employee engagement
- Position for adoption of agtech.

### Preparing for an agtech future

Against the background of the 3G shutdown, businesses like the trial farm are preparing for a future where advanced technologies play a central role in agricultural operations. By investing in better connectivity now, the trial farm is positioning itself to take full advantage of agtech innovations such as real-time analytics, sensor-based monitoring systems, and remote farm management.

With this new connectivity, the trial farm not only solves immediate communication problems but also opens the door to increased efficiency, safety, and engagement as they move into a more tech-driven future.

For anyone wanting to understand how connectivity solutions could benefit their farming business, please don't hesitate to reach out to Joe Prelc at Internet Innovations on 0412 679 718, Joe@internetinnovations.com.au or visit internetinnovations.com.au.

**Right.** View from farm pack shed once hardware installed.



### FIND OUT MORE

Please contact Jessy Logan, on 0407 366 797 or email vegnet@bfvg.com.au

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VEGNET SOUTH EAST QUEENSLAND  
**Lockyer Valley**  
REGIONAL UPDATE

## Horticulture in Australia's highly variable weather: how VegNET is supporting vegetable growers

Vegetable growers continue to face challenges that threaten productivity and sustainability. VegNET Southern Queensland continues to work with and engage growers through activities which address regional priorities, which include strengthening grower knowledge and awareness of challenges such as resilience, water and pest and diseases. Australia has a highly variable climate, with large changes from year to year superimposed on longer-term trends. This variability affects our environment and many aspects of our society, including our horticultural crops through continuing hot days, drought plus increasing pressures from weeds and insect pests.

VegNET Southern Queensland continues to work closely with vegetable growers to improve regional engagement and biosecurity, pests, and disease preparedness. Regional priorities include strong grower networks and access to industry resources, increase knowledge/awareness/and skills related to high-priority regional challenges (such as water), improve collaboration among stakeholders, and enhance early detection and communication regarding pests.

To facilitate this, VegNET and the Lockyer Valley Growers Association collaborate closely with various organisations, including the Queensland Department of Agriculture and Fisheries (QDAF), the Lockyer Valley and Somerset Water Collaborative, and local agronomists.

In August, the Lockyer Valley and Somerset Water Collaborative hosted an essential information session on the Lockyer Valley and Somerset Water Security Scheme (LVSWS), a strategic project designed to enhance water availability for irrigation. This initiative promises to significantly boost agricultural production, unlock new export opportunities, and create thousands of local jobs. Growers and industrial water users were encouraged to participate in these sessions to gain insights into how the LVSWS can transform the region's capacity to sustain its horticultural industries for future generations.

Following the information sessions, a grower BBQ was held on 29 August to provide a platform for further discussion. The event attracted 28 people; 15 growers plus industry representatives from nurseries, QDAF, AUSVEG and Hort Innovation.

Industry experts Gordon Van Der Est and Brock Sutton discussed the new water initiative, covering essential topics like the benefits of solar energy, excess water management, and the overall reliability of the water scheme. The deadline for feedback on water licences has been extended, allowing growers to submit or revise their paperwork as needed.

**Above R.** Growers and industry representatives, Grower BBQ 29 August.

Attendees had the opportunity to ask questions about the project, including the new demand assessment process necessary due to an updated design that offers over 95 percent water reliability. This assessment is crucial; insufficient demand could jeopardise the project's viability, making it imperative for interested parties to submit their forms promptly.

Research from Griffith University is also shedding light on the complexities of water trading in response to climate change and a growing population. Understanding the factors influencing farmers' decisions in water trading and management will be crucial for effective resource allocation in the future.

On 12 September, the Queensland Department of Agriculture and Fisheries (QDAF) and VegNET hosted an industry meeting in the Lockyer Valley, drawing 28 attendees. The focus of the session was on innovative pest management strategies, specifically the use of pheromone traps for monitoring fall armyworm (FAW) and differentiating it from other

species. Participants explored area-wide management practices, leveraging data from RapidAIM traps to enhance control efforts not only for FAW but also for other pests like the silverleaf whitefly.

The meeting emphasised the importance of disseminating timely alerts to growers and agronomists regarding rising insect populations, using a subregional approach while ensuring grower anonymity. Plans are also underway to convene a breakfast meeting for agronomists to discuss how to integrate new ideas into a practical platform. These discussions highlighted a critical need for improved information sharing and underscored the vital role VegNET can play in facilitating communication within the vegetable grower community.

The VegNET RDO will continue to engage with growers and stakeholders with a working lunch, grower BBQ and agronomists breakfast planned for the coming months. With a busy winter production season wrapping up growers are looking forward to our Christmas celebrations.



**FIND OUT MORE**

Please contact Darren Brown on 0456 956 340 or email [ido@lockyervalleygrowers.com.au](mailto:ido@lockyervalleygrowers.com.au)

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VEGNET

## New South Wales

REGIONAL UPDATE

## NSW Vegetable Innovation Field Days preparations underway

In an era of rapid agricultural advancement, the need for innovation and knowledge exchange within the vegetable sector has never been more critical. Recognising this necessity, VegNET NSW, in collaboration with Greater Sydney Local Land Services, successfully applied for funds from Hort Innovation's VegNET Innovation Fund for two projects. The projects aim to design and implement a series of Vegetable Innovation Field Days across New South Wales from 2024 to 2025, and to establish a national soil wealth applied research and development demonstration site at Richmond Lowlands from now until 2026.

NSW has diverse vegetable production systems in both soil and protected cropping. Given the variety of different crops, culturally diverse communities and state-wide priorities, a series of vegetable innovation days has been identified as a great way to bring industry and growers together. These projects are reflective of the diverse needs of the specific commodity groups with a focus on targeted extension and seeks to further design and identify research opportunities for further investment.

From discussions with a range of VegNET stakeholders and culturally and linguistically diverse (CaLD) groups, learnings from existing targeted soil extension programs and feedback from growers, there is a need to measure the longer-term benefits of various improved soil management practices. More specifically, the physical, chemical and biological benefits of various soil management practices over time need to be measured and assess the return on investment for making these practice changes.

The field days will serve as a platform for growers, industry experts and researchers to come together, share insights, and explore cutting-edge practices that enhance productivity, sustainability, and resilience in vegetable production. By fostering collaboration and facilitating the dissemination of innovative techniques, this initiative seeks to empower local growers and contribute to the overall growth of horticulture.



**Above.** Growers at VegNET zucchini field day in December 2019.

**Left.** Sweet corn crop at the Local Land Services Demonstration Farm. Cover crops flourishing at the Local Land Services Demonstration Farm in August 2024.



**Above L-R.** Zucchini varieties on display at VegNET zucchini field day in December 2019. Anthony Muscat, Agronomist from Ace Ohlsson, discussing zucchinis with a grower at VegNET's zucchini field day in December 2019.

### Series of Vegetable Innovation Days

The first Innovation Field Day is a 'double header' showcasing zucchini and sweet corn varieties as well as presenting the Soil Wealth Demonstration site. This field day will be held on Friday 13 December at NSW Local Land Services' Demonstration Farm at Richmond Lowlands, north-west of Sydney in the Hawkesbury Valley.

Demonstrations to expect on the day:

- New sweet corn and zucchini varieties, updates on the latest research on integrated pest and disease management, particularly with regards to fall armyworm and mosaic viruses in zucchini,
- How to manage crop pollination now that varroa mite is becoming established in NSW.
- New innovations in ag-tech and irrigation management, with a focus on water use efficiency and maximising returns and reducing the costs of production.
- A range of improved soil management practices with a range of extension resources developed and extended to growers to facilitate adoption.
- A focus on soil carbon and maintaining natural capital in soils will be a focus together with demonstrating new innovations such as alternative materials to plastic in horticulture, such as biodegradable mulches, to encourage sustainability.

### National Soil Wealth Applied Research and Development Demonstration Site

The VegNET NSW team with NSW Local Land Services has also undertaken a range of soil health projects over several years including the benefits of incorporating green waste amendments such as compost into intensive vegetable production systems. The aim is to establish a long-term Soil Wealth trial site, leveraging the highly successful Hort Innovation funded Soil Wealth and Integrated Crop Protection project and their team members from Applied Horticultural Research to demonstrate the long-term benefits of a range of improved soil management practices.

A range of improved soil management practices will be monitored over time and a range of extension resources developed and extended to growers to facilitate adoption. Sustainable practices including improving soil carbon and investigating alternative materials to plastic mulch are key objectives of this project. Over the course of these two years, several events will be held, providing growers and industry members with opportunities to engage actively in the adoption of soil health improvement practices on farms.



Beekeeper demonstrating hives at VegNET zucchini field day in December 2019.

**Other Innovation Field Days are planned for May 2025, at Local Land Services Demonstration Farm and protected cropping vegetables at Woolgoolga.**

#### 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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VEGNET VICTORIA  
**Gippsland**  
REGIONAL UPDATE

## Irrigation insights: A hands-on learning experience at Victoria's last demonstration farm



On 9 October some Gippsland growers and I had the pleasure of attending an irrigation workshop in Maffra, held at the last remaining demonstration farm entirely owned by farmer shareholders in Victoria.

This two-day event, facilitated by Agriculture Victoria's Stephanie Veskoukis and Sarah Killury and led by Peter Smith from Sapphire Irrigation Consulting, provided invaluable insights into irrigation systems and strategies for optimising water use in agriculture.

### Day 1: A deep dive into soil and irrigation fundamentals

The first day focused heavily on theory, helping us better understand the science behind effective irrigation. We explored topics such as soil textures, infiltration rates, water-holding capacity, and soil variability—critical factors that influence when and how much to irrigate.

One of the key concepts discussed was the 'soil water fuel gauge', which highlights the importance of knowing how much moisture your soil can hold before it needs to be replenished. Understanding this can significantly improve irrigation scheduling, water use efficiency, reducing water lost to runoff or evaporation, and improving crop health.

We also covered different types of irrigation systems, from surface systems to more complex spray setups, and how to choose the right one based on your farm's specific needs. It was an eye-opening session, emphasising that one-size-fits-all solutions rarely work in agriculture.

### Day 2: Hands-on learning with practical applications

The second day brought a more hands-on approach, allowing us to see firsthand how the demonstration farm manages its irrigation. Observing the farm's system in action, we could visually grasp the impact of wind on water loss—a crucial factor often underestimated.

Watching the wind pick up and seeing the water drift away from its intended target underscored the importance of timing in irrigation management. This experience highlighted the need to understand not just soil and crop requirements but also environmental factors, such as wind speed, which can affect water efficiency.

**In summary, the day was full of great learning opportunities and brought a lot of awareness in the importance of choosing the correct setup for your farm.**

#### FIND OUT MORE

Please contact Amanda Gould on 0474 500 380 or email [amanda.gould@foodfibregippsland.com.au](mailto:amanda.gould@foodfibregippsland.com.au)

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**Above.** Talking a walk to see the fixed sprinkler system at the demonstration farm.

*Photo courtesy Stephanie Veskoukis - Agriculture Victoria*

**Left.** Peter Smith from Sapphire Irrigation Consulting - explaining soil water holding capacity.

*Photo courtesy Amanda Gould.*



## VEGNET NORTH, WEST & SOUTH-EAST Victoria REGIONAL UPDATE

# Demonstrating drone use on-farm for spray application and pest monitoring

In Spring 2024, AUSVEG VIC and VegNET Regional Development Officer Danielle Park hosted an evening drone demonstration in southeastern Victoria, responding to the growing interest in drone technology for vegetable business operations. The event provided growers from the region and beyond with a valuable, hands-on opportunity to witness drone technology in action. The demonstration aimed to showcase how drones could benefit vegetable growers, helping them explore new possibilities for their businesses.

Interest in using drones within vegetable businesses to enhance efficiency and tackle production challenges remains strong. This was evident at a recent drone demonstration evening held on the Mornington Peninsula, Victoria, which drew 32 attendees.

Hosted at Taranto Farms in Tyabb on 10 September 2024, the event showcased the advanced capabilities of the DJI T50 drone. The demonstration featured crop spraying with UV dye, providing a clear understanding of leaf coverage after sunset and highlighting the drone's precision and effectiveness in agricultural applications.

David Storen from Field Master Systems led the demonstration, showcasing the drone's capabilities by first capturing aerial imagery of the site before beginning the spraying process. To highlight the drone's effectiveness in achieving optimal leaf coverage, two water rates—40L/ha and 80L/ha—were applied for comparison on a crop of cos lettuce.

Feedback from the event was overwhelmingly positive, with strong interest in adopting drone technology within vegetable businesses. Several attendees expressed plans to integrate drones into their operations after witnessing the demonstration.

### Considerations before use

During the evening drone demonstration, Lucy Mychael from Nufarm gave a presentation on key considerations for spray drone application. She emphasised the importance of water rates, while also highlighting factors like spray drift, droplet size, and product selection. These elements were crucial for ensuring effective and appropriate drone spraying in vegetable operations.

### Digital record keeping to improve biosecurity

At the evening drone demonstration, Connagh Wellington and Mhairi McKay-Stewart from Onside presented their app and system, which Taranto Farms recently adopted to enhance digital site access management and biosecurity protocols. Attendees were encouraged to check in via the Onside app by scanning a QR code at the entrance, reinforcing the importance of biosecurity measures like the use of foot baths. Onside's implementation aligns with the *Vegetable Industry Biosecurity and Business Continuity Strategy (VG22004)*, emphasising the critical need for proactive collaboration to safeguard farming businesses.

### Thermal imagery to monitor pests

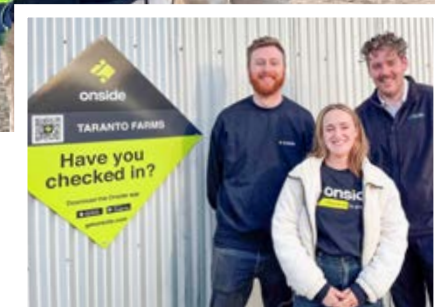
To conclude the evening, David Storen from Field Master Systems demonstrated the capabilities of a thermal imaging drone for detecting vertebrate animals. The drone successfully

identified both native species, such as possums, and pest animals, including a fox. This feature captivated attendees, highlighting its practical applications in wildlife monitoring and pest control.

**Above L-R.** Presentations during the evening were made by Lucy Mychael, Nufarm and David Storen, Field Master Systems. Getting hands on with one of the drones being demonstrated, Tim Schreurs, Chang Chuol, RPAS Manager & Daniel Hodges, Peninsula Fresh Organics.

**Inset.** Connagh Wellington & Mhairi McKay-Stewart from the Onside team supporting growers to check-in to Taranto Farms together with Zaine Watson, Executive Officer AUSVEG VIC.

**Below.** Inspecting the spray distribution following spray drone application with the use of UV dye.



### FIND OUT MORE

Please contact Danielle Park AUSVEG on 0432 324 822 or email [rdo@ausvegvic.com.au](mailto:rdo@ausvegvic.com.au)

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VEGNET  
**Tasmania**  
REGIONAL UPDATE

## Meet Tasmania's new VegNET Regional Development Officer - Tayla Field



**AUSVEG and RMCG welcome Tayla Field as the new VegNET Tasmania Regional Development Officer (RDO). She is taking over the reins from Ossie Lang after four great years on the project. Tayla, who has an agricultural science background and work experience in horticulture, is looking forward to supporting vegetable growers in Tasmania.**

### Welcoming Tayla to the VegNET Tasmania Team

Since its inception in 2016, VegNET, the *National Vegetable Industry Extension Program*, has been delivered by RMCG in Tasmania. RDO Ossie Lang worked with growers and industry on the program since 2020. After four great years of delivering the VegNET project in Tasmania, Ossie will be transitioning to work on new projects within the RMCG business. The national VegNET team have welcomed Tayla Field who will be the new RDO in Tasmania.

Reflecting on his time on the project, Ossie said that he "really enjoyed working with and learning from the wide range of growers and industry members who've joined VegNET projects and events over the last four years." He is "grateful for all their support and feedback received to deliver this project" and is "confident that Tayla will continue to deliver a great program to benefit the Tasmanian veggie industry".

While Tayla has gained experience in various agricultural sectors over the past few years, she has always returned to horticulture as her preferred area of interest. Speaking about her new role, Tayla expressed excitement about shifting her focus back to fresh produce and vegetable production. She said, "I'm looking forward to meeting and catching up with growers over the coming months to learn about their operations and build a picture of the local challenges and opportunities they are facing in Tasmania."

Tayla hopes to "support growers with practical information and extension activities that will translate to on-farm benefits. A focus will be on some of the key VegNET focus areas such as precision ag, soil management, biosecurity, training opportunities, and weed management."

Tayla is coming into the VegNET role from Foodbank Australia. There she was working with growers on sourcing programs that provided an outlet for excess or out of spec fresh produce direct from farms to those in need. Prior to this, Tayla was with One Harvest and spent time in the farming, manufacturing and commercial sales side of the business.

**Above L-R.** Simon Edwards, Daniel Gardner, Chris Boucher from TIA deploying the QUOLL® e-nose at Forthside Vegetable Research Facility. QUOLL® deployed for field trials at Forthside Vegetable Facility, August 2024.





**Above L-R.** BANDICOOT® testing at footy fields in Hobart, September 2024. BANDICOOT® testing at University of Tasmania in Hobart, September 2024. BILBY® deployed for field trials in Tunbridge, December 2023.

### Developing technology for improved on farm decision making

Following the TIA soil and agtech update at the Forthside Vegetable Research Farm in August 2024, the VegNET team dropped in to visit the team at the TIA Ag-Tech Innovation Studio. The studio specialises in supporting and advancing agricultural research through the development and engineering of innovative systems and solutions that are tailored for growers. They were able to show off the progress of their latest projects including next generation soil sensors which are under development.

Although not resembling their furry namesakes, the new technologies dubbed the BANDICOOT®, BILBY® and QUOLL®, were developed in projects funded by the Cooperative Research Centre for High Performance Soils (Soil CRC). The aim is to support growers and agronomists to make data driven decisions with easy to use and cost-effective equipment. Find out more about these projects below.

#### BANDICOOT®

The BANDICOOT®, is a an easy-to-use, portable, automated soil profiling tool that measures soil moisture, compaction, salinity, and apparent conductivity at 5cm depth intervals. With an in-built GPS, the BANDICOOT® provides real-time mapping and graphing and the ability to return to the same sample point for repeat assessments. Practical applications of the BANDICOOT's® output include irrigation scheduling, monitoring soil health, identify soil compaction and salinity, and measuring depth to clay layers.

When discussing the device, Dr Marcus Hardie from the University of Tasmania explained, "This device will enable growers to quickly and accurately investigate the cause, depth and location of poor soil or crop performance, as well as map soil moisture and penetration resistance via a mobile phone app."

#### QUOLL®

The QUOLL® is an electronic 'nose' (e-nose) that can help growers understand biological activity in their soil and provide an indication of soil health through estimating microbial activity. Simon Edwards, Research Engineer from TIA, said, "The QUOLL® works by sampling gasses emitted from microbes in the soil. It is fitted with mini sensors that detect various compounds that are produced by biological activity. It takes a sniff of the soil a couple of times each hour to collect data over a few days that gives us an insight into what is happening in the soil. It's fast and simple to use".

The project is currently undergoing field and laboratory trials. The product is estimated to be two to five years away from being a commercial product that growers or advisors would be able to purchase and use on farm.

#### BILBY®

Of the three technologies in development, the BILBY® is the nearest to being commercially available. The BILBY® is a robust, below-ground communications node for sending soil moisture data through the soil. The easy to install device, sends data from a buried soil moisture probe to a gateway located outside the paddock. Although transmission distances depend on topography, soil moisture, soil type and depth of installation, the team have had some great results with data transmitting to an above ground receiver up to 3km away.

Like other communication nodes, the BILBY® enables information to be displayed on a live dashboard for real time analysis. The long (over five years) battery life and below-ground

transmission, overcomes the issue of having exposed solar panels and wiring in paddocks by burying all the electrical components underground, safe from tractors, stock and wildlife. The key benefit is that growers can now install moisture probes anywhere in the paddock free from risk of damage.

#### Development ongoing

The team at TIA have kept industry needs front of mind in developing these technologies. While they have done this, they are still keen to ensure that the innovations are put through their paces by growers and agronomists. In particular, the team are looking for input on how the QUOLL® and BANDICOOT® can be used in the field. They want to know how the devices will support growers and agronomists with better data to support their decision-making and planning. If you'd like to participate, follow the link attached to the QR code, [bit.ly/Quoll-e-nose](https://bit.ly/Quoll-e-nose) or get in touch through the contact details below.



Scan the QR code to learn more about and collaborate on the QUOLL®

#### FIND OUT MORE

Please contact Tayla Field, on 0429 391 538 or email [taylaf@rmcg.com](mailto:taylaf@rmcg.com),  
Simon Edwards, TIA, [simon.edwards@utas.edu.au](mailto:simon.edwards@utas.edu.au)  
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VEGNET  
**South Australia**  
REGIONAL UPDATE

## Maximising fertiliser efficiency: boosting yields and sustainability

**VegNET SA has secured funding for a Fertiliser Efficiency (Fert Smart) Project which was initiated to address key concerns identified by the South Australian Regional Extension Advisory Group (SA REAG) regarding the efficient use of fertilisers and nutrition products, such as soil amendments and biologicals.**

Fertiliser efficiency plays a crucial role in modern vegetable growing, offering significant benefits to growers, the environment, and the agricultural economy. Vegetable growers can achieve higher crop yields, better produce quality, and a more sustainable farming system by improving how fertilisers are applied and utilised. The primary objective of the Fert Smart Project is to empower vegetable growers in South Australia to make informed decisions regarding sustainable crop nutrition programs.

The Fert Smart project is developing tools, guides and resources that are tailored to specific regions and will provide training for growers and agronomist on how to use the tools and information about how to improve fertiliser efficiency.

The tools being developed are a Crop Nutrition Budgeting Tool based on nutrient removal rates by crop stage for typical South Australian crops and systems, and a Nitrogen Use Efficiency (NUE) Calculator to measure nitrogen use efficiency (NUE) for key SA crops, showing the proportion of applied N not used and used by the crop and its dollar value to provide an incentive for best practice N management i.e. to achieve N use high efficiency. In addition it will provide agronomists and growers with a tool allowing them to field test and evaluate new amendments coming to market within their individual business production systems.

These tools will help growers accurately determine the specific nutrient requirements of their crops at different growth stages. This precision prevents over-application or under-application of fertilisers, ensuring that plants receive the right amount of nutrients when they need them, reducing waste and lowering input costs.

The application of the data gained from the tools will be supported by providing knowledge and resources about nutrient use efficiency, fertiliser and soil amendment options, economic benefits of crop nutrition planning, and nitrogen loss management

The project is developing Nutrient Use Efficiency Resource for growers and agronomists on factors other than fertiliser inputs that influence nutrient use efficiency. This resource will also explain the relationship between crop nutrition and plant diseases, tailored to specific regions such as Northern Plains, Adelaide Hills, and Mallee. Given nitrogen is a nutrient that is easily lost to the environment, it will also provide an understanding of N loss risks and how to manage them.

**Growers and agronomists will be equipped with knowledge about various fertiliser and soil amendment options, helping them understand how these products can best align with their production system and crop nutrition budgets.**





The education will include information about the financial benefits of crop nutrition planning and monitoring through soil, plant, and water testing, and encourage best practices for improving efficiency.

There will also be an opportunity for interested growers to be introduced to the New Zealand Institute for Plant and Food Research's nitrogen tool, which predicts nitrogen mineralisation. This tool can be particularly useful for growers using compost.

In an era where input costs are rising and environmental concerns are growing, maximising fertiliser efficiency has never been more important. The key advantages of increased fertiliser efficiency include: enhanced crop yields and quality, cost savings, improved soil health, environmental protection, pest and disease resistance, and adaptation to future challenges.

Balanced and precise nutrient management ensures that crops receive the optimal levels of essential nutrients at the right times. This promotes healthy plant growth, resulting in higher yields and improved produce quality, which are critical for market success and profitability.

**Fertilisers are one of the largest input costs for vegetable growers and by optimising fertiliser application, growers can reduce the amount of fertiliser used while still maintaining or improving crop productivity. This results in significant cost savings without sacrificing performance.**

Overuse or incorrect use of fertilisers can lead to nutrient imbalances, which degrade soil health over time. Increasing efficiency means growers can prevent nutrient depletion or toxic buildups, fostering long-term soil vitality that supports healthy crops for years to come.

Efficient fertiliser use helps reduce the risk of environmental damage caused by nutrient runoff and leaching, particularly nitrogen and phosphorus. Growers can reduce the impact of fertilisers on water quality and ecosystems by minimising excess application, contributing to more sustainable farming practices.

Resistance to pests and diseases is increased in crops that are nutritionally balanced and efficient fertiliser use ensures that plants are not deficient or overloaded with nutrients, which makes them stronger and less susceptible to infestations.

With the predicted depletion of key resources like rock phosphate and increasing pressures to reduce carbon emissions, improving fertiliser efficiency allows growers to adapt to future challenges. Efficient use of nitrogen, in particular, helps lower energy demands and greenhouse gas emissions associated with fertiliser production and application.

The goal of the Fert Smart project outcome is to equip vegetable growers and their agronomists in South Australia with the tools, resources, and knowledge needed to make informed decisions about sustainable crop nutrition programs. They will gain a solid understanding of how to optimise nutrient use efficiency by promoting soil health and selecting cost-effective nutrition products. Additionally, growers will be empowered to ask the right questions when evaluating recommended fertilisers, products, or soil amendments.

By embracing the advantages of improved fertiliser efficiency, vegetable growers can enhance the sustainability and profitability of their operations while contributing to a more resilient and environmentally responsible agricultural sector.

**The project would like a small group of growers to trial the tools being developed and if you are interested in being involved please contact Peta Coughlin.**

#### 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)

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  
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**Hort  
Innovation** ONION  
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## Research to practice: Applying lessons from a biomineral approach to veg production across WA

### Introduction

With appropriate support, growers can apply research findings to their unique production systems using field investigations that generate data and observations to inform on-farm practice.

This approach has been successful for growers in Carnarvon's horticulture industry, leading to the adaptation and integration of a biomineral production system into farming practices across a range of fruit and vegetable crops.

The biomineral system replaces inefficient, short-term fertiliser applications with a targeted approach using small doses of a custom microbe blend, controlled-release mineral fertilisers, and supplementary liquids as needed. The microbes extend the plant's root system, enabling access to otherwise unreachable nutrients and water, and convert unavailable nutrients into plant-available forms. The controlled-release fertilisers nourish both the soil biology and the plant, enhancing overall nutrient efficiency.

The benefits of a biomineral system include:

- Reduced input and production costs.
- Increased profitability.
- Enhanced product quality, driving market demand.
- Extended product shelf life.
- Increased water and nutrient use efficiency.
- Improved soil fertility and health.

Following the success and results achieved by growers in Carnarvon in the north of the state, a VegNET WA input use efficiency project actively shared these insights with the broader vegetable industry, generating significant interest among growers and providing an opportunity to expand knowledge across regions and commodities, including Albany in the south of the state.

### Key messages

- VegNET WA worked with a horticultural producer in Albany to evaluate how well sweet corn production knowledge developed in Carnarvon could be adapted to the different climatic and soil conditions of the south coast.
- The sweet corn field investigation was based on the results from a replicated trial at the Carnarvon Research Station, comparing a biomineral production system to conventional fertiliser strategies.
- The Albany trial demonstrated that the biomineral approach could achieve a similar total marketable yield as conventional methods, while producing more consistent growth with lower nutrient inputs.
- Ease of substituting biominerals from water-soluble fertilisers and reduced handling volume.

# Research to practice: Applying lessons from a biomineral approach to veg production across WA

## Field investigation targets sweet corn

The field investigation in Albany adopted a pragmatic approach, employing standard agronomic monitoring practices. The performance of the biomineral system was assessed against the traditional grower practice of using granular, water-soluble fertiliser.

The grower collected soil and leaf tissue samples, made field observations and completed yield assessments.

A soil analysis was used to determine the baseline and post-harvest nutritional status of both treatments, and leaf tissue samples were taken late in the production crop cycle to assess plant nutritional uptake.

Sweet corn crop monitoring and yield assessments were completed by the grower to make appropriate decisions and provide a meaningful assessment.

The conventional treatment (grower's normal practice) involved applying a fertiliser with a nitrogen, phosphorus and potassium (NPK) analysis of 12:5:15 at a rate of 730 kg/ha.

This was compared with a biomineral fertiliser comprising biological and controlled release mineral components with a NPK analysis of 10:7:4.5, applied at a rate of 500 kg/ha. Both treatments were banded at sowing.

Table 1 summarises the total nutrient application rates of each treatment.

Table 1: Total nutrient application rates

Treatment	Nitrogen (kg/ha)	Phosphorus (kg/ha)	Potassium (kg/ha)
Conventional	87.6	36.5	109.5
Biomineral	50	35	23

The biomineral program was based on the treatment used in the Carnarvon trial and included the option to apply supplementary nitrogen at a rate of 10 kg/ha at tasselling if a deficiency was observed. However, this was not required.

The conventional treatment had a nitrogen and phosphorus content almost directly proportional to one of the fertiliser strategies in Carnarvon, but a potassium content almost five times higher.

## Trial results

### Yield

The grower reported comparable yields from both treatments, approximately 16 tonnes/ha. This is considered a respectable yield and aligns closely with the results from the Carnarvon trial.

### Soil and plant nutrition

Despite the lower application rates of the biomineral program, neither treatment displayed nutrient deficiencies during any growth phases. This was shown by leaf tissue analysis conducted late in the crop cycle indicating that both strategies fulfilled plant nutritional requirements, despite differences in nitrogen and potassium application rates.

Post-harvest soil analysis revealed that no nutrients were depleted below acceptable levels in either treatment.

Interestingly, the biomineral treatment led to a significant increase in soil organic carbon levels, whereas a marked decline was observed in the conventional treatment (Table 2).

Table 2: Soil organic carbon levels

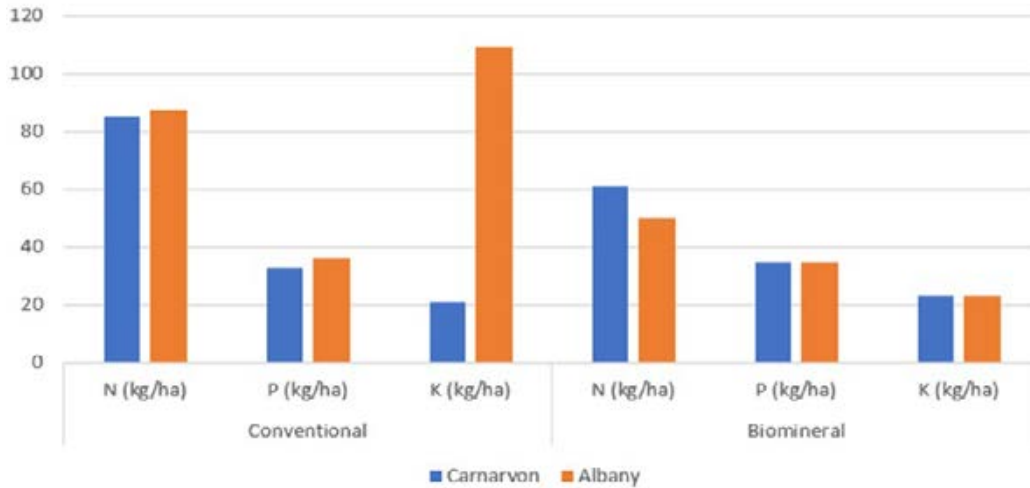
Treatment	Baseline (%)	Post-harvest (%)
Conventional	4.11	2.61
Biomineral	3.02	3.73

# Research to practice: Applying lessons from a biomineral approach to veg production across WA

The trial showed high correlation between Carnarvon and Albany treatments, except for potassium rates, highlighting translation of controlled setting results to field outcomes with consistent yield.

Figure 1 compares the application rates of the two treatments in Carnarvon and Albany.

Figure 1: Comparison of nutrient application rates in Carnarvon and Albany



### Yield responses

The results recorded in Albany strongly reflect those of the replicated trial at Carnarvon, despite the higher potassium content of the conventional treatment and the slightly reduced nitrogen in the biomineral treatment applied in Albany.



Image: VegNET WA coordinated a trial of a biomineral fertiliser production system in sweet corn in the south-west. Credit: Katrina Hill.

# Research to practice: Applying lessons from a biomineral approach to veg production across WA

## Nutrient use efficiency

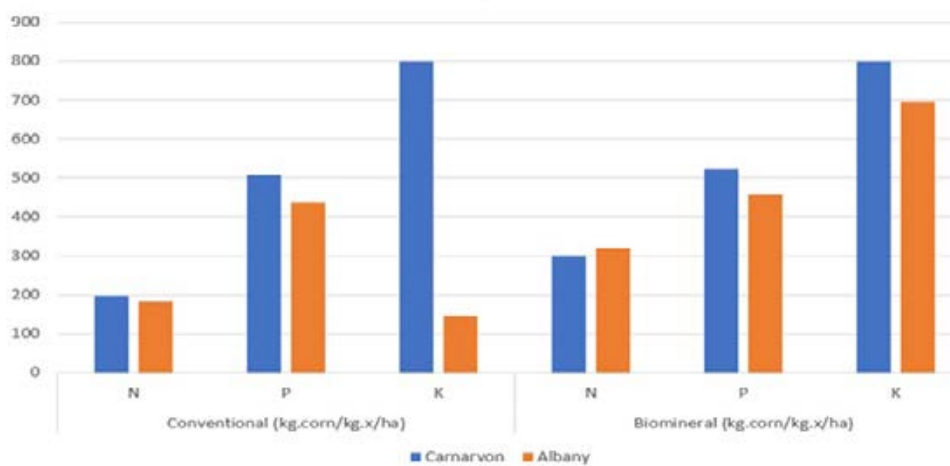
The biomineral treatment resulted in a significantly higher nitrogen use efficiency (>30 percent) at both Carnarvon and Albany, compared to the conventional treatments. This can be attributed to the controlled release format of the biomineral fertiliser formulation which introduced free-living nitrogen fixing bacteria.

The phosphorus application rates were similar in both treatments and able to fulfil crop requirements. It was observed that soil available phosphorus declined slightly under the biomineral treatment, while it increased substantially under the conventional treatment. This suggests that crop in the biomineral treatment was more effective in using the phosphorus supplied by the program in addition to what was available in the soil, demonstrating reduced risk of loss from the site when compared with the conventional treatment.

The excess potassium applied in the conventional treatment at Albany did not result in a yield response and therefore substantially lowered the efficiency of potassium use, especially when compared to the biomineral treatments at both sites and the conventional treatment in Carnarvon.

Figure 2 provides a comparative analysis of nutrient use efficiency for each treatment at Carnarvon and Albany.

Figure 2: Nutrient use efficiency comparison



These results are consistent with the outcomes of the Carnarvon trial, demonstrating the potential efficiency gains in nutrient usage with the biomineral method and providing another perspective for the grower to consider when choosing a fertiliser strategy for nutrient use efficiency.

## Soil organic carbon

The two treatments produced significantly different results for soil organic carbon levels.

Post-harvest soil test results showed these levels increased substantially following the biomineral treatment. This increase equates to an additional 10 t/ha of soil organic carbon being present in the top 10 cm of soil. This enables the soil to store an additional 40 kl/ha of water and approximately 55 kg/ha more organic nitrogen, potentially enhancing the water and nutrient use efficiency for successive crops.

Conversely, the conventional treatment resulted in a significant decrease in soil organic carbon content, by almost 40 per cent. This depletion in carbon content reduces the soil's water holding capacity by 84 kl/ha and could deplete the soil organic nitrogen pool by up to 220 kg/ha.

This depletion could have major implications for subsequent crops, potentially affecting water and nutrient use efficiency and profitability.

# Research to practice: Applying lessons from a biomineral approach to veg production across WA

## Economic assessment

The conventional treatment, despite its lower cost per tonne to apply, led to reduced nutrient use efficiency and negatively affected profitability due to the higher volume of fertiliser needed to achieve the same yield as the biomineral treatment.

Table 3 provides a detailed input cost assessment for each treatment.

Table 3: Input cost assessment – Albany

Treatment	Rate (kg/ha)	Cost (\$/tonne)	Cost (\$/ha)	Cost (\$/kg corn)
Conventional	730	1470	1073.00	0.07
Biomineral	500	1575	787.50	0.05

The differences in input costs between these two fertiliser strategies can have implications for the economic performance of an enterprise.

Given the promising operational efficiency demonstrated by the biomineral treatment in both Albany and Carnarvon, it presents a strategic opportunity for growers to increase their profitability by reducing operating costs while maintaining the same level of income.

## Improving grower productivity, profitability, preparedness and competitiveness

The results from this field investigation in Albany confirm the findings of the replicated trial in Carnarvon and aligns with production performances observed by other growers. It is consistent with results from published research in the broadacre agricultural industry and an example of how research conducted in other locations and industries is relevant to local conditions, how it can be adapted and integrated into different production systems.

The differences in soil organic carbon levels at the conclusion of the investigation highlights the capacity of the biomineral approach to improve soil health, nutrition and water holding capacity; support growers to adapt to shifting consumer expectations and bolster their environmental credentials; and enhance the economic performance of their business.

Although there was no difference in marketable yield between the two fertiliser strategies, the grower observed more consistent growth under the biomineral program, reduced handling volume and ease of substituting biominerals from water-soluble fertilisers, adding to the program's efficiency.

Based on the results from this field investigation and the research in Carnarvon, the Albany grower has decided to transition their entire operation to the biomineral production system.

This field investigation serves as both a proof of concept of research results and how they can translate into a practice change in the field.

## Next steps

The VegNET WA input use efficiency project is extending opportunities for vegetable growers across commodities to trial the biomineral production system through a supported practice change model.

Following a promising initial trial in red cabbage, a second trial is planned for kale, allowing the business to further assess the system's suitability for their mixed crop farm in the Perth metro region.

### Further information

Contact VegNET WA Regional Development Officer Katrina Hill at [katrina.hill@vegetableswa.com.au](mailto:katrina.hill@vegetableswa.com.au) or 0427 373 037.

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## John Deere technology offering innovative solutions for Australian vegetable growers

BY JOHN DEERE AUSTRALIA AND NEW ZEALAND SMALL AG & TURF MARKETING MANAGER, ERIN WAGSTAFF

**The accelerated development and application of precision agriculture technology is an exciting prospect for the Australian horticulture industry.**

Now the third largest agricultural industry in the nation and on track to reach a production value record of \$17.8 billion in 2024–25, the sector has made many gains in recent years, however the opportunity exists to progress even further.

At John Deere, we believe we are ideally placed to support vegetable growers through the world's best precision agriculture technology, as they endeavour to improve productivity and reduce input requirements, while also helping to mitigate the environmental impact of farm activities.

### Addressing the unique challenges

While much of our technology was developed in the small grains space, we recognise the unique challenges vegetable producers face, ranging from high labour requirements and input costs, to specific machine form and size, and the diverse spectrum of implements available for different crop types and farming practices.

Whether your operation requires a tractor to guide under the low hanging branches of an orchard, ride elevated above high crops or squeeze through the narrow rows of a vineyard, our specialty tractors will protect sensitive fruit and vegetable crops and bring the power, dependability and durability that is synonymous with John Deere equipment.

To ensure our customers in the horticulture sector are afforded the same benefits of technology as broadacre producers, we have worked hard to offer innovative solutions and are committed to ongoing advancements.

In particular, autonomy can drive greater quality and consistency in job execution, increase profitability and improve farm safety.

Through the utilisation of our GPS guidance solution, AutoTrac™, customers can expect increased productivity by being able to cover more ground; reduced crop damage by following the same track every time; decreased soil compaction and number of passes; minimised overlap and missed spots, creating a more even result when spraying or fertilising; and maximised inputs.

### Customers also attest to reduced operator fatigue and a better operating experience.

Our goal is to make machines that maximise driver comfort and carry technology that is simple to use. We want to help less-experienced operators function at a higher level because we know skilled labour can be hard to find and the time available to train new team members is thin on the ground.

### Improved data management

Data collection is an important part of productivity, profitability and sustainability in agriculture, however collating this data into actionable insights can often be difficult.

The integration of tech and in-field monitoring with John Deere Operations Center™ means growers can access another level of insights and data analysis to support better documentation, traceability and data-informed management decisions.

JDLINK™ allows machine and field data to flow automatically to the John Deere Operations Center™, making it visible

and useful to everyone who needs it. It also helps improve fleet utilisation with machine performance management, through better understanding of machine health and productivity, as well as sending alerts when machines are outside boundaries.

### Future innovations

From autonomous tractors to creative interfaces for our technology solutions and providing training resources to ensure growers can effectively utilise the tools available to them, we are excited to be part of this rewarding agricultural technology revolution.

We are committed to seeing increased productivity and improved sustainability, in both our business and yours, and we are focused on developing technology that promotes practices such as soil health improvement, water conservation, and reduced chemical usage, to help vegetable growers meet sustainability goals while maintaining productivity.

It's only the start of our shared journey towards enhanced productivity, efficiency, and sustainability, and we are looking forward to our future innovations that will help achieve these goals.

**Above.** Powering productivity in the fields the 5MH Tractor enhances efficiency and precision in vegetable farming. **Inset.** John Deere Australia and New Zealand Small Ag & Turf Marketing Manager, Erin Wagstaff, is excited to bring innovative solutions to Australian vegetable growers as they seek to improve productivity and sustainability.

### FIND OUT MORE

If you want to incorporate more technology into your operations, reach out to your local John Deere dealer today. [deere.com.au](http://deere.com.au)



## Understanding the common factors driving yield in Tasmanian pea production

### Introduction

Peas are an important rotational vegetable crop in Tasmania, providing a good source of organic nitrogen and a positive effect on soil health.

Tasmania grows approximately 99% of Australia's processing peas, and they are essential to crop rotations in different farming systems in Tasmania including vegetables, poppies, grain and pyrethrum.

With input costs rising and a comparatively slower increase in the sale price for peas, it is becoming a more marginal crop to grow. Therefore, processing company Simplot and its contracted growers in Tasmania wanted to look at crop production in more depth to ensure growers, agronomists and field officers were making the best crop production decisions.

VegNET Tasmania worked with the Soil Wealth ICP project, Simplot and processing pea growers to deliver extension and foster better crop management decision making by collecting, analysing, and benchmarking data from 12 pea crops in one production region for the 2023/24 season.

This case study explores the common factors driving yield by drawing comparisons between different farming production systems in Tasmania to inform pea growers on how they can improve returns per hectare.

### Key messages

- Improving nutrient use efficiencies and building soil health can help vegetable growers overcome the rising costs of inputs, particularly nitrogen fertiliser. In addition, legume crops such as peas can provide an alternative source of nitrogen.
- In Tasmania, peas are an important – yet marginal – rotational crop. VegNET Tasmania worked with the Soil Wealth ICP project, Simplot and processing pea growers to collect benchmarking data from 12 pea crops in one production season to support better decision making on crop management.
- The results from three high performing pea crops provided insights into optimum pH levels and ideal application of fertiliser inputs, and a comprehensive benchmarking report was produced for each participating grower.



Grower discussion group in the paddock

# Understanding the common factors driving yield in Tasmanian pea production

## Participating farm site information

The project spanned across 12 sites in three weather regions: Epping Forest, Hagley and Cressy. The required data was collected at key points during the crop cycle as listed in Table 1.

Table 1: Data collected

Sowing	Establishment	In-season	Harvest
<ul style="list-style-type: none"> <li>Planned sowing date</li> <li>Actual sowing date</li> <li>Variety</li> </ul>	<ul style="list-style-type: none"> <li>Established population per square metre (pl/m<sup>2</sup>)</li> <li>Establishment conditions</li> <li>Drone photographs</li> </ul>	<ul style="list-style-type: none"> <li>SILO (Scientific Information for Land Owners) climate data – precipitation and radiation</li> <li>Normalised difference vegetation index (NDVI)</li> <li>Fertiliser inputs</li> <li>Irrigation rates and frequency</li> <li>Spray inputs</li> <li>Flowering sap tests</li> </ul>	<ul style="list-style-type: none"> <li>Harvest date</li> <li>Yield</li> <li>TR (tenderness rating) reading</li> <li>Value (\$/ha)</li> </ul>

## Importance of nitrogen cycling

As Australia does not manufacture enough nitrogen to supply its domestic market, Australian farmers are faced with rising costs of nitrogen fertiliser.

While input costs have stabilised since the large cost increases seen during the COVID-19 pandemic, nitrogen fertilisers can still be a substantial expense in vegetable production. This cost means that it is important to improve nutrient use efficiencies to support sustainable cropping systems by improving soil health.

Crop residues contribute to soil mineral nitrogen through biological degradation and mineralisation by soil microbes into plant available forms, including nitrate and ammonia. In nitrogen cycling, the carbon to nitrogen ratio (C:N) is an important factor to consider.

A legume crop like peas is a good alternative source of nitrogen when inoculated with rhizobium, which has potential to add 160-200 kg/ha of nitrogen, providing a significant cost saving.

In a high crop rotation system (e.g. without long pasture or cover crop resting periods), a large amount of vegetable biomass in the crop residues provides a high nitrogen content and low C:N ratio, which results in higher mineralisation (the desirable C:N ratio is 24:1). A higher C:N ratio can result in nitrogen loss by leaching, runoff and as nitrous oxide. Immobilisation or “tie up” will occur when the net immobilisation exceeds 24:1.

## Key findings

At the end of the season, three of the 12 participating growers produced a high performing pea crop. The project team analysed the data and found the following consistencies across the three high performing growers:

- Seeder type
- 20-40 per cent of sulphur in the fertiliser program
- Very little nitrogen applied in the program
- A calcium to magnesium (Ca:Mg) ratio of 4.3-4.5 which is desirable
- Plant counts at establishment being between 90-100.

Further investigation showed that, to maintain soil health, it is important to avoid the application of fertilisers containing high levels of chloride such as Muriate of Potash (MoP).

For heavily cropped soils, it is important to maintain optimum pH levels of 6-6.5 to ensure availability of macro- and micronutrients.

To improve soil structure, calcium can be applied as gypsum or calcium thiosulphate which in turn can raise soil pH levels.

In addition, critical elements for flowering, such as boron and calcium, can be applied as a foliar spray for rapid plant uptake.

Due to the small sample size and lack of repetition, it's not possible to make conclusive statements about management and crop performance.

# Understanding the common factors driving yield in Tasmanian pea production

## Improving grower productivity, profitability, preparedness and competitiveness

Overall, there was a positive grower response with a good level of interest among the 12 participating growers.

A comprehensive benchmarking report was developed for each participating grower which provided an in-depth crop and seasonal summary which included a set of benchmarks to show how each grower was positioned in the dataset.

"It was great to see so much in-depth information about [my] pea crop," one participating grower said.

On-farm extension activities and grower-led discussions encouraged sharing of knowledge to improve farm production practices. These in-paddock discussions with growers, agronomists and field staff covered topics including soil test interpretation, irrigation, soil microbiology and factors driving yield.

Ultimately, this project was a demonstration of the feasibility of running other crop benchmarking projects in the future.

## Next steps

Future VegNET Tasmania projects will focus on extending the findings of this study to other regions and crops in the state.

In-paddock discussions will continue to support growers to improve soil health, as well as water and nutrient use efficiencies, reduce the reliance on expensive inputs and optimise yield.

## Acknowledgments

Thank you to Simplot and AUSVEG for conducting the data collection.

The Soil Wealth ICP project is funded by Hort Innovation using the vegetable and melon research and development levies and contributions from the Australian Government.



Networking is an important part of any extension activity.

## Further information

Contact VegNET Tasmania Regional Development Officer Tayla Field at [taylaf@rmcg.com.au](mailto:taylaf@rmcg.com.au) or 0429 391 538.

Soil Wealth ICP nutrient use efficiency in vegetable, potato and onion crops video: [soilwealth.com.au/2024/07/nutrient-use-efficiency-tas/](https://soilwealth.com.au/2024/07/nutrient-use-efficiency-tas/)

Nitrogen use calculator – [https://bit.ly/NUE\\_Calc](https://bit.ly/NUE_Calc)

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# AUSVEG

## state update

### NORTHERN TERRITORY

The Northern Territory is coming to the end of its main vegetable growing season which has turned out to be a relatively successful season with improved prices for most commodities from the previous season. Now it is time for growers to slow down and prepare for the Wet Season rains which will even flood some farms. Some growers will look to plant a cover crop over the Wet Season and those that are ambitious will even try to push through, growing another planting of okra while the prices are high. Okra is a hardy, high yielding Asian vegetable and one of the few that can survive the Wet Season conditions.

The last quarter has also seen a state election, with the Country Liberal Party (CLP) winning the NT election overturning the previous Labour Party Government. The change in government is hoped to bring great support to the agricultural sector in the NT. Prior to election the CLP, if elected, vowed to unlock our agricultural resources through simple, well-regulated frameworks that give certainty and let investors know that the Territory is open for business. The CLP also claimed to halve approval times relating to agricultural development across government and put investment into roads, research and development. The CLP will also support the development of thousands of square kilometres of crop-ready land capable of producing fruits, vegetables and nuts.

The NT now has a new Combined Science Services Laboratory open at the Berrimah Farm Science Precinct which is home to cutting edge entomology, plant pathology, virology, water chemistry and microbiology laboratories. It also includes a Territory first eDNA laboratory enabling identification of diseases from air and water samples. The state-of-the-art facility is pivotal in supporting the growth of the NT primary industry sector and is expected to enhance the NT's response and capabilities to any biosecurity incursions.

As you can see this quarter has brought some key pivotal developments and changes to the Agricultural sector which are anticipated to help support industry into the future.

**Mariah Maughan**

NT Farmers Association | [ido@ntfarmers.org.au](mailto:ido@ntfarmers.org.au)  
Phone. 0417 618 468 | 08 8983 3233

### NEW SOUTH WALES

Competition and biosecurity are two of the key priorities for NSW Farmers Horticulture Council – and there is no shortage of developments in either space.

Biosecurity remains a critical priority for the broader horticulture industry, with a recent outbreak of tomato brown rugose fruit virus (ToBRFV) in South Australia presenting a new threat to farmers alongside the continued battle to contain fire ants in Queensland and the establishment of Varroa mite in NSW.

As the situation with ToBRFV evolves, NSW Farmers continues to work with government, growers and industry – including AUSVEG – to ensure the flow of accurate and timely information around the threat, with the ultimate goal of eradicating the disease as quickly as possible.

Meanwhile, much work is also underway in the competition space, with NSW Farmers welcoming some significant developments within Australia's competition landscape in recent months.

In September, the Australian Competition and Consumer Commission (ACCC) released its interim report into the nation's major supermarkets, confirming a worsening pattern of market power misuse in the grocery sector.

An ACCC survey of over 21,000 consumers showed that Australian are facing 'excessive' prices at the checkout, with the consumer watchdog announcing it will investigate allegations of market power misuse, land banking and other concerning behaviour in the food and grocery sector over the coming months.

As the ACCC continues its investigations, NSW Farmers has continued to advocate for the introduction of several tools to address the lack of competition in the sector, including:

- A mandatory, enforceable Food and Grocery Code of Conduct
- Solutions to increase price transparency, such as a price transparency database
- An economy-wide prohibition on unfair trading practices
- Divestiture powers as a tool of last resort to break apart duopolies, in cases of extreme market power misuse.

Progress on implementing these tools is already well underway, with a mandatory, enforceable Food and Grocery Code of Conduct now drafted and set to enter into force in April 2025.

While NSW Farmers continues to call for the Code's provision to be strengthened to ensure better clarity, protect farmers against retribution, and ensure an independent dispute resolution is in place, the draft Code marks a strong step forward toward reform, and serves as a real sign that the dial is finally shifting.

# AUSVEG state update

## NEW SOUTH WALES CONTINUED

A bill to improve merger laws – including increasing scrutiny of mergers that could entrench market power – was also introduced into Parliament in early October, and hopes are high that these reforms will progress soon.

In addition, the ACCC has been awarded an additional \$30 million by the Federal Government to crack down on misleading and deceptive pricing by the major supermarkets, and the competition watchdog has now also launched legal action against Woolworths and Coles for allegedly misleading consumers through their discount pricing practices.

Further scrutiny of the major supermarkets is expected as the ACCC prepares to finalise its inquiry into the supermarkets, delivering its final report into the sector in February 2025.

NSW Farmers looks forward to receiving the results of this report, and sharing the next updates on our advocacy in the horticulture space very soon.

*NSW Farmers advocates for a profitable and sustainable New South Wales farming sector and you can find out more, including how to become a member, via our website: [nswfarmers.org.au](http://nswfarmers.org.au)*

**Elen Welch**  
**NSW Farmers**

Senior Policy Advisor – Agricultural Industries (Extensives)  
Phone. 0419 124 691



### **Safe Leafy Vegetable Program:** Strengthening Food Safety with New Research Pilot

In response to evolving food safety regulations, AUSVEG VIC has partnered with SP Singh from the NSW Department of Primary Industries to launch a new research pilot under the Safe Leafy Vegetable Program. Co-funded by vegetable R&D levy funds and contributions from both the Australian and NSW Governments, the program aims to strengthen food safety systems for leafy vegetable production.

This research pilot is particularly exciting because it focuses on real-world scenarios, with anonymous on-farm sample collections helping to build a robust scientific database. The initiative will assist growers in managing food safety risks more effectively by providing data-driven insights.

Leafy vegetable growers were invited to participate in one of five categories based on their production practices, including the use of organic amendments like untreated manures or composts. Interest in this project has been outstanding, and we look forward to the trials commencing and revealing important insights that will guide the development of future food safety protocols.

### **AUSVEG VIC 2024 AGM**

On Friday, October 18th, AUSVEG VIC held its 2024 Annual General Meeting, where we reviewed the significant achievements of the past 12 months. The board re-elected Paul Gazzola as President for his eighth consecutive year as Chair. Rick Butler was re-elected as Vice President, and Deborah Corrigan was elected as Treasurer.

The executive committee has remained the same as in 2023, with the addition of Natasha Shields from Peninsula Fresh Organics. We warmly welcome Natasha and look forward to her contributions to AUSVEG VIC over the next 12 months.

**Zaine Watson**  
**Executive Officer**  
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## VICTORIA

**AUSVEG VIC continues to play a pivotal role in supporting the Victorian vegetable industry, below are the initiatives making headlines this season.**

### **Western Port Recycled Water Scheme:** A boost for Cardinia Shire Growers

On Thursday, October 3rd, AUSVEG VIC Vice President Rick Butler joined a lineup of government officials, including Senator Raff Ciccone, Victorian Government Minister for Water, the Hon. Harriet Shing MP, Member for Bass Jordan Crugnale MP, and Member for Pakenham Emma Vulin MP, to celebrate a \$46.6 million funding boost for the Western Port Recycled Water Scheme. This investment, secured through the Australian Government's National Water Grid Authority, will be a game-changer for growers in the Cardinia Shire.

Stage 1 of the project will see the construction of a new pump station and a 49 km pipeline originating from the Pakenham Water Recycling Plant, which will deliver high-quality recycled water across the region. This is fantastic news for farms in the area. AUSVEG VIC's advocacy has played an essential role in ensuring the interests of local growers are at the forefront of this initiative, enhancing resilience and productivity in the region.



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of action

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Lepidoptera

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Strong  
residual  
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