AUSTRALIAN
GROWER
2023 SUMMER
VEGETABLES / POTATOES / ONIONS

FEATURE

Bundaberg + Wide Bay Burnett

ATMAC Europe and UK Tour

Women in Hort

Tracking Leafy Veg Contaminants

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The projects National Vegetable Industry Communications Program (VG22000) and Accelerating the adoption of best management practices for the Australian onion industry (VN21000) are strategic levy investments under the Hort Innovation Vegetable and Onion Funds. Communication of research and development projects has been 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. *Australian Grower* is produced by AUSVEG Ltd and is free for all national vegetable levy payers.

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CORTEVA agriscience

Cover. The Bundaberg region is home to a huge variety of horticultural crops. Clinton Marcon of Marcon Family Farms specialises in protected cropping for eggplants. *Image courtesy Cory Rossiter. See Page 44.*

AUSVEG Hort Innovation

Australian Grower is the consolidated magazine comprising Potatoes Australia and Vegetables Australia, which was the most widely distributed magazine in Australian horticulture in the most recent reporting period.

ISSN 1834-2493

Audited Media Association of Australia cab

From the Editor

The industry continues to be at the mercy of the elements, pricing and labour, and the Bundaberg Wide Bay Burnett region is no exception. But as *Australian Grower* discovered, the wealth of the region is in its people.

The feature for this issue is the Bundaberg region, with a wealth of horticulture produced virtually year-round. Many of the growers are multi-generational with a wealth of local knowledge, but many are also looking at ways to improve their productivity and their stewardship of the region. With good soils, reasonably stable temperatures and a degree of water security, the region is also an attractive proposition for companies to establish a site for winter production when the southern states go quiet.

We continue to highlight excellence in the industry with profiles of winners from the Hort Connections Awards, including the Pirrone Bros who show that the next generation are going great guns, while industry is well served by mentors such as Angela Candeloro and Allan McGann through his work with drumMuster.

Our VegNET RDOs are well and truly in the field with the warmer weather, with plenty of field days, trials and information sessions for growers to learn more about advances in the industry – everything from soil health to lean management strategies to advances in agtech.

Ahead of the Christmas season I encourage you to look ahead, not just at harvest, but also for the wellbeing of you and your staff, plus preparedness for what could be a difficult summer weather wise.

We wish our growers a happy and successful Christmas and New Year.

Stay safe,
Deborah

Message from the Chair

The past six months have been exceptionally challenging for many of us. Between the rising cost of production, challenges finding workers and extreme weather conditions, just getting produce out the farm gate has been extremely difficult for many growers. Combined with low market prices, very few growers are actually making money at the moment.

The current conditions are affecting growers large and small, and we acknowledge the strain many of you are under.

The news of serious hail damage to growers in the Lockyer Valley in mid-November was another blow, particularly for those in the region still recovering from flood damage.

The unfortunate reality is that we have to be prepared for more extreme weather events like this. We're coming out of a rare triple La Niña period that saw three years of high rainfall and cooler conditions. While that brought its own challenges with flooding, we're now entering a confirmed El Niño year. Dryer, hotter conditions are a given, with the resulting risk of drought and bushfire.

The challenging conditions underline the need to find, wherever possible, opportunities to build resiliency into our businesses. Diversification of crops or revenue streams, holding stocks of inputs to protect against supply disruption, protected cropping, or flood and fire mitigation systems are just some of the approaches many growers are pursuing to harden their businesses against increasingly fickle fortunes.

Mental resilience is perhaps the most important of these. The stigma of mental health has, thankfully, eroded over the years, but some in this industry still struggle to ask for help when they need it. I encourage anyone who could use some extra support to ask for it. In these challenging conditions it is entirely reasonable to need a helping hand to get through a tough patch, and there are more avenues to get it than ever before.

Likewise, this is the time for those in the industry to support each other. I would like to call out the hard work and commitment of growers who have been contributing to industry, whether that's by helping neighbours in a time of need, serving on industry committees, taking part in research projects or the many other ways they are giving back.

We also need to recognise the support the industry has from our partners and sponsors, funding bodies and other stakeholders. The work that AUSVEG does on behalf of growers couldn't happen without their backing.

As we come to the end of the year, I wish you all a merry Christmas and happy holidays, and I hope you can all make time to celebrate with your friends and loved ones.

Bill Bulmer
AUSVEG CHAIR

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IMPLEMENTS

TOP CHOICE

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3-6 Furrows

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Adam Bremner
Wombat Forest Organics, VIC

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Message from the CEO

With the pressures facing growers continuing to mount, AUSVEG is pushing ahead with our advocacy for the industry's interests with government and regulators.

In the past 12 months, we have made the conscious decision to participate in more collective advocacy activities, working with organisations such as the National Farmers Federation Horticulture Council, the National Food Supply Chain Alliance and the Global Coalition of Fresh Produce, among others.

The purpose of that collaboration is to get the vegetable, potato and onion industry's issues raised in forums where they might not otherwise be heard, and to ensure we have a single message coming from many voices.

AUSVEG is also investing in our influence in the halls of power. Recently, we engaged a specialist government relations and corporate affairs consultancy, Premier National, to contribute to our efforts in engaging and influencing the Government's policy agenda.

Our government engagement and advocacy work has been running tirelessly in recent months in response to changes in government policy and developments in the workforce, industrial relations, and competition portfolios, among others.

In advance of the Federal Government's changes to the Pacific Australia Labour Mobility (PALM) scheme, Working Holiday Maker Visa and other workforce changes, AUSVEG was heavily involved in the industry consultation process – a process which ultimately was, unfortunately, only paid lip-service by the Government.

Following the announcement of the changes, AUSVEG has worked closely with other agricultural representative bodies to seek amendments to salvage the PALM scheme, and raise awareness with the public about the negative impact of the government's changes.

Industrial relations and workforce issues will continue to be a large focus for AUSVEG. With labour now making up 50-60 percent of the vegetable cost of production, close to the highest in the world, it's critical the issue isn't further aggravated by poor policy, and for growers to receive a fair return for their produce.

In the retail market, there is an opportunity in front of our industry from the Food and Grocery Code of Conduct Review, which was announced in October this year.

There is an opportunity to seek structural reform to the way the retailer-supplier relationship works, and to introduce additional protections for growers in the retail sector.

AUSVEG has been seeking data and documentation from growers to build an evidence-based platform to advocate for changes as part of the review.

Looking further along the supply chain, AUSVEG is also aiming to address the low level of vegetable consumption in Australia. Only seven percent of Australian adults and five percent of children meet the recommended guideline for daily vegetable intake. We'll have more to announce on this in the New Year.

In more positive news, registrations opened in November for Hort Connections 2024, which is returning to the Melbourne Convention Centre on 3-5 June 2024. The event continues to grow, and offers the industry an unparalleled opportunity to network, do business and learn about the latest trends, research and products. I hope to see many of you at Australia's largest horticultural industry conference next year, but in the meantime, I would like to wish all growers and other industry participants a happy and safe holiday season.

Michael Coote
CEO, AUSVEG

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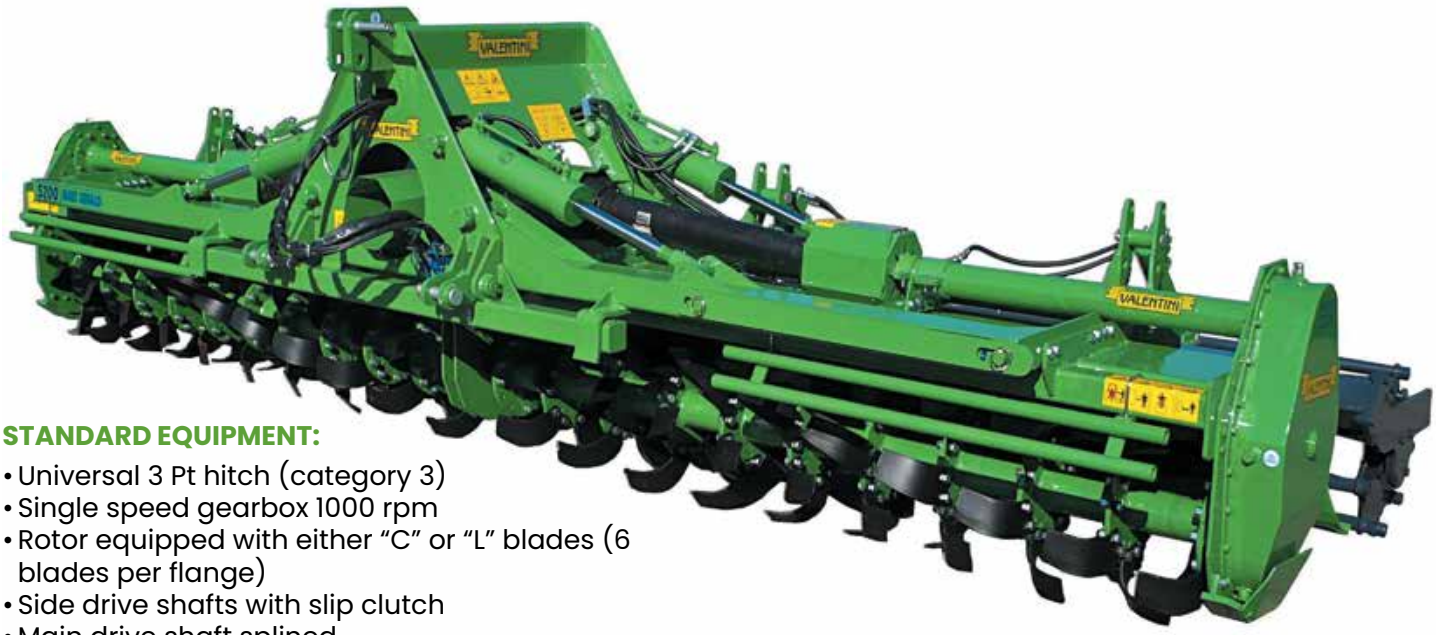
The Valentini Maxi Squalo is the ideal machine for farmers and contractors. Suitable for work on unbroken soil the Maxi Squalo is designed to work on tractors up to 300hp. With a working width up to 5.7 metres it cultivates large areas quickly. With hydraulic folding rams the Maxi Squalo can be transported on public roads. The tiller has a working depth up to 28cms which is hydraulically adjustable from the tractor.



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- CE safety shields
- Safety shields for transport
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4200	140/300 HP 103/222 kW	4280	96	28	258	2470	2920
4700	160/300 HP 118/222 kW	4780	108	28	258	2470	3150
5200	200/300 HP 148/222 kW	5280	120	28	258	2470	3300
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industry update

Bushfire Preparedness this Summer

Devastating bushfires in Australia have become an all too familiar headline over recent years. To lower the risk to your business, property, staff, family and home, be prepared for the possibility of a bushfire.

What determines a 'bad' bushfire season?

This year, the BoM is predicting that Australia will face its hottest summer yet, *see page 107* for more information.

The long-range forecast is influenced by the El Niño declaration and the Positive Indian Ocean Dipole (IOD) creating a stronger and more wide-spread drying effect across land with below average rainfall in spring.

Leading into this forecast, global Sea Surface Temperatures (SSTs) and air temperatures have both been the highest on record, and Australia has recorded its warmest winter since the early 1900s.

Secondly, Australia has just experienced a rare triple La Niña with three years of cooler weather, rain and flooding. A warm winter and spring leads to increased grass and vegetation growth, providing a bigger fuel load for bushfires.

Lastly, an international study (including the CSIRO) has shown that extreme fire weather days have increased in Australia by 56 per cent in the past 40 years, which is primarily due to climate change. Globally, it has increased by 54 per cent.

Additional Emergency Contacts

For fire weather forecasts go to the Bureau of Meteorology website **or phone the Bureau on 1300 659 214.**

For public safety messages and general updates go to the ABC Emergency website or tune into your local radio station abc.net.au/emergency

DO NOT BLOCK +61 444 444 444. This is the Emergency Alert national telephone warning system used to send voice and text messages within defined areas about potential emergencies and evacuation requirements. Do not wait for an official warning. Act decisively the moment you know there is danger.

For more information on bushfire preparedness and evacuation centres, contact the relevant fire brigade in your state, or your local council.

How should I protect my home and my business?

For many growers, a disaster preparedness can fall low on the priority list at this time of year, but ensuring the safety of your family and your livelihood should come first.

Prepare a plan and have it available for your staff and family as a ready reference in the event of a bushfire.

- **Documents:** identification, insurance and other important documents are backed up online and kept in a safe place.
- Compose a list of family and business assets in the event of insurance claims.
- Consider upgrading the gutters, windows and doors on the business and home buildings to metal; install fire sprinkler systems and check fire safety equipment.
- Your property should be free of debris, and easy for the fire brigade to locate with clear roadside numbering. Maintain your firebreaks or create new ones.
- Petrol has a short shelf life so ensure your machinery and generators are replenished with fresh fuel regularly if they are part of your property protection and evacuation plan, and that maintenance is up to date on your water infrastructure. Protect your farm and drinking water from contamination caused by fires.
- Ensure you have enough stock, supplies or spare parts in case your road access is cut off and plan for extended power outages by getting a generator and fuel or relocating perishable stock.
- Consider the safety of workers living on the property – is there enough transport to evacuate them if necessary, and where will they go? Practice workplace simulations to test your staff on their knowledge of how to respond if there is a fire. Make sure they are trained in seeking help in an emergency.
- Practice loading your livestock into trucks or moving them to safer ground, and have your 'go bags' ready for your family and pets.

Hort Specific

After the severe bushfires in 2019-2020, the NSW DPI conducted a study of an apple orchard and have published learnings from the experience.
It includes useful observations such as:

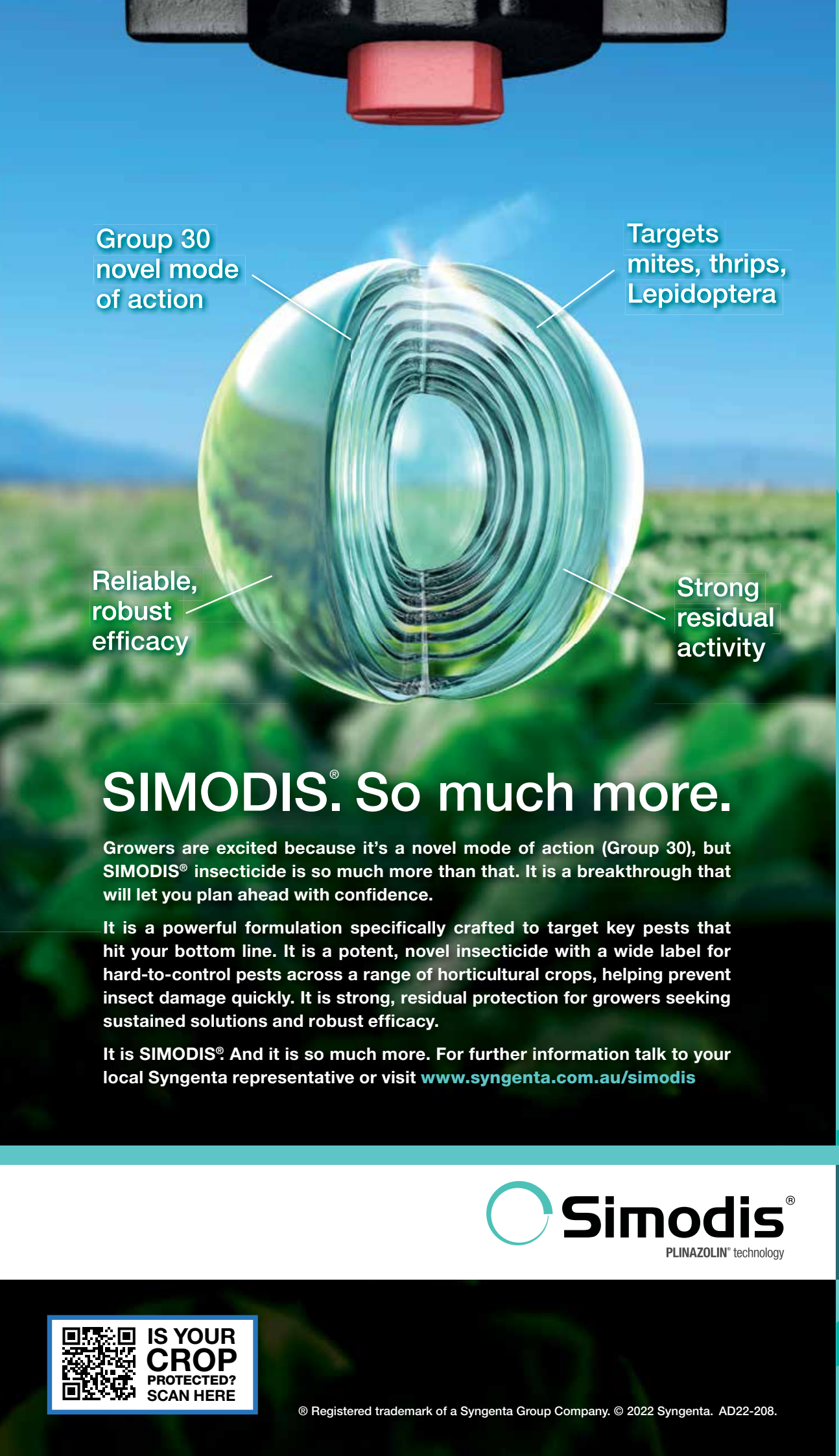
- Pre-watering to help trees and crops cope with the hot and dry conditions;
- Keeping inter-rows green;
- Considering how overhead sprinkler systems might be used during a fire;
- Having bin sheds and material stockpiles away from production areas;
- Using large areas of concrete or sealed surfaces free of any combustible material (packing shed car parks and sealed roadways) to offer the best protection for machinery;
- Avoiding grouping machinery in one location to avoid total loss of assets;
- Consider directing your firefighting efforts towards things that can't be insured such as trees, plants and farm infrastructure.

The Fresh Produce Safety Centre also released a factsheet on the Effects of Bushfires on Fresh Produce Safety in December 2021 which includes information on the effect on water quality, sediments, soil health through hot temperatures, ash, fire retardants and smoke.

Visit the AUSVEG website for further insights into:

- Understanding weather patterns
- How does a bushfire start?
- When are fire danger periods at the highest?
- AFAC's seasonal bushfire outlook.

AUSVEG Advocacy
Bushfire Preparedness
ausveg.com.au/articles/ausveg-advocacy-bushfire-preparedness



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The Power of Mentorship

BY ZARMEEN HASSAN

In October 2023, I graduated from the National Farmers Federation (NFF) *Diversity in Agriculture Leadership Program* as part of a cohort of 12 amazing women.

Growing up in the city of Kashmir, Pakistan with 25 million people the population of Australia and one tenth the land area – agriculture was not on my radar or career options. However, as the 2005 earthquake struck, taking over 87,350 lives and 3.5 million rendered homeless, I was volunteering in the aftermath, seeing the devastation that uninhibited land clearing delivers and the impact on food production, livelihoods and lives.

Fast forward seven years, a new country, a new life, and a desire to delve into a new career – agriculture chose me, or I chose agriculture – I am not sure and I found my calling.

In agriculture, and particularly in vegetable production, I found a career with a purpose – with challenges that can dwarf even the most daredevil rollercoasters.

In my previous career of marketing, branding and communication, mentorship was part of the fabric of career planning, progression and growth. It was a glaring gap in my agriculture career, and one where I felt the absence acutely. Five years into my role at AUSVEG, jumping through the COVID challenges and an organisational transition, I really noticed the absence of a mentor, a safe space to guide and support.

Leading a team of high performing scientists and extension professionals and a portfolio driven by exponential growth and one that supports adoption of best practise on farm, I knew that I needed to pause, reflect, recharge, reaffirm and reinvest in my commitment as a leader within the organisation and importantly, withing the industry.

The National Farmers Federation, *Diversity in Agriculture Leadership Program* (DiALP) was exactly what I needed. I was one of a cohort of 12 amazing women to embark on a journey of self-discovery, ably supported by an equally incredible mentor.

DIALP was established by Fiona Simson, the first female president of NFF. In 2018, when the program began, women comprised 41% of the agricultural workforce but made up only 18% of management and 2.3% of CEO positions. DIALP is an effort to bring transformational change and double the number of women in agriculture leadership by 2030 as part of the NFF vision for farm gate value of $100 billion.

The women in the 2023 program came from different backgrounds and experiences and applied for this program for a diverse range of reasons. The program allowed us a rare opportunity for a safe space to be vulnerable in all our challenges. And it is this thread of vulnerability that knitted us all together. We realised really quickly that we all had challenges, insecurities, cobwebs and aspirations that we were here to discuss, navigate and leap frog forward on - ably stewarded as a group by Kristy Barber of NFF.

The cohort provided a range of practical skills training important for leadership – media training, personal brand development and leadership impact along with networking opportunities with decision makers. Each member of the cohort was paired with a mentor – based on the participants aspiration from the program and career.

I was thrilled and privileged to have been paired with Brondwen McLean who has more than 23 years of experience in biosecurity and leadership.

With Brondwen, I embarked on a journey of understanding my impact as a leader. To be a more present leader for my team, be accountable for my career aspirations and delegate and create an environment for my team to perform at their best. Most critically, I created space to focus on what's important on my leadership journey. The power of a safe space to be vulnerable with all our challenges and to explore the possibilities through those vulnerabilities was, in my opinion, the most significant breakthrough.

Reflecting back on the program, I have clarity of purpose on my goals and more importantly, to be accountable to my aspirations in work and in life. I believe that privilege has accountability and with a renewed focus on my purpose, I hope to foster that through my work in agriculture both locally and overseas.

Above L-R. Zarmeen Hassan. Brondwen McLean, Fiona Simson, Zarmeen Hassan and Mila Bristow at the *Diversity in Agriculture Leadership* graduation ceremony.

Sustainable practices key to profitability

Australia's producers know that long-term efficiency and profitability is reliant on how they optimise the performance of their land.

Elders shares in this commitment with Australian farmers, as evidenced in work underway across the country.

One such example lies in the eastern Gippsland region of Victoria, where Bairnsdale branch manager and horticultural agronomist Noel Jansz works with clients to optimise their cropping regimes.

"Some days I perform tests to determine soil health and nutrient levels, and others I could be using drones to analyse data on crop yields and plant health," said Noel.

"I also develop and implement full-scale crop management plans, including planting schedules, irrigation strategies using moisture probes, and pest management techniques.

"But the most important part of my role is helping farmers improve yield, reduce environmental impact and ensure sustainable practices."

Elders' network of agronomists and Thomas Elder consultants support thousands of clients across Australia in managing the productivity and sustainability of their farms, facilitating thousands of soil tests every year.

A growing segment of Noel's workday is helping clients transition to more sustainable and regenerative farming practices. In his region, escalating resistance to some forms of crop protection is increasing willingness for producers to try new, alternative practices.

"The focus is on improving soil health, through making incremental changes in machinery or products used. The goal is to benefit the whole farming system, from soil health to water conservation and biodiversity," Noel said.

"Not only does this have a positive environmental impact, but it also improves business success, driving higher yields and improved profitability.

"Practices can also drive better nutrient density in a crop, which could support future market access and product premiumisation."

"There's an increasing trend in the use of technologies such as precision agriculture, automation, and genetic engineering in farming practices. As farmers begin to incorporate these advanced technologies, it is likely that the industry will become even more efficient and productive."

Elders' new innovation and sustainability arm, Thomas Elder Sustainable Agriculture (TESA) aims to promote greater on-farm adoption of research-based practices for more productive and sustainable farms, that are resilient to changing climate and able to seize potential opportunities in emerging markets.

Through TESA and its national network of agronomists, Elders also partners with government and research institutions, multinational supply partners as well as private enterprises to run industry research and development projects on trial sites. In FY23, the team supported 12 major trial sites with over 60 trials across Victoria, Queensland, New South Wales, South Australia and Western Australia in collaboration with key supply partners. These sites support the development and adoption of innovation and best practice management in both winter and summer crop production.

Executive General Manager Sustainability, Strategy & Innovation, Anna Bennett, says that Elders is at the forefront of understanding producer needs and wants around sustainable agriculture.

"If there is one learning to be extracted from the work that agronomists like Noel do, and the RD&E work that Elders is involved in, it's that there is incredible potential for the implementation of decision agriculture to generate major lifts in the gross value of agricultural production, estimated at $20.3 billion[1]. Here lies a crucial role for Elders to improve access to technology, information, and markets to help them extract this value," Ms Bennett said.

"We aim to do this through TESA, dedicating a purposefully built arm of our business to ensure that innovation has meaningful economic and environmental outcomes for producers."

Above. Noel Jansz with Bairnsdale's two graduate agronomists, Hugh McShane and Olivia Betts.

Accelerating Precision to Decision Agriculture, Cotton Research and Development Corporation (CRDC)

FIND OUT MORE
Contact your local Elders branch for tailored, sustainable advice.

Young, employed, high earners going hungry

The *Foodbank Hunger Report 2023* finds 3.7 million households went hungry in Australia in the past year, more than all the households in Sydney and Melbourne combined.

Foodbank Hunger Report 2023

Foodbank Australia says the research highlights one glaringly obvious cause why 36 percent of Australian households are experiencing food insecurity: the cost-of-living crisis.

Food insecurity is now being experienced in homes it has never touched before, with 77 percent of food insecure households experiencing it for the first time in the past year.

The report release in late October, 2023 confirms the face of hunger is changing. More than half of food insecure households have someone in paid work (60 percent), and those experiencing food insecurity for the first time are younger, with mid to higher incomes.

The research highlights what Foodbank sees first-hand every day; food is the pressure valve for the many households doing it tough. It is the most likely item to be sacrificed to make ends meet.

Almost all (94 percent) of food insecure households tried to mitigate the cost-of-living pressures by reducing their spend on food and grocery items. Tactics included looking for sales and discounts or cheaper alternative and reducing eating out. In a move that may have future public health consequences, nearly half said they reduced their purchasing of fresh produce and protein.

Foodbank Australia CEO, Brianna Casey, says the cost of the most basic of rights – food and shelter, is now the most common cause of food insecurity in Australia.

"We have an increasing number of people struggling to secure adequate food and the housing crisis is only exacerbating the problem, with half of all renters and a third of all mortgage holders food insecure in the last 12 months.

"We are fast heading towards a reality where more than half the population will know what food insecurity is because they are experiencing it themselves. Almost one in two Australians have felt anxious about accessing adequate food or struggled to consistently access it. In a country where we produce enough food to feed our population three times over, this should not be happening."

During Anti-Poverty Week charities are advocating the Federal Government to use the *Foodbank Hunger Report 2023* as a reference point in future policy settings underpinning poverty and inequality and to ensure the food relief sector is adequately resourced to respond to current and future levels of demand across Australia.

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Whatever your vision of the future, MIRAVIS® Duo fungicide can help bring it to life. MIRAVIS® Duo combines two active ingredients to provide best-in-class protection of powdery mildew and leaf spot diseases in a wide range of horticultural crops.

With dual modes of action it offers robust residual protection while reducing the risk of fungicide resistance. MIRAVIS® Duo offers a powerful new tool for growers who want peace of mind, high yields and quality that really stands out.

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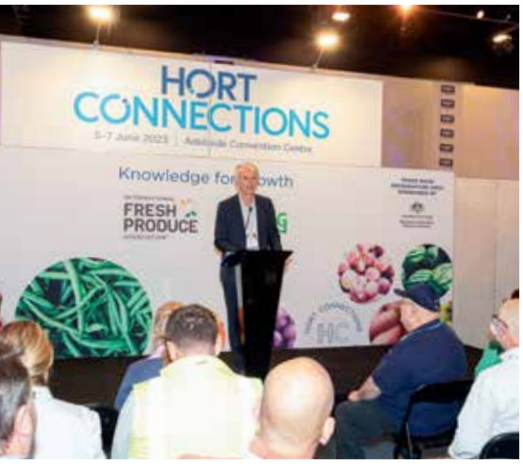
Inaccurate Fertiliser Labelling Increases during Supply Chain Disruptions



Disruptions to the fertiliser supply chain through the COVID-19 pandemic and the Russian invasion of Ukraine have forced some fertiliser importers to source product from unfamiliar markets.

One of the challenges of these new supply sources has been poor or even incorrect labelling of fertiliser.

The poor labelling raises doubts about the quality of the product, the exact nature and composition of the product or possible contaminants, says Jeff Kraak, Program Manager at industry association Fertilizer Australia.

"When fertiliser is poorly labelled, it brings into question what it is in the product," he told the audience at the Hort Connections 2023 conference.

"What beneficial nutrients are in there? And what might be the harmful contaminants that we don't want?"

In many cases, poor labelling on imported product also contravenes the requirements in place in Australia to properly label fertilisers. Each state has regulation around the labelling and description of fertilisers. Fertilizer Australia also produces a Code of Practice which collates the individual state requirements into one outline of what should be on labels.

Given the many different formulations of fertiliser on the market, good labelling is critical to ensure it's used effectively, says Jeff.

"Those labels contain vital information to help agronomists and farmers to determine what is required for optimal plant growth and quality, while caring for the environment and food safety," he explains.

Poor labelling is also a safety concern. While most fertilisers are not classified as dangerous goods, some products are scheduled as poisons or hazardous substances. Labels need to reflect that to inform those that are handling or transporting products to ensure correct handling.

"Labels also aid in traceability, which is a key requirement for certification schemes like Freshcare," Jeff says.

While poor labelling can make using the product more difficult that necessary, it can also hide more serious problems.

Above. Jeff Kraak presented on *Bad Fertiliser Labelling* at Hort Connections 2023.

"There have been cases in the past where the quality of the fertiliser has not matched the certificate of analysis provided by the supplier," says Jeff.

"In one case, the cadmium levels in the product far exceeded the maximum permissible concentrations under the regulations and Code of Practice. In another example, a batch of imported fertiliser appeared to be simply soil, which didn't contain the nutrients that it claimed."

There are a few key elements that fertiliser labels should include:

- The concentration of beneficial nutrients
- Contaminants
- Safety warnings
- Information on the batch and date of manufacture to enable traceability.

It needs to detail the nutrients in the product, their concentration, as well as the form of the nutrients – whether it's in immediately plant-available form, or slow release.

"It should also include the contaminant warnings and trigger levels, for example for cadmium, lead or mercury, and he maximum permissible concentrations," says Jeff.

"It is often difficult to know if these are under the maximum levels with poorly labelled product without a full analysis."

All this information is necessary to help agronomists and farmers determine how to use the product for their production systems – what Jeff calls the 'four Rs'. "The right source of fertiliser, the right rate of application, the right method of application, and the right timing," explains Jeff.

"All four components are critical to optimise the benefits of fertiliser while minimising the risks to the environment and food safety."

While Fertilizer Australia's Code of Practice describes what should be on labels, the code is not enforceable.

While the association's members represent the majority of fertiliser marketed in Australia, there are still imports coming into the country with poor labelling, and Jeff encourages all members of the industry to be cautious about fertiliser from unfamiliar sources.

An example of poor labelling on imported fertiliser. *Photo Jeff Kraak*

Bringing World Best Practice in Horticulture to Aussie Soil

THE RECIPIENTS

Amid the Aussie horticulture's projected rise in value of 22.5 per cent by 2030, three emerging industry leaders are set to travel the globe to learn how to apply international best-practice to Australian growing conditions.

Announced at the Nuffield National Conference, participants in the onion, berry, and vegetable industries each won a 2024 Nuffield Scholarship, funded by research and development levies through Hort Innovation.

The scholars will receive a $35,000 bursary to research cutting-edge production techniques and technologies across a wide range of industries overseas.

Hort Innovation chief executive officer Brett Fifield said supporting passionate leaders will not only benefit the individuals and their businesses, but the horticulture sector as a whole.

"Hort Innovation is committed to working with industry to build capacity within the horticulture sector," Mr Fifield said.

"Through supporting initiatives such as Nuffield Scholarships, horticulture professionals get the opportunity to develop their leadership skills, and ultimately, give back to their industry by sharing the knowledge they gained overseas."

Jacob Moon from Moonrocks in Queensland will explore machine harvesting and improving onion shelf life.

Supported by the onion R&D levy, Mr Moon works in his family's business as an engineering and maintenance manager. The family started Moonrocks 24 years ago, and produces pumpkin and cotton, and are leading producers of garlic and onions. Jacob has noticed that at Moonrocks, they are only able to machine harvest onions in certain areas. Given the benefits of machine harvesting – primarily a reduced reliance on labour – Jacob is interested in researching how machine harvesting can be applied more broadly, as well as how post-harvest management can increase shelf life for onions and garlic.

"Soil conditions currently play a large part in limiting the use of machine harvesting," Mr Moon said. "But I believe there are ways to undertake machine harvesting of onions in all soil conditions. My goal is not just to benefit our business, but the onion industry as a whole."

Kirsty Dickensen from Costa, owner of the largest raspberry and blackberry farms in Australia, will research maximising industry sustainability.

Supported by the raspberry and blackberry R&D levy, Ms Dickensen is a horticulturalist, specialising in berries for the last five years. Her role sees her managing pest and disease, production, R&D initiatives and more. Kirsty has seen the raspberry and blackberry industry experience massive growth during her time in the sector. As the industry matures, she is interested in how it can manage resources as effectively as possible.

"Many businesses have built monoculture environments and after years of farming are beginning to realise the impact of low biodiversity in the system," Ms Dickensen said. "Pest pressure is increasing, so too is the reliance on agrichemicals. How do we build more biodiversity into the system to support integrated pest and disease management programs and reduce potential biosecurity threats?"


STEPHANIE TABONE


JUSTIN DELLAZOPPA

Stephanie Tabone, horticultural researcher at national organisation Applied Horticultural Research will investigate the use of legumes as an alternative nitrogen source for vegetable cropping systems.

In her role, Ms Tabone identifies solutions to challenges that growers experience in vegetable crop production. She supports growers through a range of communication and extension activities to try, and adopt improved practices to increase the productivity, profitability and sustainability of their farming operations. Supported by the vegetable R&D levy, Ms Tabone will share her learnings with the industry through her role working with vegetable growers.

"Legumes can fix nitrogen from the atmosphere through a symbiotic relationship with rhizobia bacteria," Ms Tabone said. "They can also help to improve soil health and offer other rotational benefits. The challenge is knowing when the nitrogen will be released into plant-available forms."

Justin DellaZoppa sees big things for potato farming in Australia. Improving quality and sustainability of seed potatoes, sponsored by Woolworths

Justin's property, DellaZoppa Farms in South Australia's Riverland, produces citrus, shallot, onions, canola seed, wheat, barley, oats – and seed potatoes. He has seen firsthand how effective new technology can be in assisting the growth and development of seed potatoes and mini tubers.

"Technology can transform agriculture," Justin says.

"Given the demographic of farming across Australia, many smallholder farmers are inexperienced with technology making it more difficult for them to adopt technology without support."

"Technology can spot early symptoms of disease, water stress and soil degradation by reducing the guesswork in farming. Smart agriculture enables crops to reach their full potential without the excessive use of chemicals or water."

Justin's 2024 scholarship, supported by Woolworths, will take him to the US, Canada, the Netherlands, Ireland, Germany, Spain, northern France and Belgium.

Justin has seen new tech be demonstrated, but not adopted. He is interested in autonomous disease detection, plant monitoring, robot sprayers, tractors, drones, optical grading lines and cool storage.

"There is better grading equipment out there that can address labour shortages in Australia, which isn't being widely used mainly because of the costs."

Justin looks forward to sharing his research with other growers and engaging across his sector, accelerating the adoption of new ways to optimise potato yields.

For more on Nuffield, go to nuffield.com.au

Hort Innovation VEGETABLE FUND
Hort Innovation ONION FUND

The Nuffield Scholarship is a strategic levy investment in the Hort Innovation Vegetable, Rubus and Onion Funds.
Project Number: VG14065, MT22003

#Veginfluencer Campaign Gets Under Way

A collaboration between Veg Education and Nutrition Australia to increase vegetable consumption amongst children using social media influencers, the #Veginfluencer campaign, kicked off in October 2023.

About 94 percent of Australian children aged 2-17 aren't getting their recommended daily vegetable intake, according to consecutive Australian Health Surveys.

The #Veginfluencer campaign is aimed at getting children to increase their vegetable intake by getting resources in front of people in the children's health and wellbeing sector.

The project will use resources developed by VegKit, a five-year initiative funded by the Hort Innovation Vegetable Levy under the *Evidence-based education program to support increased vegetable consumption in children* project, and delivered by Nutrition Australia in partnership with CSIRO and Flinders University.

The VegKit project developed a range of information and education resources for professionals working in health and child-based settings to help them promote increased vegetable intake in children.

"The aim of the project is to gain market penetration through multiple channels, particularly social media, to maximise exposure and reach and get the VegKit resources being used to increase children's vegetable intake," said Catherine Velisha, director and co-founder of Veg Education, and Managing Director of third-generation Victorian grower Velisha Farms.

#VegInfluencer will leverage the VegKit resources and present them in an interesting, engaging and contemporary way with the grower front and centre, Catherine told attendees at the launch.

With a focus on social media, the #VegInfluencer project will recruit a range of social media influencers, particularly in TikTok, to promote the initiative and share the VegKit resources.

"What we're trying to do through a variety of different ways is speak to different cohorts of people to increase consumption. The aim of this project will be to gain market penetration through social media that goes viral," says Catherine.

Unveiled with a launch event at Velisha Farms, a group of nutritionists, educators, growers and media heard from Veg Education and staff from Nutrition Australia. Attendees were also treated to a cooking demonstration from Alex Elliott-Howery, co-founder of the Cornersmith café and cooking school in Sydney, and author of several cookbooks.

Above L-R. Catherine Velisha of Veg Education with Alex Elliott-Howery of Cornersmith giving a cooking demonstration at the #VegInfluencer launch. **Below.** Amber Kelaart of Nutrition Australia.

FOR MORE INFORMATION
Contact Amber Kelaart at
akelaart@nutritionaustralia.org.au

Hort Innovation VEGETABLE FUND

Evidence-based education program to support increased vegetable consumption in children is a strategic levy investment under the Hort Innovation Vegetable Fund.
Project Number: VG22005

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JOHN DEERE

EUROPEAN STUDY TOUR

Explores Export Opportunities, Future Trends

In October 2023, a group of a dozen Australian vegetable growers and industry participants toured through Europe to study export opportunities, compliance and sustainability systems, and market dynamics

The Australian Trade and Market Access Cooperation (ATMAC) European Study Tour visited Spain, the Netherlands and the UK, with a goal of understanding compliance and commercial drivers in overseas markets to maximise trade outcomes.

The study tour investigated food safety and farm sustainability practices from farm to retailer, and included farm sustainability activities, value-adding and waste utilisation, food labelling and packaging, innovation in the vegetable industry, and marketing trends.

The trip was coordinated by AUSVEG with funding support from the Australian Government's Department of Agriculture, Fisheries and Forestry through the ATMAC program, and was led by AUSVEG's National Public Affairs Manager Lucy Gregg and Senior Communications Officer Tom Bicknell.

Consumer Trends

The standout difference in consumer demand in European markets compared to Australia was prepared or fresh cut products. The study tour visited the Netherlands and the UK, the two leading consumers of prepared fresh food in Europe on a per capita basis.

The tour visited Hessing in the Netherlands, one of the largest processed produce suppliers in the country. That business alone supplied around seven million packs of processed fresh produce every week, and nearly all of that was consumed just within the Dutch market of 17 million people.

Tour participants heard that consumer interest in prepared vegetable products across Europe has contracted due to the cost-of-living crisis, however, with some retailers reducing their SKUs by 15 percent. Organic produce has also experienced a big drop in demand.

Above. A visit to a variety demonstration site with breeder company Elsoms Seeds, **Inset.** The tour participants.

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Jase Dobra
The Loose Leaf Lettuce Company
Gingin, WA.

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Retail Dynamics

While Europe is far removed from the Australian domestic market and our main export destinations, it is nevertheless highly influential for Australia's vegetable industry.

Europe is a major trend setter when it comes to retail and consumer trends. In the Australian domestic market, UK retail trends in particular routinely find their way to our shores within a few years, influenced in part by the frequent recruitment of UK retail buyers by Australian supermarket chains.

In our export markets, European retailers and consumers are at the forefront of demands for sustainability, food safety and labour welfare. As a major importer, European requirements are very influential for exporting nations.

The retail dynamics seen by study tour participants were noticeably different to those in Australia. The UK retail market, for example, has become increasingly fragmented as discounters have grown in recent years. What was the 'big four' – Tesco, Sainsbury's, Asda and Morrisons – is now the 'big six' as Aldi and Lidl have gained share. There are 16 supermarket chains currently operating in the UK.

That diversified retail market contrasts against a consolidated supply sector, where major grower-importers are, in some cases, supplying half or three quarters of all volume for individual categories in the UK, such as iceberg lettuce or leeks.

Growers typically negotiate prices and supply volumes with retailers annually, with prices averaged over the year, and taking into account the pre-planned 'Super Six' promotions that have been adopted by most supermarkets since Aldi introduced the practice.

Driven by this highly competitive dynamic, UK retailers are arguable the primary driving force behind increasingly rigorous certification and assurance programs to give themselves an edge with consumers, and most of the supermarkets have their own programs which suppliers are required to meet.

Certification Systems

The two big drivers of food safety, sustainability and ethical farming certification systems in Europe are the retailers and the European Union. Many of Europe's certification requirements are eventually felt in many far-flung countries, and a key goal of the ATMAC European Study Tour was to learn about emerging trends that may impact Australian vegetable exports in future.

Perhaps the most prominent example of this dynamic is GLOBALG.A.P., which was developed by a group of European retailers in 1997 under the EUREPGAP initiative in response to local consumer demand for more sustainable produce. EUREPGAP became GLOBALG.A.P. in 2007, and the sustainable farming scheme is now used by producers across 130 countries worldwide, including Australia.

Prior to and during the tour, participants spoke about certification with representatives from GLOBALG.A.P., Red Tractor, LEAF, BRCGS, SEDEX and Freshfel. Participants saw many of these schemes being implemented on farms and processing facilities, as well as others like SMETA and GRASP. Growers are

Above L-R. UK vegetable grower AH Worth. A visit to processing equipment manufacturer Sormac. A mobile celery harvesting-processing-packing machine at G's Fresh. **Inset.** Some of the tour participants began the trip in Spain for the Fruit Attraction trade show.

also subject to multiple retailer-developed certification schemes, such as Tesco Nature's Choice (TNC).

All these different certification schemes conduct audits, and some growers tour participants heard from in the UK were being audited every week or two by one scheme or another. Audits can take one to three days each, and cost thousands of pounds to conduct.

But while the audit burden is significant, European growers are nevertheless voluntarily adopting additional compliance and certification programs. This appears to be driven by a commitment to continuous improvement, a need to improve efficiency and worker retention due to a labour shortage, and long-term thinking from multi-generational, family-owned growers.

Export opportunities

Australia's vegetable exports to Europe have declined from their high point last century, as other lower cost counter-seasonal suppliers have grown, such as South Africa, Kenya, Egypt, New Zealand or Chile, among others.

The UK, historically Australia's main export market in the region, received just 934 tonnes of fresh product and nuts from Australia last year, compared to almost 15,000 tonnes two decades ago.

Australia does still fill narrow seasonal windows in Europe, mainly brown onions around May-June at the end of local supplies.

Europe also has a steady demand for premium imported produce, and tour participants heard that niche, high-end products still have opportunities from suppliers like Australia.

Below L-R. Dutch protected cropping demonstration and education site Tomatoworld. An early morning visit to the New Covent Garden Markets in London. UK alliums grower-importer Moulton Bulbs. A mechanically-harvested sweetcorn field at Barfoots of Botley. The study tour visited several retail outlets across Europe.

ITINERARY
ATMAC Study Tour

3 OCTOBER Madrid **SPAIN**

Fruit Attraction Trade Show
GlobalGAP Certification

4 OCTOBER Madrid **SPAIN**

Fruit Attraction Trade Show

5 OCTOBER Venlo **NETHERLANDS**

SORMAC
Vegetable processing equipment
Hessing Supervers
Vegetable processing plant

6 OCTOBER Lelystad **NETHERLANDS**

Rabobank Agrifinance
Farm of the Future
Research institution
Geert's Best
Diversified Dutch farmer

7 OCTOBER The Hague **NETHERLANDS**

Tomato World
Protected cropping demonstration site
Dutch retail visit

8 OCTOBER Chipping Norton **UK**

Diddly Squat Agritourism

9 OCTOBER Spalding **UK**

Moulton Bulb Company
Allium grower
AH Worth/Worth Farms
Vegetable grower
Elsoms Seeds Seed breeder/supplier

10 OCTOBER Cambridge **UK**

G's Fresh Vegetable grower
Russell Smith Farms
Vegetable grower

11 OCTOBER Cambridge **UK**

ADAS Research institution
PG Rix/Stourgarden Vegetable grower

12 OCTOBER Portsmouth **UK**

Barfoots of Botley Vegetable grower
Nature's Way Processed/
fresh cut food manufacturer

13 OCTOBER London **UK**

New Covent Garden Market
Wholesale market
Fruitnet Media International
Fresh produce media/events
UK retail visits
Red Tractor Assurance Certification

LEARN MORE
To read a detailed day-by-day account of the ATMAC European Study Tour, including photos and video interview with participants, visit ausveg.com.au/news-media/latest-news/atmac2023/

Retail Negotiation is a Skill
that can be beneficial to all parties

Growers often do not understand the thinking behind the retailers' strategy, negotiations and tactics when entering into a contract. With training growers are in a better position to gain a better commercial outcome.

Most growers are very good at negotiating the price of farm equipment and understanding the latest technology. However, it is often not the case with retailers. Effective engagement will ensure growers get a fairer return for their hard work to grow fresh produce.

AUSVEG in partnership with NextGen recently conducted a training course for growers to learn retailer negotiation skills.

Presenter Neil Rechlin says that many growers receive the contract details from the retailer, but often don't understand them, or the strategy that underpins the discussion. To be in a better position, grower knowledge of what drives retailer behaviour and their tactics goes a long way to improving the outcome for the grower.

"Suppliers have a rigorous approach to planning, managing and executing their retail negotiations, " said Neil.

"Ensuring that the process is fully documented and that both parties have understood what is expected, can have a positive impact."

Operating Under a Duopoly

Australia's dominance by a duopoly for supermarkets gives fewer avenues to spread grower risk, and delays in contracts can have a profound impact on cash flow and the commercial health of the grower.

The recent quarterly profit results of Australia's grocery retail sitting in the top 10% globally will sit uncomfortably with many growers, particularly with conversations around high cost of living pressures. It suggests that the retailers are not giving as much to shoppers as the rhetoric and marketing suggests.

The relationship between the various retailers and suppliers varies enormously. In some instances, the relationship is stable or potentially even improving in others it remains fraught and tense.

"It is harder having a duopoly without doubt, as you have fewer avenues through which to spread your risk.

"The ability to access four or five different markets or more material markets gives growers and suppliers the opportunity to spread the risk but when you only have two or two representing the majority of the market then it clearly makes it extraordinarily one sided in the negotiation between suppliers and retailers and the power balance is firmly with the retailer in a duopolistic environment."

"Certainly for growers and suppliers there is no doubt that there has been pressure exerted by the retailers over the past 24 months post COVID, and escalating input prices, but there has been significant transfer of profit from suppliers to the retailers where retailers have also materially pushed prices ahead of input cost increases. It is a good example of how what is still fundamentally a mainstream grocery duopoly can operate in relative isolation of the broader market."

Neil has been working with the New Zealand Food and Grocery Code and says one of the dynamics of that system is the ability to fine retailers $3 million or 3% of their annual turnover plus award damages or compensation to suppliers. Individuals can also be fined up $200,000 for Code breaches.

"In Australia we have no ability to fine a retailer or an individual, and there really are very few teeth for the powers-that-be to apply breaches of the Code."

"I think there's going to be some interesting learnings of how the NZ Code plays out over the next few months as there certainly appears to be a significantly greater degree of awareness of the consequences of Code breach in NZ, whereas in Australia the perception is that there is no consequence or punishment."

As a result of no punishment, Neil says there is consistent poor behaviour and no consequences to those behaviours. The ability to police and fine retailers for poor behaviour would be a significant step forward that can only be achieved through making it a mandated code as the current voluntary prescribed mechanic doesn't allow, under the legal framework, for fines to be levied against retailers for a breach.

The UK model has a government appointed arbiter that polices the Code. In NZ a Grocery Commissioner polices the NZ code. In Australia, an independent reviewer is appointed by government to review how independent arbiters operate, but the Code reviewer has no ability to issue fines or reverse decisions.

The policing of the Code in Australia is still reasonably ineffective as suppliers still have a significant concern around making complaints to an independent arbiter that is fully funded and employed by the retailer, albeit independent of the retailer.

"Suppliers that are well versed in the Code are often able to manipulate the commercial outcomes through leveraging the Code with retailers. When the retailer sees the supplier is Code savvy they typically tread more carefully and avoid pushing suppliers into a position that might be unreasonable from a Code perspective."

Recent changes to Australian consumer law in November 2023 now prohibit the use of unfair contract terms, giving growers an opportunity to re-balance terms of contracts. Neil says when suppliers or growers don't understand how the changes to legislation can benefit them, often nothing changes, according to Neil.

"It really does come down to the supplier understanding where they can benefit, what the change of behaviour from their trading partnership should look like, and then being in the position to start enforcing that. Many fear upsetting the retailer and pushing their rights too far and risking the contract."

Price Transparency a Tool for the Grower?

Typically the fresher the product the greater the margin differential between supplier and retailer. When growers' volumes to a single retailer can be as high as 70%, it makes it difficult for the consumer to see price transparency and the costs that may be incurred by the retailer.

Part of the problem, says Neil is in the way retail engages with suppliers and competitors, often to their own detriment. The inequity of the profit split or share is a real challenge. Addressing the inequity through advocacy and media, and how the market works combined with more transparent systems around the way those markets are structured and operate will be critical for fresh produce.

Does a brand give a Higher Premium?

"Brands are proxy for quality and generally we are prepared to pay more for a product that does the same job because we think it's better," says Neil.

"But that doesn't mean that they can't attract a premium for quality even if it isn't branded, but you need to educate the consumer about what good and bad quality looks like."

Globally there is not a lot of precedence for branded product in vegetables. For the retailer there is likely to be a maximum price ceiling for certain vegetables such as carrots. With a brand, the margin for the retailer for the branded carrot is likely to be less, such that an unbranded product is more likely to gain shelf space if the premium product is not in demand by the consumer.

"The question is whether the return for the amount of effort to create a brand will give a commercial return and if the retailer supports it or would prefer to find another point of difference such as organic."

Neil points out that retailers are likely to say that consumers won't pay a higher price, but often have two objectives – competition for the consumer and what is in the basket, and profit.

If the retailer can charge more for the broccoli without losing a customer, then a marketing position is created when there is perceived value. There is no one formula that will determine when consumers won't pay a higher (or lower) price. The price point for broccoli may be only one piece in the puzzle across all categories in the store.

"There are clearly price sensitivities that do come into play, and those sensitivities vary over time but there are sweet spots for the consumers.

"Price acceptances vary over time as people's disposable income changes, as the seasons change, as people look at different meal combinations for their families, or as fruit and veg play a different role in the weekly shop.

"If a retailer tells a grower that a higher price is not sustainable for the shopper, I would always treat that with a pinch of salt and I would do some independent work around understanding what the right price points are on vegetables. Having that information at least allows the grower to have a more forthright and direct conversation with the retailer when told the maximum price that they are prepared to pay. Understanding shopper behaviour means growers can have a more informed conversation rather than just accepting it as fact.

"I see a lot of people complaining about the treatment by retailers on primary producers but I don't see that there are many people doing something about it – and maybe that gets back to the fear of retribution by the retailers for being noisy voice growers and are afraid they will do business with other growers.

"The Horticultural Code in my opinion doesn't really work either and maybe there needs to be some 'beefing-up' of the primary producer element of the Food and Grocery Code and continued political pressure around competition reform which AUSVEG is already doing.

"Australian primary producers do a remarkable job behind the scenes that none of us as consumers really understand.

"The narrative is owned almost entirely by the retailers, it would be lovely to get greater transparency around how the industry works and how farming operates in Australia.

"Engaging consumers about the industry is long overdue and with the right narrative around how the vegetable sector operates would be well accepted by consumers."

About Neil Rechlin

For the past 20 years Neil has been front and centre in the development of both category and capability solutions, working extensively with both retailers and manufacturers. For the past seven years he has led the NextGen involvement in the Grocery Code of Conduct, working with manufacturers, industry bodies and the ACCC to continue the evolution of the Code in Australia.

Neil has a passion for helping suppliers in their sometimes challenging engagements, with the major retailers and wholesalers. For the past three years, the NextGen team have been very actively supporting manufacturers in their quest to recover significant increases in their input costs through retail price increases.

Neil is a regular presenter at industry forums and contributor on retail matters with Channel 9, ABC and Sky News.

Shenzi Insecticide– the right one

Shenzi (400 g/L chlorantraniliprole) is a new high strength insecticide by UPL that currently offers the widest registered use label for this active in the Australian market.

UPL Australia's head of marketing and business development, Ian Cass, said that while chlorantraniliprole is not new to the market, UPL believes Shenzi will become the right choice of insecticide fc growers and agronomists.

"At 400g/L of active, Shenzi offers growers a low-rate option witl the convenience of handling less product compared to existing 200g/L active products," Mr Cass said.

"Growers now have access to this highly effective and selective chemistry," added Mr Cass. "It provides not only the right chemis· try but also the right fit as an ideal IPM partner."

Shenzi provides great control on target pests but is soft on a broad range of beneficial insects including damsel bug, ladybird beetles, big eyed bug, arachnid and parisitoid wasps. While also soft on pollinators, it should not be applied when bees are actively foraging.

Shenzi has translaminar activity and acropetal systemicity – meaning that when applied to the leaf surface, it moves into the leaf and protects the underside as well as moving from the site of application outwards towards the tip of the leaf.

The combination of these properties allows for control of target pests across the entire leaf surface, even if eggs have been laid or larvae are hiding on the underside of the leaf, potentially shielded from the direct spray.

"Shenzi has been specially formulated to handle the rigours of Australian growing conditions. It is stable and rainfast, making it easy and convenient to use," said Mr Cass.

The insecticide is temperature stable, UV and pH stable and is rainfast two hours after application.

UPL recommend targeting lepidopteran insect pests with Shenzi insecticide early, spraying at the first sign of pests.

"Shenzi is highly effective against eggs and larvae," said Mr Cass. "It can provide larval 'knockdown' control, and so application should ideally coincide with egg hatching."

Above. Eggplants treated with Shenzi insecticide versus untreated.

SHENZI INSECTICIDE REGISTRATIONS – Horticulture	
Brassica vegetables	Sweet corn
Brassica leafy vegetables	Almonds
Stalk & stem vegetables	Pome & stone fruit
Leafy vegetables	Grapes
Fruiting vegetables	Strawberries
Legume vegetables	Potatoes
Cucurbits	

Larvae emerging from treated eggs are controlled via ingestion of Shenzi residues on the outer surface of the egg.

Whilst it is recommended to target pests when young, Shenzi provides effective control at a range of life stages, making it a good rotational insecticide.

As with all Group 28 insecticides, it is important to rotate Shenzi with alternative modes of action and to always follow the label directions and required spray intervals. Use is restricted to a maxi- mum of three applications to any one crop, and no more than two consecutive sprays, in a season.

To keep the active viable for as long as possible always use Shenzi insecticide in accordance with AIRAC Insecticide Resistance Management Strategy Guidelines.

"UPL is excited to bring to market a product that we feel is the right fit for Australian growers," said Mr Cass. "Shenzi is the right choice of insecticide across a broad range of crops when it comes to chemistry, rate, timing, rotation and fit."

Shenzi is available now in convenient 1L and 5L pack sizes from all good agricultural retailers for the 2023 summer cropping season.

FIND OUT MORE
To find out more visit upl-ltd.com/au/product-details/shenzi

Wide Bay Burnett Regional Food Bowl

With agriculture the dominant land use, the Wide Bay Burnett region, encompassing Bundaberg is a rich source of fruit, vegetables and nuts.

A relatively stable climate year round, rich soils ranging from volcanic to sand, plus good water resources, enables vegetable growers to grow a range of produce for most of the year.

The economy of Bundaberg is based primarily on agriculture, forestry, fishing and tourism, with a gross regional product at about $5.07 billion.

Traditionally, sugar cane was the mainstay of the region, with sugar mills dotting the horizon, and the iconic Bundaberg Rum distillery still a major product and tourist attraction.

Diversification for many growers in recent years in the region has seen avocados and macadamias added to the mix of vegetables grown.

Climate

The Bundaberg Region is characterized by hot summers and mild winters. Rainfall is summer dominant, averages 1,110mm and occurs predominantly in high intensity events. Average monthly temperatures range from 16.1°C in July to 25.7°C in January. The Bundaberg irrigation area is virtually frost free.

Water

The Bundaberg Irrigation Scheme (BIS) incorporates Paradise Dam on the Burnett River, Fred Haigh Dam on the Kolan River, and irrigates over 57,500 ha in the Bundaberg, Childers and Gin Gin areas.

Soils

The region is characterised by large areas of Class A (sandy) land suited to a broad range of dryland and irrigated agricultural crops. This is supported by a significant area of productive Class B (loam) land that is suited to pastures and cropping with moderate improvements.

TOP 5 VEGETABLES GROWN – 2020-21	%
Tomato	20%
Sweetpotato	16%
Capsicum & chilli	9%
Melons	5%
Beans	4%
All other vegetables	45%

COMMODITY	$	% AUSTRALIA	% QLD	% BUNDABERG OF QLD
Vegetables	103,854,706	12.8	5.6	12.7
Potatoes	41,168,682	5.1	0.7	41.2
Beans	4,412,201	0.5	0.7	4.4
Pumpkins	2,997,837	0.4	0.3	7.6
Lettuces	56,998	0.0	0.5	0.1
Sweet corn	20,694,974	2.6	1.1	13.5
Capsicum	18,329,254	2.3	0.6	22.7
Melons	16,194,760	2.0	0.5	23.3

Sources: QLD Government Soil survey – Bundaberg area. Australian Bureau of Statistics, Value of Agricultural Commodities Produced, Australia, 2020/21. Cat. No. 7503.0

Strong Leadership for Strong Horticulture

The Bundaberg Fruit and Vegetable Growers Association is a valuable resource to the Wide Bay Burnett region providing information and services to better the outcomes for growers and industry. Leading the team is Bree Watson.

This year, Bundaberg Fruit and Vegetable Growers (BFVG) is celebrating a milestone anniversary of 75 years.

As a grassroots organisation, generations of growers have benefited from the organisation's commitment to improving productivity and profitability for industry through programs and services such as VegNET, Pick of the Crop, advocacy and training.

CEO of BFVG is Bree Watson, who is Bundaberg born and bred is passionate about her home and its horticultural future.

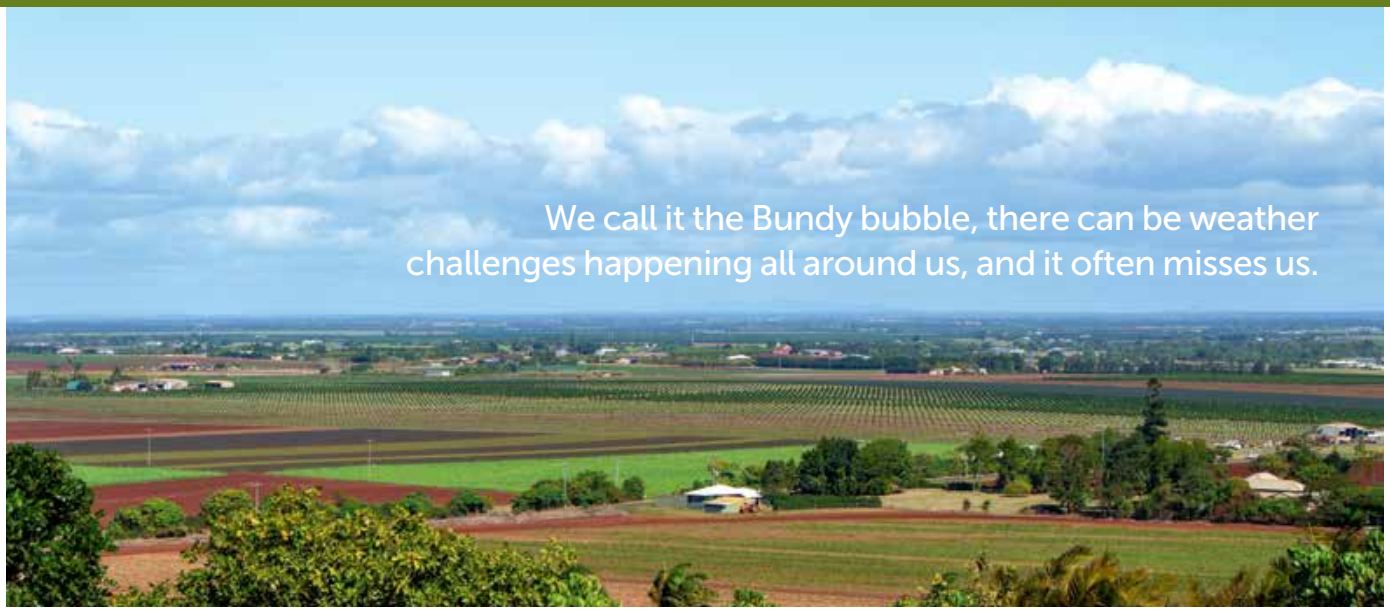
Bree has been with BFVG for more than ten years, and CEO for seven years. In that time, Board members and staff have been generational, giving long term knowledge and experience of the region. This longevity has been a benefit to the organisation as some issues can be ongoing for many years.

With more than 50 major fruit, vegetable, herbs and nut commodities in the region, there is a lot going on.

Tell us a little about the region and the role BFVG plays?

We don't experience as many cyclones as north Queensland, nor flooding like down south or frosts like the inland. We call it the Bundy bubble, there can be weather challenges happening all around us, and it often misses us.

We are really excited to celebrate 75 years of service at a grass roots level, with many of the Board providing long term strategy that stretches for generations. Whether it is in services, support or R&D trials on their properties or delivering projects, it is important to stay connected with our members. With more than 50 major fruit, vegetable, herbs and nut commodities in the region, there is a lot going on.



What are some of the challenges growers face in the region?

Sometimes it goes hand in hand with the fact that we can grow 52 weeks of the year. There is a lot of opportunity for growers to expand their properties and increase their plantings, but we need to make sure we have enough water. Water is our key staple input and we need to make sure we maintain that security. We have had some challenges over the years to secure our water supply but have fought really hard for it. Unfortunately it will still be many years before we see that come to fruition.

Biosecurity is a challenge. We have Queensland Fruit Fly in our region and are losing a lot of chemicals in our industry, and not seeing replacements come through. We need more support for growers and alternatives to help them in that space.

Input costs are incredibly challenging. There are not a lot of solutions on the table, and not a lot of planning to change this. We need to recognise the tight margins that growers are under and the stress it puts on them and their families in the region. It is important we support them with services as they transition through this time. It is now that they need industry and government support to see them through to the next season.

How do you see your role and what do you love about it?

We are a small team of seven and we have projects that we deliver on behalf of the growers.

My key role is advocacy which means being in regular touch with the members. Being on farm, chatting on the phone, I also do a lot of media on behalf of members. But I would never do media without ground truthing it first. What I say must reflect their needs.

We are here to serve the members and industry. We need to have respectful discussions, understand the challenges and help our decision makers know and value where our food comes from. It sounds simple, but that is what drives me, the knowledge of where our food comes from. Once at that shared understanding, we might actually see some policies turn around that actually support growers and reward them for putting food on our plates every day.

I absolute love that no two days are the same. I can go from being on farm talking to growers, to being in Brisbane to talk policy with ministers helping them to understand the impacts of their decisions and perhaps where we can support growers better.

I swap my boots for my heels at the drop of hat. I get to manage a small team who are so passionate about the industry. Most of the time, people who work in this industry are very passionate about it. Whether they started in the industry or not, they learn very quickly that real people matter.

In a leadership role, what do you think you need to bring?

I think patience and understanding. Patience is important, we can work on issues for many years There is a saying in Bundy, that no one has a better memory than an irrigator. It's true – we have so many people who have been in the industry all their life and remember what has happened over the years.

Understanding where they are coming from and their viewpoint and being able to translate that to people who perhaps have not spent as much time on a farm who may take their issues for granted. I work with multiple personality types, teams and growers and it is important I stay connected with them. Being able to multi-task, operate on the smell of an oily rag, and the inbox is never empty – you need to be ok with that.

Outside of BFVG what do you enjoy?

I've been with the organisation for 13 years, you don't stay long term unless you truly believe in what you are doing. I love what I do. One moment I can be in an avocado orchard or in Canberra, it is the variety I love.

On the weekends, myself and my young boy who is 10 we like to get out and play sport. I like the gym, I'm an avid gym goer, and have been for many years. You need to take the time to focus on yourself and your family. A one-hour workout is 4% part of your day, so if you are not putting 4% of your day into yourself or your family, you need to look at how you are spending your day.

In the future I am keen to see where I can take advocacy further, I may look to going to the other side of the table in terms of decision making. For a long time now I have been pushing forward ideas, and I would love to be more involved in the decision making process.

Smart Farm Technology for Better Farming and Ecosystems

The Smart Farming Partnerships program is an industry collaboration to focus on protecting ecosystems in the Great Barrier Reef catchment area, using technology that monitors nutrient leaching, sediment run-off and water efficiency.

Commencing in October 2019, the *Digital remote monitoring to improve horticulture's environmental performance (ST19024)* project involves collaborators including Hort Innovation, Applied Horticultural Research, Freshcare, Hitachi Vantara, Landcare and industry bodies Greenlife Industry Australia, AUSVEG, the Australian Banana Growers' Council, Queensland Fruit and Vegetable Growers, and Smart Farm grower sites.

Demonstration 'smart farm' sites were established in banana, avocado, vegetable and nursery properties to initially establish a benchmark of data through a digital dashboard. The ongoing development of the modelling from the data will allow growers to predict and manage plant health and nutrient loss more effectively.

A number of instruments have been utilised to measure the outputs of the demonstration sites including dendometers, soil moisture probes, sap flow meters (for avocados) and weather stations.

The demonstration site for vegetables is within Austchilli, a major export grower of chilli and avocados. The primary focus for the company is value-add products and ingredients into food industries, supplied year round at a consistent volume.

Austchilli utilise technology across all facets of the business from growing chillies through to packaging to maximise efficiencies and minimise waste.

Hort Innovation VEGETABLE FUND

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

Project Number :ST19024

Above. Naomi Diplock of AHR and Kaushal Gunasekara inspect the sensors.

Above L-R. Sensors amongst the chilli measure weather and soil moisture.
In the field with Ben Lions holding chilli plant. Sap flow meter on an avocado trunk.

Within only a few kilometres to the coast, and the Elliot River, Austchilli founding director and owner, David De Paoli considers the company a custodian for environmental stewardship of the Great Barrier Reef and Fraser Island.

"Austchilli is known for using technology to improve business efficiencies, so we were approached to be part of the Smart Farm project from the beginning," said David.

"When you grow commercially everything hits and tests you. As a commercial grower we need to forecast our supply to meet customer demand.

"Going into this program it was hoped to take some of those variables out. Input costs across the world have increased. It is a major concern, so this project will help us to reduce our costs to the bare minimum that the plant needs for production. With the forecast of El Niño, we are going to be dry, so every drop of water has to count. We place it at the right time, at the right place and the right amount to maximise yield, minimise cost."

In essence, David is looking to use the learnings and technology from the project to give commercial outcomes that benefit the business.

The data from the sensors can be accessed via mobile phone apps or on site, to give staff the ability to monitor plant stress and respond accordingly.

According to Kaushal Gunasekara, agronomist with Austchilli, the data and forecast can give insights into when irrigation needs to be turned on or off, or if the plant is stressed from other factors. Kaushal also stressed that soil moisture probes may indicate wet or dry conditions but a plant-based sensor such as sap flow meters will give a more complete picture.

For chillies, the root depth can extend down to 50cm, however moisture and nutrient uptake occurs in the top 25% of the roots. Applying the right amount of water and nutrients in that zone means greater uptake by the plant for stronger health and yield. Over application however may lead to nitrate leaching and sediment run-off. From a commercial perspective, it is a more cost effective approach to water and input management.

Cover Crops for the Next Trial

The project is due to initiate a further trial late in 2023, where the focus for Austchilli will be the use of cover crops to manage soil health as an extension of this project.

By using a cover crop, further prevention of leaching and run-off can be achieved, while improving the soil health and lowering soil erosion.

"Previous trials aimed to understand the automation, technology and processes to improve productivity and environmental outcomes," said David.

"The focus for this trial on cover crops is to keep the soil healthy and improve microbe activity, nitrogen fixing and improving organic matter in the soil.

"Bundaberg can be quite windy, so the cover crop also acts as a wind barrier between rows, keeping the soil cooler, therefore lowering the need for further irrigation and lowering the risk of pest and disease pressure."

David said that the project has given the company baseline data for analysis. The next stage is to convert it to a commercial system that growers can adapt very easily to their own benefit.

"It is something to be proud of, having this type of technology on your farm. Customers are very switched on, so when you tell them you are improving the environment, using robotics and automation to keep costs down, they love it.

"For the grower, we can increase yield and lower plant stress and soften the extremes. The key is to farm smarter, not harder, and be profitable. Identify your costs, work together with industry bodies and local associations, and the researchers, to move forward to adopt all this technology so we can benchmark ourselves against the world and compete more effectively with economies of scale."

70 Years of Service to Bundaberg Horticulture

Lindsay Rural has been a mainstay in the Bundaberg region for 40 years providing growers with market access and farm supplies.

A rural store is the heartbeat of many farmers, to provide everything from fencing materials to irrigation repairs to fertilisers as well as advice and a chat.

P&H Produce was one such store in Bundaberg for decades. Along with the usual rural store stock, it also provided growers with packaging options for their produce for transport to the Brisbane markets.

In 2001, the company became Lindsay Rural. The Lindsay Australia group has three divisions – Lindsay Rural, Lindsay Transport and Lindsay Fresh Logistics. With access to the greater Lindsay network, Lindsay Rural in Bundaberg was able to provide growers with cold store options and transport.

Orlando Facchiano, branch manager of Lindsay Rural Bundaberg, says that being part of the Lindsay group enables growers to reach markets more easily and efficiently, while still being able to source their on-farm needs - adding value from paddock to plate.

"Lindsay Rural still provides growers in the region with all their chemical and input needs, we have an agronomist on the team to give advice and all the other aspects of a rural store," he said.

"Our difference is that we also hold stock for all their packaging needs, such as branded boxes for produce like snow peas, sweetpotato and mangoes that are used to transport down to the wholesale markets around the country.

"We can provide them with the packaging they need, the fertilisers they need, any small irrigation bits and pieces they may need, product protection chemicals and then on the return trip from the farm, bring their produce back so that it can go down to the Brisbane markets."

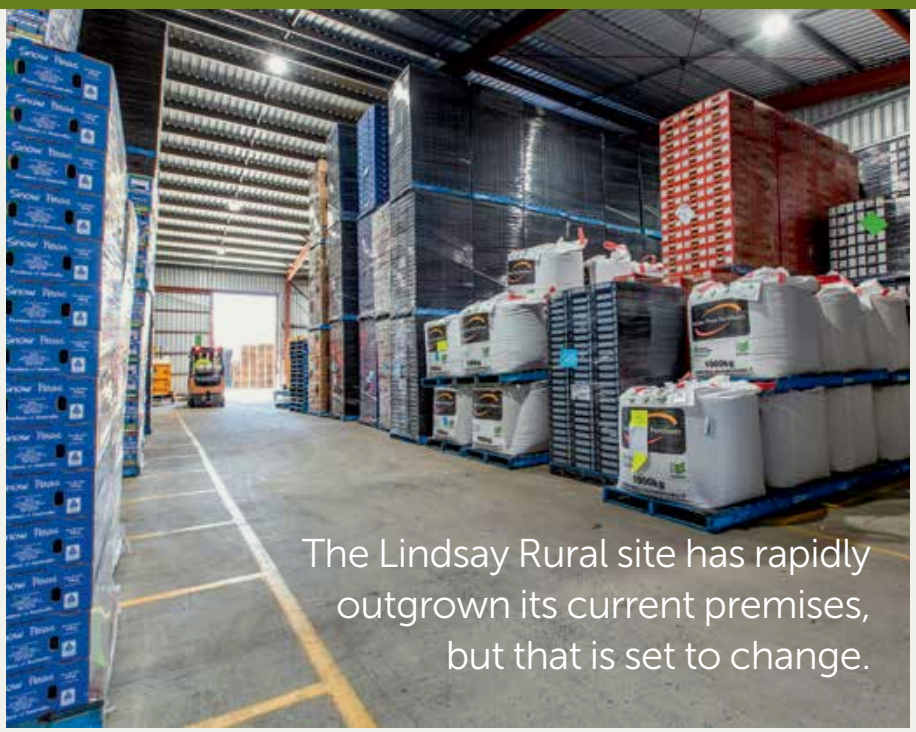
The facility provides storage for flat pack boxes, and other packaging materials, as well as services for machine erected boxes for smaller 10kg boxes through to bulk bins. We also support many local growers who donate in bulk bins to organisations such as Foodbank.

Orlando and the team pride themselves on reliability, customer service and being able to assist customers wherever possible. With many staff having a farming background, the breadth of knowledge is an asset to the company.

As part of the Lindsay group, the Bundaberg team has embraced the corporate ethos of the 'Lindsay Way' – to ensure that everyone goes to work safe and comes home safe, with safety the number one priority.

"Our 40 years as Lindsay Rural and 70 years as Lindsay Transport means a lot to us. It is a big milestone for the whole company because we have people who've worked for the company for 30 plus years. Our Lindsay Way of thinking means that we can achieve that and employees are with us for the long term."

Above. Orlando Facchiano, branch manager of Lindsay Rural Bundaberg.



The Lindsay Rural site has rapidly outgrown its current premises, but that is set to change.

"We are very excited to announce that in approximately 18 months to two years' time, we are building a new complex which is going to be 8,000 sqm under one roof with 3,000 sqm for cold rooms chillers, so that we can transport frozen goods and 5,000 sqm for packaging and farm inputs, under one roof.

"It means we will be working side by side with Rural and Transport and I'm really excited about that. The simple fact is that as our trucks come up overnight, we can unload the stock and check it off the next day and we can confidently tell our growers that we've got the stock here for them that makes us smile and makes them smile because it means they can get their produce to market quickly.

"With everything on one premises it will be how we like to say here one team, one dream."

A toe in the water for year round supply

Butler Market Gardens are well known for their herbs, Asian vegetables and spring onions that are grown in Victoria. The cold winter months can play havoc with productivity so the decision was made to fill the gap and trial growing in the Bundaberg region.

A lower production in the winter of 2022, plus price variations put supply under pressure for Butler Market Gardens, so an idea that had been brewing for several years of a northern growing region was given the green light to trial.

After six generations of growing vegetables and herbs, the Butler family have developed systems and processes that work extremely well in Melbourne giving CEO Rick Butler confidence that making the move to Bundaberg could work.

The attraction of the Bundaberg region to give year around productivity was a major factor in choosing the area.

"Our strategy has always been to be able to grow our own product, control our packing and processing and reduce the need for any procurement to meet demand," said Rick Butler, CEO of Butler Market Gardens.

"I had confidence in our team and our business that we had the skills and systems to make the transition from Melbourne to Bundaberg a viable option. Of course, the climate, the location and the local elements would still be a challenge, but I trusted our team to work through those to set up the location."

Initially, the plan for Butler Market Gardens is to trial regenerative herbs under greenhouses in a hydroponic set up. The herbs were propagated in Melbourne and transported to the Bundaberg site in time for summer. There are 260,000 pots across nine different herbs including sage, chives, thyme, mint and oregano.

The herbs will be trimmed on site, then transported to Melbourne for distribution to Victorian customers to maintain supply through the winter months. The rapid growth of herbs in Bundaberg during the winter months means that productivity is much higher than in Melbourne.

The herbs will be given a few years to test the viability of the location, with the view that in five years' time, expansion of the operation may include vegetable lines.

Above. Butler's herb greenhouse Bundaberg.
Inset L-R. Andrew Smith and Catalina Arango.

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Rick knew that there would be challenges in setting up a new location that range from sourcing box liner bags, to ensuring water supply.

Thus far, he has found the local businesses and community supportive, and happy to help and give advice when needed.

"One of the elements we did underestimate is the time and cost needed to set up the greenhouse and dripper systems from scratch. With the resources we had, we have a solution but it means for the short term some of the irrigation is overhead sprinklers, which we will look to changing, but for the moment it works.

"Our next challenge is likely to be maintaining the health of the herbs during the Bundaberg summer. This will be our first summer, so we will need to keep a closer eye on the plants in terms of irrigation management, pest and disease control to maintain plant health for next winter's harvest."

Increasing energy costs in Victoria was another factor in the decision to set up Bundaberg. While one site in Victoria uses a biomass system for heating the greenhouses in winter which is very energy efficient, the cost of heating some of the other sites is significant. With the warmer, more stable temperatures through the winter in Bundaberg, the reduction of energy costs will be noticeable to the overall operating costs.

As other vegetable growers have found, the cost and shelf life of transporting cut product to Victoria outweighs the cost of setting up processing facilities locally. The philosophy of Butlers is to grow it themselves in the shortest time and the shortest distance, which in the winter months means that Bundaberg is a viable option.

"Bundaberg is a horticultural hub, it has the infrastructure and services that you need, everyone you speak to in the street is in the industry. The community is geared around horticulture.

"Having said that, it is important to understand what grows well in the region before making the move to set up in Bundaberg. There is a lot of different products grown in the region, so you need to understand what market you are going to supply, what quantities and whether the Bundaberg region is suitable.

"There is a lot of different options and variables involved, so we are just putting our toe in the water with Bundaberg and taking baby steps and learning as we go. Even though we did invest a fair bit of money into it, it's been a great move for the business to be able to have that volume for stock security.

"We will keep working on it every week and every month as we learn, to get to the end destination of where we want to be."

Disease Management Made Easy

From open field to protected cropping, MIRAVIS® Duo fungicide has delivered outstanding protection against powdery mildew and leaf diseases, across a diverse range of programs, since the Syngenta innovation was launched a year ago. Eden Farms are a family-owned hydroponic greenhouse operation who have been market leaders in the supply of cucumbers for over two decades. A considerable proportion of Australia's continental and baby cucumbers are grown on two farms located in the Wide Bay-Burnett region in Queensland.

The combination of high humidity and warm temperatures in a greenhouse environment make fungal disease management a challenge. Agronomists Marija Tromp and David Towner (Lindsay Rural, Bundaberg) worked with Eden Farms to improve control of fungal diseases in cucumber crops.

"When MIRAVIS® Duo first came out, and we got the training on it, we knew it would have a fit in this customer's program," said Mr Towner.

"We recommended MIRAVIS® Duo to Eden Farms straight away and we've seen a huge difference," said Mrs Tromp. "It improved disease control and increased shelf life for baby cucumbers. We were able to remove two or three different products from the grower's program and replace them with MIRAVIS® Duo and there was no financial burden."

"We recommend applying MIRAVIS® Duo preventatively in the early stage of cucumber crops, to stop disease early," said Mrs Tromp. "Other products may have 3-5 day withholding periods which makes them difficult to fit into harvest programs. The one day withholding period of MIRAVIS® Duo means the grower can spray in the late afternoon and start picking in late afternoon on the next day."

At the other end of Australia, Elders Tasmania agronomist, Ross Tulich has found a fit for MIRAVIS® Duo fungicide in potatoes where it provides protection from target spot/early blight (*Alternaria spp.*) and can be applied via boom spray, aerial application or chemigation.

"Being very honest, I love it. I think it's an absolutely awesome product" he said.

Syngenta has three MIRAVIS® fungicides registered in potatoes; MIRAVIS®, MIRAVIS® Prime and MIRAVIS® Duo fungicides. Key application timing to protect against target spot is just prior to row closure to protect the canopy and then throughout the season.

"I particularly rely on MIRAVIS® Duo late in a crop's program, just prior to foliar nitrogen levels dropping off and favourable disease conditions occurring, which can lead to target spot coming in on the older leaves. I use other fungicide products earlier in the crop and pull the trigger on MIRAVIS® Duo prior to senescence. That's where I think MIRAVIS® Duo comes into its own as I believe it greatly aids to fill tubers."

"The biggest benefit of MIRAVIS® Duo is that you're going to get multiple weeks out of it, whereas previously you were using other products and only getting seven days of target spot protection.

"We can get high target spot pressure in Tassie due to periods of free moisture and favourable temperatures.

"The fact that you can put it on and get a longer protection window is where it is a greater step up on what was previously available.

"The other thing that differentiates MIRAVIS® Duo from other products is its rain-fastness, which is a really large benefit for us.

"One hour is absolutely perfect, a lot of other products can be up to 24 hours.

"We can get a lot of unpredictable scuds [showers] pass through late in our season, so this flexibility is a big positive; it also allows farmers to press on with irrigation which is critical during this period."

MIRAVIS® Duo fungicide also delivers superior protection against key diseases in other horticultural crops, including Alternaria, powdery mildew and Cercospora leaf spot in fruiting vegetables; early blight/target spot/leaf spot *(Alternaria spp.)* and powdery mildew in root vegetables; Cercospora leaf spot and Septoria leaf spot in celery; and early and late leaf spot, net blotch and rust (suppression) in peanuts.

Above L-R. Jeremy Browne, General Manager, Eden Farms. Mr Ross Tulich (left) has been working with Elders as an agronomist since 2018 and covers all crops around Launceston, but has expertise in growing potatoes. Pictured with client Nick McEldowney.

FIND OUT MORE
For more information about MIRAVIS® Duo speak to your local Syngenta representative or visit syngenta.com.au/miravis-duo

Strategic horticulture to ride out the storms

Most growers around the country start out as a mum and dad enterprise, and often the farm grows in an organic fashion, but a strategy for growth can give succession, employment and year round produce.

Starting as Australian Fresh Salads in the Stanthorpe region of the Darling Downs, the origins of Dicky Bill was a small operation on 40 acres, growing strawberry runners.

An opportunity to trial fresh cut salad lines in the 1990s gave an acre's worth of produce in the first year, cut by hand. Deciding that it had potential the family looked to mechanising the operation to expand capacity.

From 2001, business expanded with the purchase of further properties in the Stanthorpe region to meet the increasing demand for summer salad in Queensland.

However, Stanthorpe's weather and variable rainfall began to make itself known, requiring a re-think on how and where, the business should be based.

At an elevation of 900m, Stanthorpe is principally a summer growing region. However, the summer storms can be volatile with torrential rain, and often, damaging hail, that has at times, wiped out an entire season.

A decision to set up operations near Gympie on the Mary River, gave the business an option for winter growing. However, it wasn't long before Mother Nature made herself known, by first leaving the property landlocked, and then water locked.

"We decided at that point that we needed to look at a region that had better water security and access to land," said Ryan McLeod, manager and director of Dicky Bill.

"The property at Gin Gin was originally sugarcane and citrus. We bought late in 2010. And it rained, and rained and rained.

"We spent the summer trying to prepare an entire farm from scratch, finally planting in the April across 300 acres. Within three years it became obvious that we had run out of land, and bought another 200 acres."

"The decision to move to the Bundaberg area was based on observations and research. We had a strong business in salad lines, and it was clear that Bundaberg offered great potential to do the same lines."

Above. Coral lettuces under harvest.
Inset L-R. Ryan McLeod (manager and director of Dicky Bill) with wife Tahirih McLeod, and their children Jack and Connor

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The ability to grow salad lines in the winter in Bundaberg is a definite seasonal one, as the summer months across December and January can be difficult for products such as spinach and soft herbs due to the high humidity.

The decision was made to establish a summer growing location to offset the Bundaberg location. Maffra in Victoria's east Gippsland region has been chosen.

"The decision for our business model was to be able to extend our growing seasons throughout the year, rather than be restricted to optimum times in Gin Gin. The Maffra location gives us greater flexibility.

"In addition, we look to growing produce in the Bundaberg off-season, corn is a great crop for the September-December window. It also means we can provide continuous employment for our staff."

The majority of the crops grown are spinach (mid savoy), baby cos, lettuces, Asian greens and wild rocket. A strategic move into herbs is now available to consumers through the EZ Herbs brand.

Basil, parsley, coriander, mint and dill will form the basis of the range, presented in pillow packs as leaf only products, ready to eat, adding a significant number of days to shelf life.

Sudan grass provides the cover crop for the Bundaberg site and a light dressing of gypsum and lime is added to correct the pH if required. Water is available from water scheme supply, dams on site provide back up water sources as needed.

The decision was also made to go to wider beds with smaller wheel tracks that has enabled greater productivity and yield, and given the soil a healthier profile with less issues such as compaction. Fertiliser wastage is also reduced due to the wider beds, along with diesel efficiencies to run equipment as fewer passes are required.

The challenge with operating two sites is the cost of infrastructure. Each location requires equipment and staff, so the decision to operate in multiple locations must be commercially viable.

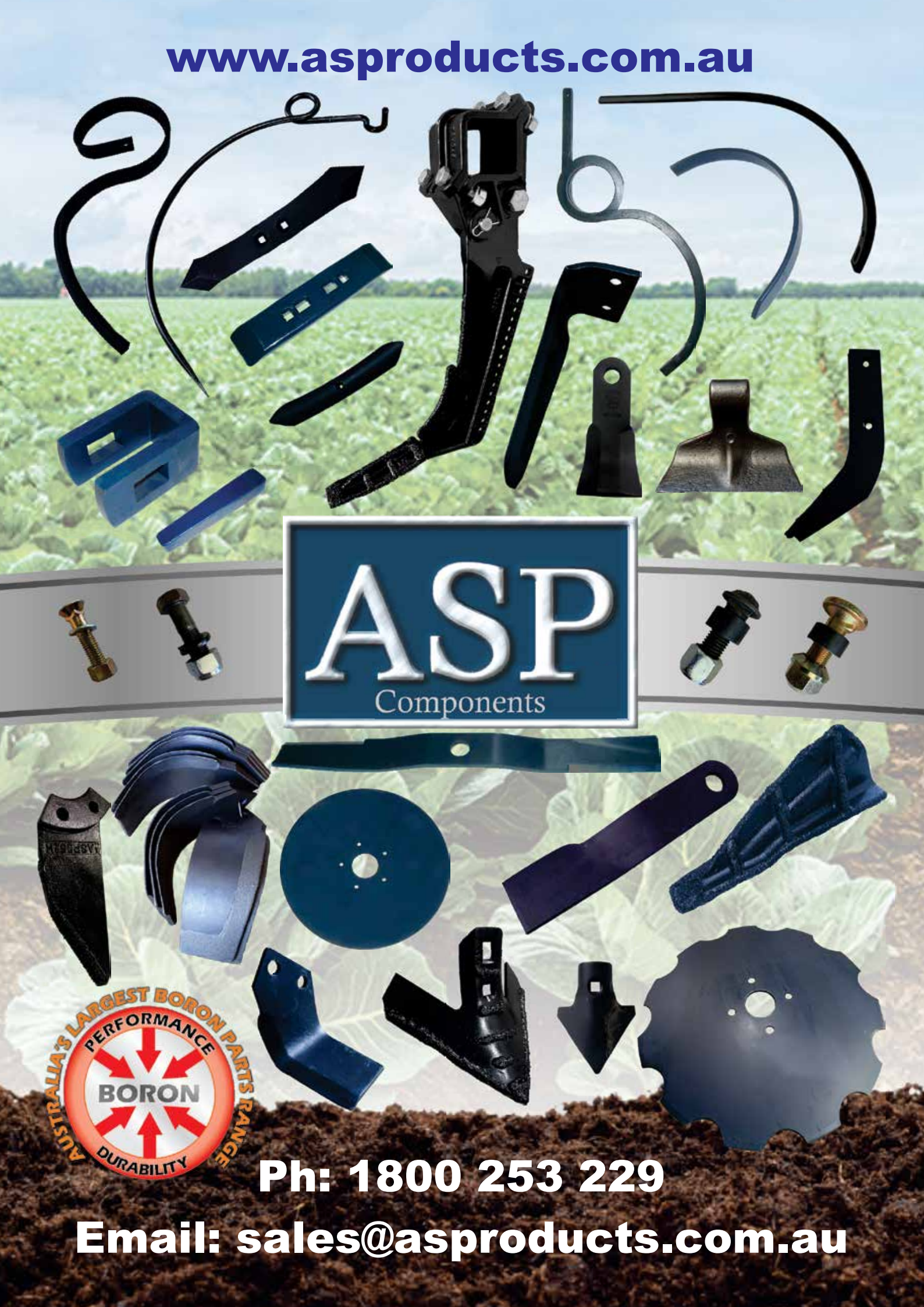
In terms of processing and packing, Ryan said it was more cost effective to have one location, and transport produce to that site. As a consequence, all processing and most packing is undertaken at the Maffra location, and final product is distributed to the major wholesale markets ex Maffra.

"By cutting product at Bundaberg and transporting it to Maffra, we reduce a lot of waste," said Ryan. "It might seem counter-intuitive, but from a cost of energy perspective, to run coolstores, dryers, packing lines and so on during the summer months in Bundaberg, it is actually more cost effective to truck to Maffra as required."

Energy usage is managed by simply turning off systems when it is not needed during the off-season, and solar power provides much of the energy during the growing season.

The Dicky Bill ethos is to employ sustainable practices as much as possible including reclamation of irrigation run-off and reducing packaging for the EZ Herbs range. For the Bundaberg region Dicky Bill is involved with the reef rescue programs.

"Mother Nature sure can throw some curve balls, but it is really satisfying to see your product growing and on the shelf. We have a great team, and with two locations we can supply year round herbs and salad."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Cross Family Farm
Rides the highs and lows for 30 years

Trevor Cross is a passionate veggie grower, who started with radishes in the family garden as a youngster, is now one of the biggest growers in the Bundaberg region.

In 30 years of horticulture, Trevor and his wife, Wendy have ridden the ups and downs of the industry and understand what it takes to be a successful business that continues to grow.

As a kid growing a few radishes to sell in the local area, to a stint share farming pumpkin and melons, to now growing 17 lines of vegetables across 2,500 acres, Trevor has seen his fair share of challenges.

Vegetables grown include several varieties of tomatoes, pumpkins, chillis, butter beans, borlotti beans, capsicums, egg-plant, cabbage and zucchinis, all of which are in-field, using drip irrigation. All the produce is sent to the wholesale markets of Brisbane, Sydney and Melbourne. A portion is reserved for charities such as Foodbank.

The adoption of drip irrigation has reduced the effects of evaporation, while channels and swales around the crops and dams assist with controlling run off and sediment. The farm has access to government run channels, and onsite bores. The awareness by local growers to protect the Great Barrier Reef extends across the whole Wide Bay Burnett region.

"We are actually very lucky in Bundaberg, because the temperatures are good all year, and normally has reasonable rainfall. There is so much diversity in the crops grown from sugar cane, to avocadoes to citrus to veggies and nuts.

"Water security is an issue, we are fortunate to have access to three sources of water," said Trevor.

"We made sure that we put a lot of effort into earthworks to drain back into catchment ponds and recycle the water. Soil moisture is regularly checked – we use probes, but also walk the fields every day to actually check the moisture. A probe is in one spot, it doesn't always give the full picture."

In the past 30 years, Trevor has seen a shift in soil health attitudes in the agricultural industry. The use of pest management, organic fertilisers, soil biome and using softer chemicals is becoming more prominent. On-farm, Trevor uses a cover crop of sorghum – both for soil health and as fodder for a small herd of livestock.

"Soils in the region are diverse from sandy, through to red to black, which means you can pretty much grow anything, depending on the soil type you need. Add in soil health, and it is a pretty successful region."

Facing the Current Challenges

Trevor and Wendy's commitment to charity has come from personal experience with people they have known that needed a hand in tough times.

What started as a small contribution has led to a greater commitment, that earned Trevor and Wendy an OAM in 2021 for their work and dedication.

"The charity work has been important to us, and hopefully those who need it get the benefit," said Trevor.

"This year, may be the first time we have had to cut back on our charity work, because our cost or production has gone up substantially.

"With the current dry weather, poor prices at wholesale and the cost of labour, there is only so much we can do without running at a loss.

"If we can get through this year ok, we will look to diversifying back into sugar cane again, and perhaps invest more into the macadamia orchard that we have. Working collaboratively for value-add is also on the cards, like a nut processing facility, or perhaps expanding the honey bees.

Protected cropping provides controlled environment for year round produce

As one of the first to utilise the benefits of protected cropping in the Bundaberg region, the Marcon family are making the most that the technique provides.

A third generation family owned farm, the Marcon Family Farm was established in 1954. In 2002, the first greenhouse was built to grow a range of tomato varieties to take advantage of the more controlled environment that it can provide against variable weather conditions.

The arrival of a tomato leaf virus resulted in a move away from tomatoes, to eggplants in the greenhouse, and in field crops of capsicum and zucchini.

The farm is now operated by Clinton Marcon and his wife, Danielle, while his brothers operate the adjoining macadamia farm.

"We decided to go with eggplants in the greenhouse, because they grow quite well on a trellis. If you grow them in field, and get a bit of wind or rain, they mark easily," said Clinton.

"We supply the wholesale market through Brisbane, Sydney and Melbourne, and operate for 10 months of the year."

During the December and January period, when Bundaberg is at its hottest, the family take the opportunity to clean and sterilise the greenhouses ready for planting in February.

"By doing the clean in summer, the temperature gets to about 70°C, which pretty well kills any pests or diseases so we can start in February with a clean slate. It also means, that as a family, and for our staff, we can take a break."

Above. Clinton and his wife Danielle and their children Rocco and Annabel Marcon.

To prepare for the next season, new coconut husk pots are laid out, and the seedlings planted. As the plant grows it is clipped to the trellis. After about six weeks, the plants are about head height, and ready for the first pick. In order to make picking easier and more efficient, the plants are layered.

Clinton says the perfect eggplant is all about colour – the darker the better and size Customers often ask if he polishes the fruit, but the glossy sheen is natural.

The glasshouse system is essentially a hydroponic system, with a drip system delivering water and nutrients. Any run-off is still quite nutrient dense, and collected to water and feed the macadamia plantation.

"When my father first started in greenhouses more than 20 years ago, it was the cloth opera-style technology, that was difficult to control temperature and humidity. The newer glasshouse is now fully climate controlled – temperature, humidity and airflow – and automated.

"Humidity when it is heavy rain is still a factor up here in Bundaberg, so we usually apply a fungicide every couple of weeks to keep on top of it."

"The Bundaberg region is the best region for greenhouse growing, we can grow through the winter without heating, and through the summer, but we choose not to.

"I anticipate that we will continue to grow in field capsicums and zucchinis for a few more years, but eventually we will transition it to greenhouses. We can achieve much higher yields in the greenhouse, with less pest and disease pressure and produce high quality vegetables."

Allan McGann the guiding hand to drumMUSTER

Recognised at Hort Connections for the E.E. Muir and Sons Community Stewardship Award in June 2023 for his work in managing and implementing the drumMUSTER program, Allan McGann's work has assisted in preventing thousands of tonnes of plastics and chemicals from ending in landfill.

The drumMUSTER and ChemClear programs provide a collection and disposal pathway for unwanted agvet chemicals and containers, to avoid these chemicals being disposed of improperly.

drumMUSTER has collected and recycled close to 42 million AgVet chemical containers since the program began, while ChemClear has collected and disposed of 980 tonnes of obsolete, inherited or unknown AgVet chemicals.

Working with local councils, and other collection agencies, drumMUSTER has established collection facilities around the country. Once the drums are collected, they are recycled into re-usable products such as wheelie bins, road signs, fence posts and bollards.

Allan has been the guiding hand for the drumMuster program since 2001, and the ChemClear program since its launch in 2003.

His dedication and commitment to these important programs has ensured that Australian farmers and agvet chemical users have access to safe and environmentally responsible ways to dispose of used containers and chemicals.

The program was first established 1998 by industry - Allan joined in 2001. At the time, he was a national field officer for the east coast to set up the program with local councils.

"The initial response was mixed, but most were supportive of the concept," said Allan. "Encouraging farmers to change their habits to take their drums to certain locations for recycling took time but was accepted very quickly.

"The awareness of the program was very high around 95%. We now have around 840 collection points around the country.

"For the farmer, it as much about reducing waste on-farm, but also for best management practice and quality assurance under schemes such as FreshCare.

In terms of the award, Allan says that it is a humbling and surprising to receive it, but it is recognition for the program and those on the ground that continue to support and implement it.

"There is real value in the program. I have been around a long time and know how to assist people to be a part of the program and the commitment of our team to bring drumMUSTER is remarkable.

"It is rewarding to see that programs like drumMUSTER are taking hold right around the world to reduce the amount of plastic on-farm."

Above. Andrew Muir, CEO presents Allan McGann with the E.E Muir & Sons Community Stewardship Award at Hort Connections 2023. *Image courtesy of Andrew Beveridge.*

bagMUSTER one step closer

Clearing Australia's farms of used plastic bags is one step closer thanks to the leadership of CropLife Australia and the Australian Seed Federation.

bagMUSTER® will provide an environmentally sustainable collection and recycling pathway for single use agricultural input plastic bags.

A CropLife Australia stewardship initiative — in strategic partnership with the Australian Seed Federation— bagMUSTER will provide an environmentally sustainable collection and recycling pathway for AgVet industry single-use plastic bags. It will be delivered by Agsafe and will be modelled on the highly successful drumMUSTER stewardship program.

bagMUSTER pilots were conducted by Agsafe in July at Narromine in New South Wales and Gatton in Queensland.

To minimise cost to the end user, bagMUSTER will be funded by importers and suppliers of single use plastic bags, as well as the brand owners of the products in the bags.

Plastic packaging plays an essential role in Australia's agricultural industry by protecting pesticides, seed and other agricultural inputs for their safe transport, use and storage.

Eligible single-use plastic bags are 5kg bags up to 1,000kg bulk bags (woven polypropylene and biaxially-oriented polypropylene). Currently, these types of soft plastic polypropylene bags end up as land fill, are destroyed in an environmentally unfriendly manner or remain as on-farm waste.

Agsafe General Manager Dominique Doyle said that with the right technologies and infrastructure, there is now opportunity to improve on this. She said bagMUSTER will provide industry and farmers with access to sustainable disposal pathways for this plastic.

As part of voluntary participation in bagMUSTER, importers and suppliers of agricultural product in single use plastics bags will pay a fee-for-service at the point these products enter the retail and farm supply chain.

She said the pilot trial has helped Agsafe test and refine logistics, collection infrastructure, industry engagement and partnerships to ensure that the bagMUSTER model is fit-for-purpose prior to national expansion.

"With our experience delivering CropLife's existing stewardship programs, drumMUSTER and ChemClear®, Agsafe are well placed and proud to continue the plant science sector's leadership in delivering sustainable whole-of-lifecycle stewardship initiatives," she said.

Ms Doyle said the recycled polypropylene plastic resins can be used for a wide range of applications, including flowerpots, car bumpers, buckets and homewares.

For more information visit
agsafe.org.au | drummuster.org.au
chemclear.org.au

bagMuster pilot at Gatton.

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

Hort Innovation VEGETABLE FUND

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IS YOUR CROP PROTECTED? SCAN HERE

VEGETABLES
POTATOES
ONIONS

Hort Innovation Annual Report reflects on the year we have had

The 2022/23 Hort Innovation Annual Report shows that it was a record-breaking year with more than $139m invested across levies, Australian Government contributions, grants and co-investment.

2022/23 by the Numbers

$60.2m
Invested in Strategic Levy R&D

456 Project Investments

$52.9m
Invested In Hort Frontiers and Non-Levy R&D Initiatives

$21.1m
Invested In Strategic Levy Marketing Programs

To read the Annual Report in full visit horticulture.com.au

Horticulture is a growing industry, with a production value increase of 23 per cent over the past five years. Horticulture value has grown every year since 2012/13 – an anomaly for agriculture, which is often characterised by significant fluctuation.

The National Farmers' Federation (NFF) has set a bold target for the agriculture sector – to exceed $100 billion in farmgate output by 2030. This year data shows that output is forecast to reach $84 billion.

Despite a range of challenges facing the sector, horticulture has the potential to be a key driving force behind reaching the NFF 2030 target. In industry growth projections to 2030, horticulture was assigned the highest total growth rate at 33.1 per cent.

As Australia's Rural Research and Development Corporation for the horticulture sector, Hort Innovation is committed to helping industry grow by improving productivity, preparedness and competitiveness.

The annual report is structured around performance principles:

- Capture value from investments
- Deliver on investments in areas such as production, sustainability, biosecurity, trade and marketing & demand creation.
- Engagement through grower visits, advice mechanism, decision making, consultation, data & insights, innovation and communications
- Collaboration with government, R&D companies, delivery and marketing partners,
- Performance is measured to evaluate the impact and evaluation, of the investment
- Governance of the Hort Innovation team, risk management and continuous improvement.

How the Funding Works

Hort Innovation's work is funded by statutory and voluntary industry levies, co investment dollars brokered from a range of partners, grant support and Australian Government contributions. Other funding sources can also come into play, including royalties and the company's centralised strategic levy reserves.

In 2022/23, Hort Innovation used two primary funding models: one for strategic levy investments and one for investments within our Hort Frontiers strategic partnership initiative.

Levy funding is the core model for Hort Innovation's work, involving the investment of statutory or voluntary industry levies, along with Australian Government contributions (where applicable). Levy investments are specific to each industry's needs, but multi-industry projects can collaborate across multiple commodities for maximum efficiency and impact.

Hort Innovation

Hort Innovation does not set or directly collect levies. Individual horticulture industries choose whether to have a levy and determine how (or if) their levy is split for investment between R&D and marketing.

Levies can be statutory (or compulsory) levies through the Department of Agriculture, Fisheries and Forestry (DAFF) or voluntary through an approved Collective Industry Fund (CIF) arrangement with Hort Innovation. Industries with a voluntary levy include almond, blueberry, pistachio, processing tomato and pyrethrum.

Industry may have other levies that are not managed by Hort Innovation, such as biosecurity levies that are passed onto Plant Health Australia.

* Encapsulating extension and international trade

Vegetable Fund Annual Report 2022/23 Snapshot

Here are some highlights from what was delivered during the year:

A new Soil Wealth and Integrated Crop Protection program to assist vegetable and melon growers to improve the management of their soil and crop health and drive their productivity, sustainability and profitability on farm – access all the resources from the program at soilwealth.com.au.

Research into the benefits of on-farm biosecurity practices so that recommendations can be made on how to incentivise vegetable and melon growers to adopt appropriate biosecurity measures – keep up to date at hortinn.com/mt22008.

Investigation into developing a national surveillance and diagnostic framework for soilborne pathogens of vegetables, melon, onion, potato and sweetpotato is underway – see hortinn.com/mt21016.

Delivery of an area wide management strategy to address high-priority viral and bacterial diseases affecting vegetable crops – find out more at hortinn.com/vg16086.

Research into addressing tomato potato psyllid including alternative disinfestation methods for affected crops see hortinn.com/vg17015 and a surveillance program see hortinn.com/mt18008.

Identification of the sources and routes of microbial contamination in leafy vegetables so that recommendation can be made on how industry can manage any risks – hortinn.com/vg22002.

Continued collaboration between the melon, onion and vegetable industries on an export program to build export capability and capacity – see hortinn.com/mt21009.

VEGNET program supporting growers in adopting best practices on-farm – read more at hortinn.com/vg21000.

Access to consumer insights through multi-industry investments to understand consumer behaviours, attitudes and purchase intentions – see horticulture.com.au/vegetable

2022/23 by the Numbers

$14,094,288
Invested in R&D

$12,134,128
In Levies Collected by the government and passed on to Hort Innovation for Investment.

Support for the National Bee Pest Surveillance program to help safeguard honey-bee and pollinator-dependent industries in Australia – read more at hortinn.com/mt21008.

A new industry communications program delivering the *Australian Grower magazine,* AUSVEG weekly newsletter and much more – see hortinn.com/vg22000.

Vegetable Harvest to Home dashboards providing regular household purchase data and insight reporting at harvesttohome.net.au.

Visit horticulture.com.au/vegetable at any time to access information on new, ongoing and completed projects, and to download resources produced by levy investments. The Vegetable Fund Annual Investment Plan 2023/24 is also available which includes details on current and proposed investments, as well as key financial information and a five year forecast.

Hort Innovation VEGETABLE FUND



Complete Vegetable solutions **designed for your business**

- Produce Handling & Storage
- Peeling, Grading, Washing
- Electroporation
- Cutting, Pureeing
- Value-added Processing
- Product Handling
- Weighing & Filling
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Across industries and applications, we design specialised solutions.

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Harnessing the Power of Cover Crops
for Enhanced Soil Health

The Soil Wealth and Integrated Crop Protection (Soil Wealth ICP) project works with growers to put soil management and plant health research into practice. *Soil Wealth ICP Phase 3* (MT22004) is a strategic levy investment under the Hort Innovation Vegetable and Melon Funds. This article explains why cover crops, integral to sustainable agriculture, are our allies in the endeavour to protect and enhance soils and their crucial functions.

World Soil Day, celebrated on 5 December each year, brings to light the critical role that soil plays in our lives, from ensuring food security and regulating our climate to preserving biodiversity. As environmental challenges escalate, this annual event takes on even greater significance, serving as a timely reminder of the urgent need for responsible soil management practices to protect our planet and feed its people.

Cover crops, an essential component of sustainable agriculture, are able to do much of the heavy lifting in the quest to maintain and enhance soil health. They act as living shields, not only preserving soil and its essential functions, but also improving and rehabilitating degraded soils.

Cover Crops at the Gatton Showcase

At the recent Gatton AgTech showcase in Queensland's Lockyer Valley, Dr Kelvin Montagu, Dr Doris Blaesing, and Steph Tabone showcased a Soil Wealth ICP cover crop trial, hosting two field walks under the theme *Making the most of your cover crops.*

The extensive cover crop trial was designed to facilitate in-depth conversations on various topics, including the contribution of legumes to nitrogen availability in the soil, different crop termination options to maximise cover crop benefits, and considerations for growing mixed species cover crops.

The trial site featured several combinations of cover crops, ensuring a diversity of species, functions and termination methods. Cover crops were selected based on their ability to demonstrate different termination methods and promote discussion among attendees.

Above L-R. Wedderburn farm trialled plastic mulch with ryegrass in the interrow. Ryegrass cover crop – whole bed terminated (left), 30cm strip terminated (right).

Field Walk Conversations

With a cover crop available for all seasons, soils, water availability and end uses such as nitrogen fixing, biofumigant or erosion control, broad generalisations cannot be made. Some specific observations are listed in the *Cover Crop Summary at Gatton showcase* (*see page 55*); however, ultimately, what you grow, how you manage it, when you plant it, when you terminate it and how you terminate it depends on your unique situation.

The diversity of crops and their management was the focus of the field walk. Participants were interested in the following:

- Principles of growing cover crops
- Challenges associated with specific species
- Strategies for planting and termination
- Cover crops as an alternative to plastic mulch
- Incorporating cover crops with strip tillage
- Building soil health
- Managing soilborne diseases
- Comparing mixed species to single species
- Understanding the role of cover crops in biosecurity and disease reduction.

Conversation often returned to a key theme: the dual role of cover crops in reducing the high costs of inputs and improving soil health.

Worthy of Celebration

Cover crops offer a range of benefits to an agroecosystem, with a primary focus on improving soils. As invaluable contributors to sustainable agriculture and healthy soils, let's also celebrate cover crops this World Soil Day.

GATTON SHOWCASE

Cover Crop Summary

Warm Season Legume Mix - Lablab, Sunn Hemp, Cowpea

- Adds nitrogen to the system (1 tonne of dry weight adds 25kg/ha of nitrogen).
- Terminate before maturity for quality biomass.
- Inoculate legume seeds with the correct strain of Rhizobia bacteria.
- Consider existing soil nitrogen levels.
- Termination methods affect nitrogen availability.
- Chopped and incorporated residue releases nitrogen quickly.

Cool Season Mix Cereal - Rye, Oats, Vetch

- Cereals scavenge nitrogen, encouraging legume nitrogen fixation.
- Compatibility with vetch climbing cereals.
- Consider different termination methods.
- Rolling effective for termination of cereal rye.

Warm Season Mix - AGF Seeds Warm Cover Mix 11 Species

- Mixed species phase in and out as cover crop matures.
- Mixed species bringing biodiversity to the farming system.
- Not all species will establish.
- Challenges: potential weed problems and disease hosting.
- Complex weed management.

Buckwheat

- Quick growth, attracts pollinators.
- Terminate before flowering to avoid seed set.
- Establishment was variable due to water availability at planting.
- Reinforces the importance of cover crop care.

Biofumigant - Caliente rojo

- Controls soilborne diseases with glucosinolates.
- Terminate at 25% flowering.
- Mulching and incorporation release glucosinolates.
- Glucosinolates become toxic gases for pathogens.
- Can be grown year-round in the Lockyer Valley.
- Biomass varies with seasons and regions.

French Millet - Warm Season Grass

- Various types of millet with different performance.
- Suppresses weeds and aids broadleaf weed control.
- Useful for nutrient recovery.
- Heat-tolerant grass species.

Above. Dr Kelvin Montagu addressing field walk participants.

FOR MORE INFORMATION

Contact project leaders Dr Gordon Rogers on 02 8627 1040 or gordon@ahr.com.au and Dr Anne-Maree Boland on 03 9882 2670 or anne-mareeb@rmcg.com.au.

Soil Wealth ICP focuses on addressing growers' specific interests and regional issues, fostering knowledge exchange, elevating sustainability, and improving soil and crop health across the industry.

Hort Innovation VEGETABLE FUND Hort Innovation MELON FUND

This project has been funded by Hort Innovation using the vegetable and melon research and development levies and contributions from the Australian Government.
Project Number: MT22004

Replacing plastic mulch with cover crops for weed suppression and improved soil health

Working closely with the Soil Wealth ICP team, vegetable grower Kim Ngov (pictured) **trialled cover crops as a replacement for plastic mulch on his Wedderburn farm in NSW, starting in 2020.**

Kim's motivation stemmed from a desire to reduce plastic use, improve soil health, and effectively manage weeds on his vegetable crops.

Supported by the Soil Wealth ICP team, Kim adopted an incremental approach, making small changes and refining his management practices as needed, resulting in a time- and cost-effective process. The transition away from plastic mulch came with its share of challenges, but Kim's determination yielded positive results.

THE CHALLENGE: Plastic Mulch vs. Sustainability

Plastic mulch, a common practice, serves as a physical barrier to weed germination and growth, aids in stabilising soil temperature, and maintains optimal soil moisture levels. However, the installation, removal, and disposal costs of plastic mulch can be substantial.

It is also a common practice to leave plastic in place for several years, leading to reduced effectiveness as weeds can penetrate it, and environmental pollution as the plastic degrades.

THE SOLUTION: Cover Crops

Over the course of three years, Kim conducted three vital demonstration trials:

- Cover crops between beds (2020).
- Fully terminated cover crops on beds (2021).
- Partially terminated cover crops on beds (2022).

Cover crops proved effective in replacing plastic mulch, successfully suppressing weeds both between beds and on the beds themselves. Weed management became more manageable after implementing cover crops compared to fallow periods with weeds. Furthermore, cover crops played a pivotal role in reducing erosion and enhancing water infiltration, particularly during seasons of heavy rainfall.

Preparing the beds for vegetable crops before planting cover crops reduced time, labour, and machinery costs, making the transition smoother. Partial cover crop termination was effective in weed management and erosion prevention, however it highlighted a need for further trials with wider termination widths, as competition for light and nutrients with vegetable crops became evident.

Kim found annual ryegrass to be the most suitable cover crop for his needs, thriving in cool, wet conditions with its low and dense growth habit.

Kim was able to fully adapt to the new practice and integrate cover crops into his operations.

A New Generation of Export at Premier Fresh

If you want to see the story of Australia's fresh produce export history in a single company, a good starting point would be Premier Fresh Australia. That story is now at a high point, with the Hort Innovation Exporter of the Year Award presented at Hort Connections 2023 to Frank Frappa, Premier's Executive GM - Avocado, Citrus, Grapes, International & Stone Fruit.

Above. Hort Innovation Chair, Julie Bird with Frank Frappa who was presented with the *Hort Innovation Exporter of the Year Award* at Hort Connections 2023. *Image courtesy of Andrew Beveridge.*

Between the pandemic, rising costs and political upheavals, export in recent years has been a difficult business to be in, and the future of Premier's exports was by no means certain, says Frank.

"We've had an enormous number of challenges over the last few years, especially once COVID-19 come into play, and then the flow-on effect after COVID-19 of the world catching back up again," he explains.

"So we had our challenges, and we also had our discussions internally on how and what we would manage, whether we would continue or not."

But with Frank leading the export team, Premier still saw a real opportunity to grow exports.

"We've seen that traditionally in the fruit and veg space, most of the exporters are of an older generation, and many of them took the opportunity of COVID-19 to retire," says Frank.

"We saw that as an opportunity to take it on and have a real go. We've definitely had our moments since, but it's been great. Our growth has been good, and we're pretty excited about the future."

Reinvigorating Premier's exports

One of Australia's largest and oldest produce businesses, Premier has traditionally been focused on the domestic market, and its exports have ebbed and flowed over its century-long history in response to market conditions.

Six years ago, Premier's international trade was on the back burner after many years as a small part of the business. The company had just lost its export manager during the merger of Premier Fruits Group and the LaManna Group to become what is now Premier Fresh Australia, and exports were stalled.

"Exports had fizzled out, and I caught up with the business and had a chat with them about reinvigorating the internat–ional space," explains Frank.

Joining the business as a result of that discussion, Frank began to rebuild Premier's exports, starting with a short foray into the New Zealand market.

"My first point was to build the trans-Tasman business, with a focus on veggies, predominantly zucchini, capsicum and some melons," he says.

It wasn't an easy market for Australian exports. New Zealand has a very good vegetable supply base with similar seasonality to Australia.

Adding to the challenge was an outbreak of Cucumber Green Mottle Mosaic Virus (CGMMV) in Queensland in August 2018, after which New Zealand banned the entry of Australian cucurbits.

By that point, Premier's fruit exports to other countries had started to take off.

"So we parked the New Zealand business and ran with the rest of it," says Frank. "We're five and half years in now, and we've got an export team of 10, and it's going really well."

Exports used to represent 1-2 percent of Premier's business, but it's now closer to 20 percent and continuing to grow.

The changing nature of Australian exports

Premier's new generation export team is dealing with a very different trade landscape than its forebears.

"The whole landscape within export has changed in the last 10 to 15 years, from costs to equipment to ships to clearance, political issues, the whole lot," explains Frank.

"In the last five years, we've had challenges with every single one of those. Pre-COVID, there were ships left, right and centre. You'd pay $4,000-5,000 for a container to go into Asia. Nowadays, you're paying $9,000-11,000 per container. And the cost of business in Australia right now is up through the roof, as we're all aware."

To meet those challenges, Australian produce companies are now treating export as a distinct business, rather than a pressure release valve for the domestic market in times of high supply, as had been the case for so long.

Many growers are now growing specifically for the international market, but Frank says that doesn't mean there's no connection between export and the domestic market anymore.

"We need to have a love for both," he states. "It's important for our growers and our business to have a diversity in customers overseas and domestically."

"It gives us avenues to move a full crop. The growers we work with don't want us to come to them and say 'we just want that 15 percent that's going to the supermarket, and that 15 percent that's going to export'. We need to take the full crop, so we need to have avenues between both markets for that."

"But we're fresh produce guys – we're resilient, it's what we do."

Opportunities for Vegetables

Premier's exports focus on three categories – grapes, citrus and stonefruit. Most of the company's grapes and stonefruit are destined for China, while citrus heads to the US, Canada, Taiwan, Vietnam, South Korea and Japan.

The company has a large domestic vegetable business, but vegetable exports have been a challenge.

"We've got our tomato farm based out of Lancaster and we also partner with a range of growers that grow different vegetables, particularly capsicums, zucchinis and eggplants, but the majority of it stays here," Frank says.

"We are doing a little bit of baby broccoli at the moment into South Korea, which has been a good little program."

While Premier receives plenty of interest from importers looking for carrots, onions, potatoes or salads, Frank says most Australian exports of those crops come from vertically-integrated grower-exporters, and for Premier to try to compete in those crops doesn't add up.

Vegetable exports are always going to be trickier than fruit, according to Frank.

"If you have something unique, something niche, there's always going to be an opportunity," he says. "But it's more challenging, because most countries can grow vegetables. I think it will always be there, but nowhere near the level of where fruits are."

"That's got to come first, but it's hard to build that at the same time as scaling indoor production. The scale [of open field cropping] we've got already has been pretty fast compared to a lot of growers. We've built this up in effectively five years."

"We have to do it full scale or forget about it. The capital cost is excessive up front, but long term it makes sense."

Left. Premier Fresh Australia regularly exhibits at international trade shows like the *FHV Food and Hotel Exhibition* in Vietnam.

A Mentor for Young Growers Acknowledged

Above. Jo van Niekerk from Boomaroo Nurseries with Angela Candeloro who was presented with the *The Boomaroo Nurseries Women in Horticulture Award* at Hort Connections 2023.

The recognition of women in horticulture is often more than that, it is acknowledgement of the role women can play in industry to mentor and guide the next generation of growers. Angela Candeloro is one such individual.

The Boomaroo Nurseries Women in Horticulture Award recognises a leading female member of the Australian horticulture industry who has demonstrated outstanding ability and success in her chosen field. Third generation market gardener Angela Candeloro has been named as the winner of the 2023 award in recognition of her contribution as a role model and mentor for young people in the industry.

Angela grew up on her parents' market garden, F&M Candeloro, ultimately taking over the business. The operation became Tripod Farmers in 1989. Today, Tripod Farmers grows vegetables, primarily leafy greens, on 1000 acres across Western Melbourne and Gippsland in Victoria. Angela's role in the business grew from being very hands on in the early days to managing the quality assurance and harvest teams, and she now serves as a Director and together with her sister Carmel, oversees all areas of the business.

"My grandfather was a market gardener in Werribee, and my parents moved to Bacchus Marsh in the 1960s, so I have virtually lived on the farm all my life, working from a young age," says Angela.

"My sister and I had big expectations put on us at a young age, there was never any doubt that we were not capable of doing all aspects of the farm work. We resented it at the time – we would rather be on holiday with our friends in the summer.

"That upbringing has given me the resilience and strength to keep trying and persevere when things get a bit tough."

Angela credits that attitude with her ability to help young growers who may need some encouragement, support or mentoring. Quite often, Angela says, young women who come from a background where women are not empowered, that encouragement to try and have a meaningful part of the business enables them to gain confidence and grow.

"I can empathise with people new to farming and trying to learn a new skill, I have had to learn those tasks as well, so I know how daunting it can be. With practice and encouragement it does get easier to do those tasks."

Angela was humbled that her peers in the industry consider her a mentor but feels quite privileged to be a position to help train people new to the industry.

As the recipient of the award, Angela is deeply grateful.

"This award is more than just me. My sister Carmel, my sons and nephew all work here on the farm, and all those that work here, it is really for them. Without them, I would not be here, doing what I love.

"It is important that you love what you do and be passionate. Horticulture is a great industry to be in, we are offering great healthy food, it gives you a good feeling that you are doing something great for the population.

"For someone coming into the industry, if you have the passion, you can do anything. I see it every day, when a girl –or guy works hard, they can do just about anything. It is important to stay focused and be prepared to work hard."

HORT CONNECTIONS 3-5 June 2024 Melbourne Convention Centre

INTERNATIONAL FRESH PRODUCE ASSOCIATION

AUSVEG

Hort Connections is the largest horticulture conference and trade show for Australia and New Zealand giving attendees, exhibitors and sponsors an opportunity to connect, learn and showcase the best in the industry.

Following on from the success of Hort Connections 2023 in Adelaide, the 2024 event is shaping up to be a significant event in the horticultural calendar.

Returning to Melbourne for the first time since 2019, the event program has been expanded to give greater opportunity for attendees and exhibitors greater scope to reach industry.

The event is between 3-5 June, 2024 at the Melbourne Convention Centre kicking off with the Monday Trade Show which has been extended from 3-7pm. Presentations within the trade area have doubled in size to accommodate their popularity.

For exhibitors, the Melbourne Convention Centre offers a great deal of scope as one of the biggest spaces available in Australia. Hort Connections is delighted to announce that more than 400 stands will be available. As was the case in 2023, trade show demand is high, and for 2024 it is already 60 per cent sold.

Take advantage of Early Bird registration

Tickets for attendees go quicker than Taylor Swift concert tickets, so take advantage of the Early Bird registration, opening in November.

Registrations are available for:

- Conference Access Passes
- Gala Dinner
- *Perfection Fresh* Breakfast
- Affiliated events.

Take advantage of accommodation bookings with the Hort Connections partner, Corporate Traveller, which can be accessed through the Hort Connections website.

It has been a tough year for many, so Grower Funding will once again be available for Hort Connections 2024, with applications opening soon. Growers will be able to access up to $1,000 to cover registration, travel and accommodation when booked through Corporate Traveller.

Stellar Speakers

Hort Connections is excited to announce the MC for Hort Connections 2024 will be swimming legend, Giaan Rooney. Ms Rooney is a former Olympic medallist and now has a successful career in media as a TV presenter. In addition, together with her husband, they run a macadamia property in northern NSW.

The speaker line-up in 2023 included some incredible knowledge, insight and innovation for the industry and is shaping up to do so again in 2024.

For more information
hortconnections.com.au

A lifetime in pleasurable food education

BY CLAIRE HARRIS

Inset. Stephanie Alexander presented at Hort Connections 2023 on the benefits of teaching children the pleasure of fruit and vegetables. *Image courtesy of Andrew Beveridge.*

Above. Stephanie Alexander Images©kitchengardenfoundation.org.au

When it comes to food education, industry stalwart Stephanie Alexander says the most important ingredient of all is pleasure.

With more than 50 years in the food industry – as a cook, restaurateur and food writer – the Kitchen Garden Foundation founder remains as determined as ever to instil a love of healthy foods in the next generation.

Stephanie attended the Hort Connections conference in Adelaide in June 2023, where she shared the highs and lows of a lifetime involved in and advocating for pleasurable food education.

Growing up in Melbourne and then on the Mornington Peninsula, Stephanie said her 'idyllic' teenage years involved enjoyable family dinners around a shared kitchen table, and an appreciation for her family's orchard and garden.

This childhood was perhaps foreshadowing for her future career. Starting out as a librarian, she switched into hospitality ten years later, an industry she stayed in until 1997.

"More than 30-plus years working in hospitality was driven by wanting to give pleasure through great tasting food, and convincing others that eating well made for a happier and healthier life," she said.

"Moving forward to today, I am a totally convinced fruit and veg lover – put me in a fresh food market and the sights and sounds cause my heart to race and my body is on alert."

Stephanie's preoccupation with the power of pleasurable food connection led her to developing a comprehensive gardening and cooking program at Collingwood College in Melbourne, in 2001.

"The school had an Italian principal who was convinced that fresh food was an important part of a good life. She looked on with dismay at the food eaten by many of her students, and she was only too ready to support my idea," Stephanie said.

Off the back of the success of this pilot program, Stephanie established the Kitchen Garden Foundation in 2004 – aiming to captivate the curiosity and taste buds of students right across the country.

The Foundation allows students to grow, harvest, prepare and share fresh and seasonal food grown on their own school grounds.

Fast forward nearly 20 years, and the program is available in more than 1,000 schools nationwide including early learning centres and special schools.

"I truly believe that if every Australian child had access to this initiative at school, we'd be raising a healthier and happier generation, and certainly a generation that eats more fruits and vegetables."

"Engaging young people in the lifecycle of fruit and vegetables is an important way to influence the food choices of these young people forever," Stephanie said.

"Stressing the beauty, traditions, flavours and textures of food is at least as important, and probably more effective, than stressing the vitamins, fibre and antioxidants that might have physical benefits."

"My starting point was enjoyment and pleasure, not punitive or earnest messages. We did not start to talk about environment or sustainability or food groups or health – of course I acknowledge their importance, but there are other aspects of the enjoyment of fruits and vegetables that are worth focusing on."

Benefits aplenty

Stephanie said the program offered a multitude of benefits to participants, including knowledge, practical skills, and social learnings.

"It is impossible to participate in this program and not gain the very minimum of an understanding of how food is produced, and usually amazement of all those involved, plus increased interest in the final product," she said.

"Learning to cooperate with each other, the students appreciate difference and quickly grasp that there is more than one way of doing things.

"They have to be careful and considerate, and often the phrase 'just try it' leads to some great discoveries."

Stephanie emphasised that schools needed to 'own the program' – a concept which is usually embraced.

"The program is designed to be sustainable, to be embedded and integrated into the life of the school, rather than just being a fly-in-fly-out or once-off activity that takes huge resources and has limited impact," she said.

Cost not insurmountable

While the cost of living is putting a strain on family budgets, Stephanie remained steadfast that intelligent purchasing could allow for fresh produce to still make its way into shopping baskets.

"The popular press would have us believe that low-income families cannot afford to buy enough fruit and vegetables to sustain a family, but good cooks know to buy according to the seasons, when supply is at its maximum and prices and flavours are the best they can be," she said.

With food choices often dictated by convenience and economy, Stephanie is hopeful that her program will cement healthy eating as a priority for younger generations, and a priority that stays with them as they move through life.

"The reality is that many children have no introduction nor broad education around growing or enjoying good food at home. I understand this, but I cannot give up my belief that with more understanding and experience, habits can change," she said.

"Students who handle something unfamiliar are much more likely to be willing to taste it. I have seen parents come into a class and say 'my son doesn't eat anything green', while that son is onto helping three serves of ricotta and spinach pasta."

Support welcomed

Over the years, government support for the Kitchen Garden Foundation has varied in terms of the amount offered, and whether the assistance is state-based or at a federal level. Stephanie said support has been 'considerable', but never recurrent – something she hopes will change soon.

"We want the government to see that investing in our work is a sustainable use of the public purse, as it pays huge dividends long term, and responds to multiple health and education challenges in the one program," she said.

Above. Stephanie Alexander
Images©kitchengardenfoundation.org.au

Stephanie Alexander KITCHEN GARDEN FOUNDATION
Growing Harvesting Preparing Sharing

For more Information
Contact the Kitchen Garden Foundation at support@kitchengardenfoundation.org.au

Mental Agility Needs Conscious Effort

BY CLAIRE HARRIS

According to behavioural scientist Milo Wilkinson, our ability to make so many decisions in a short timeframe is due to our ability to be much more efficient in the way we think – but that doesn't mean we have it all sorted when it comes to brain health.

Presenting as part of the Women In Horticulture session at Hort Connections in Adelaide, June 2023, Milo explained a few tips on improving mental agility for optimal brain function.

"I have travelled the world talking about the brain. But the translation between something academic, and someone with a profession (in horticulture), is that we all have a brain, but we don't all understand what it means," she said.

"Neurology is about the way the brain functions, and psychology is around the way we think. Put them together and that equals peak performance.

"It's not peak performance in a corporate domain, or in a sport, it's peak performance in whatever you choose to do on any given day."

Milo explained that a healthy functioning brain has between 50,000 and 60,000 thoughts a day, however 90 per cent of these thoughts are subconscious. In addition, 92-95 per cent of the total number of thoughts are same as those from the day before, and 73 percent of the total number of thoughts are negative.

"Whatever our narrative is, our brain seeks to prove it – and usually that narrative is negative," she said.

"Our thoughts are on a loop. If you want to think differently about your profession, your life, your kids, your marriage, you have to decide. Every day is the same unless you actively reset your brain."

Milo divided thoughts into white arrows, representing positive thoughts and attributes, and red arrows, representing negative thoughts and attributes.

She urged people to focus on 'white arrow' attributes of their surroundings, colleagues, friends and family.

"We hold a lot of red arrows because we feel safe with them. But you cannot change anything about your thinking unless you are honest about why you are thinking it," she said.

"What we believe to be happening and what is actually true is not always the same, because we don't have the capacity to sort data all the time. What you believe to be true, you will only focus on that.

"If we are in a world of red arrows all the time, if we are always thinking of the disadvantages and things that are wrong, it will have an adverse effect on our neurology and psychology."

The Power of Relaxation

In a world of multitasking and busyness, Milo said the need for relaxation remained vital.

"There have got to be times in your life when you are powering down," she said. "From a neurological perspective, when you are able to relax by watching TV, or reading a book, or staring at a beautiful vista, your brain is mapping the territory for the next activity. That is thrive state.

"If you are always on the move, you are in survive state. Your brain is functioning in the here and now, surviving."

Adding to the complexity of relaxation in today's world, is society's decreasing attention spans – down from 15 seconds in 2008, to eight seconds post-Covid.

"Our ability to sit and think before something else comes into our thoughts is so low. Goldfish have an attention span of nine seconds, so we are now officially worse. We are less focused than we ever have been."

"We have to learn to be still, and we need to prioritise relaxation."

Think it into Reality

When it comes to navigating tricky decisions in life or making a change, Milo said evidence showed the power of thought to be monumental.

"If you want to do anything with your life – if you want to disrupt it, start something new, or leave something – you have to imagine your life with that change for 10 minutes, three times a week, for 14 days minimum," she said.

"If you do this, on average there is a 92% success rate compared to a less than 10% success rate if you disrupt your thinking and make a change immediately.

"Where you put your mind, your body will follow."

Above. Milo Wilkinson presented at Hort Connections 2023.
Image courtesy of Andrew Beveridge.

Innovative Approaches Needed to fix Eating Habits

BY CLAIRE HARRIS

The benefits of a healthy diet are extensive, and yet 95 per cent of Australian adults and 94 per cent of Australian children aren't eating enough fruits and vegetables each day.

This fact was revealed by Heart Foundation dietitian Jemma O'Hanlon, at the Annual Vegetable Industry Seminar (AVIS) held in Adelaide in June 2023.

"If Australians ate one more serve of vegetables each day, could you imagine the impact that would have?" Jemma said.

"The benefits of healthy eating go well beyond heart health – to gut heath, mood, and energy, and a multitude of other things," she said.

In 2017, the Heart Foundation conducted a literature review of post-2010 studies about dietary patterns contributing to cardiovascular outcomes. Based on the evidence, the organisation then put together a heart-healthy eating pattern.

The pattern has five pillars – eat plenty of vegetables, fruit and wholegrains, include a variety of healthy protein-rich foods, choose unflavoured milk, yoghurt and cheese, include healthy fats and oils and use herbs and spices to flavour foods instead of salt.

"As a general rule for mealtimes, fill half the plate with vegetables, a quarter with protein, and a quarter with wholegrains," Jemma said.

While the health benefits of fruits and vegetables are common knowledge in the horticultural industry – and often in the wider population – Jemma said it would take a national approach to see this knowledge translate to healthier eating habits.

"It's one thing to encourage individuals to eat more fruits and vegetables, but when we live in a society where there is junk food all around us and unhealthy food is often the cheapest and most convenient, we have some serious issues," she said.

She envisaged a national food nutrition strategy to require a collaborative approach, including government, corporates, not-for-profit organisations and consumers.

"We need a food system that encourages healthy eating, and affordable accessible foods – that will be a step in the right direction," she said.

Inset. Dr Jason Wu gave an update on the Produce Prescription program at the Annual Vegetable Industry Seminar.
Image courtesy of Andrew Beveridge.

The program draws on the rapidly-evolving 'food is medicine' concept, which is in place in other parts of the world.

Food Is Medicine

One such program aiming to champion the benefits of healthy eating is the Produce Prescription program being investigated by the University of Sydney's George Institute for Global Health.

Spearheaded by the institute's Head of Nutrition Science, Jason Wu, the program aims to integrate healthy food provision into the healthcare system for the prevention, management, and treatment of disease, especially for food-insecure patients and other vulnerable groups.

The program draws on the rapidly-evolving 'food is medicine' concept, which is in place in other parts of the world.

"The United States are already a good five to 10 years ahead of us. There are already 16 states there where doctors can give patients a prescription of healthy foods to use at a supermarket," Dr Wu said.

Dr Wu gave an update on the Produce Prescription program at the Annual Vegetable Industry Seminar.

"The program has tremendous potential to transform the way that healthcare thinks about and approaches diet-related diseases," Dr Wu said.

"About one third of cardiovascular disease mortality is attributed to a poor diet – that is more than smoking, physical activity and alcohol use combined. That gives you a sense of the magnitude of what we could do if we helped people eat healthier, just for cardiovascular disease alone."

As part of the Produce Prescription program, a small collaborative pilot study was carried out in 2022 whereby 50 adults with Type 2 diabetes received healthy food boxes weekly free of charge. The contents of the box were sufficient to create two meals per day, five days a week, for the entire household.

At the conclusion of the experiment, there was a 1.7kg average reduction in body weight, while blood lipids also improved.

"If we were able to sustain these kinds of changes, this could lead to a 12-15 per cent reduction in the long-term risk of cardiovascular disease in Australia. That could be tens of thousands of lives that could be saved," Dr Wu said.

He emphasised that weight loss was not the core goal of the study.

"Focusing on calories has never worked, we need to focus on the quality of the diet. We need diets which are culturally appropriate, nutritionally adequate, and include foods people want to eat," he said.

Springboarding from the positive results of the pilot program, the next step is a larger collaborative study involving 280 Type 2 diabetes patients across New South Wales. Half of the patients will receive a medically tailored meal program (produce prescription), while the remaining half will continue their usual clinical care. The trial will last for six months.

"We will be able to see how it all works in a longer timeframe to see if the impact of providing the produce sustainable, impactful, and cost effective from a healthcare point of view," Dr Wu said.

"Promising evidence is building around these Food Is Medicine programs, but we really need to continue develop the evidence. We need healthcare payers to step into this area, work with industry, and work with researchers to try to further develop these programs."

FOR MORE INFORMATION

Contact Jemma O'Hanlon at jemma@jemmaohanlon.com or Jason Wu at jwu1@georgeinstitute.org.au

The Produce Prescription pilot program research paper is available at pubmed.ncbi.nlm.nih.gov/36774107

Hort Innovation VEGETABLE FUND

The Annual Vegetable Industry Seminar 2022-2024 (VG21003) is a strategic levy investment under the Hort Innovation Vegetable Fund.

Project Number: VG21003

The Post-Covid Consumer: What Do They Look Like?

BY CLAIRE HARRIS

Consumer trends have been on a rollercoaster across the last few years, leading to a number of behaviour changes and patterns at physical and online checkouts across the country.

Marco Silva, from NielsenIQ, presented at the Annual Vegetable Industry Seminar (AVIS) in June and provided an insight into how consumer behaviours have evolved in the past three years in light of Covid-19 and inflation.

NielsenIQ is a global market leader in consumer research and market measurement, analysing consumer buying behaviour and revealing new pathways for growth.

"There was life as we knew it before Covid, but that seems like a parallel universe now," Marco said.

He said people often used to shop in smaller shopping trips at smaller stores, and while online shopping had started to pick up, it was nowhere near as popular as it has become today.

Inset. Marco Silva from NielsenIQ, presented at the Annual Vegetable Industry Seminar. *Image courtesy of Andrew Beveridge.*

"When Covid hit, shelves were empty and people were buying out of panic. Online was starting to move during that period. We had consistent growth in the online channel thanks to many shoppers buying online for the first time in their life and some of those habits have stuck," Marco said.

"Most recently, we have what we can call a cost-of-living crisis, and we have seen inflation for the first time in a generation in Australia, caused by lots of supply chain bottlenecks and also consumer demand.

"The tricky thing about inflation is once it starts, everyone tries to get their fair share and increase prices, which makes it difficult to control."

With a potential recession on the horizon, Marco said customers were already reacting to uncertainty that possibly lies ahead.

NeilsenIQ has run a customer segmentation, segmenting people into five different groups based on their feelings towards the cost-of-living situation – strugglers, rebounders, cautious, unchanged, and drivers.

The cautious group – people who don't yet feel an impact but are adopting a cautious approach to a potential recession – currently makes up more than half of Australia.

"It is the calm before the storm and people are preparing for something that could be bigger," he said.

"When we ask consumers how they are feeling about their financial situation, nearly half are worse off financially this year compared to before. They are feeling a cost-of-living impact.

"We also have one of every four Australians having only enough money for the basics. Consumers are concerned about food prices, housing costs, and energy price increases – these are all things which affect everyone."

Shopping Around

As food prices have increased, so too has the consumer trend to 'shop around' at different retailers in search of the best deal.

Marco said very few food retailers – if any – had exclusive shoppers, with 75 per cent of Australian consumers shopping with at least three different grocery retailers each quarter.

"Shopping around for the best deals is the number one strategy to manage budget – and it becomes increasingly more relevant as the kind of shopping trip comes from top-up shops rather than stock-up shops," he said.

Popularity of discounter retailers such as Aldi and Costco is also growing, with 250,000 Australian households shopping at discounters in 2023 who were not doing so last year.

As consumers are shopping around and shopping more frequently at discounters, they are increasingly looking for private label items.

"We are still very behind private label representation in Australia, compared to other countries," Marco said.

Private-label products equate to roughly 20pc of the market share in Australia, yet Marco said countries such as Germany and Switzerland were nearly double Australia's figure.

"Pretty much every household will buy at least one private label product on a quarterly basis, and we could see a slow but steady growth in this category in Australia over the next few years," he said.

Fresh Produce

Marco said popularity of fresh produce was not quite at the same level as other categories, with a few trends emerging.

Direct substitutes like frozen vegetables, frozen dessert, and canned vegetables and fruits growing faster than the fresh equivalent.

Food boxes and meal kits are growing strongly in popularity though, so there could be the opportunity for the industry to partner with companies that make those kinds of products, and offer more vegetables or fruits in the recipes.

Online shopping

The boom of online shopping post-Covid is well-known, yet Marco said there was still significant room for growth in the online buying of fresh produce.

Roughly 60 percent of households buy FMCG (fast moving consumer goods) online at least once a year, with the average spend being $110 per trip compared to $50 for a bricks and mortar shopping trip.

On average, people are buying FMCG online 15 times a year. Of those who buy online, fruits and vegetables make it into the shopping basket 12-13 times a year.

"Fruits and vegetables are still performing below overall FMCG, as there is still potentially a bit of a barrier surrounding perception of freshness or preference for a greengrocer, so there is still room to grow in that space," Marco said.

He said some fresh products, such as apples, had an online penetration figure of 20 percent – meaning they end up in one fifth of online shopping baskets – while others were much lower, such as pears sitting at 8 percent.

"There is the opportunity for major fruits to reach their fair share of penetration online, but also for smaller fruits to catch up with the others, and get into the basket," Marco said.

"If we can break some barriers and perceptions, such as perceived lack of freshness, there is a major opportunity for the fresh produce industry to have room for growth and penetration online."

Hort Innovation VEGETABLE FUND

The Annual Vegetable Industry Seminar 2022-2024 (VG21003) is a strategic levy investment under the Hort Innovation Vegetable Fund.

Project Number: VG21003

The Hidden Menace
Tackling Internal Fruit Rot in Capsicums

It's invisible, and you can't see it until it's too late; internal fruit rot is a significant problem for field-grown capsicum growers, as it remains unseen until the consumer cuts into the vegetable, leading to rejections by retailers and a loss of consumer confidence.

A levy-funded project, *Internal fruit rot of capsicum* (VG17012), has been exploring the problem since 2019, and has one season left to run. While the research has shed light on some factors affecting the prevalence of internal fruit rot in capsicums, project lead Dr Jenny Ekman of Applied Horticultural Research (AHR) *(pictured)* says the problem has been frustratingly resistant to treatment.

The Scope of the Problem

Internal fruit rot primarily affects field-grown capsicum, with protected cropping escaping its clutches. The issue is far from insignificant for field growers, however. Internal fruit rot, or internal mould, remains concealed within the seed cavity, rendering it invisible from the outside. This hidden menace prompts consumer complaints and retailer rejections.

"It's a really big problem," says Dr Ekman. "It only affects the seed cavity that you throw away and not the flesh at all, but the problem is that when the consumer cuts open the capsicum and finds fluffy stuff in the middle, they immediately complain to the retailer they purchased it from."

Internal mould infections can affect up to 25% of a field-grown capsicum crop, resulting in significant economic losses.

The Winds of Change

The first goal of the research project has been to unravel the causes of internal mould. Researchers have identified at least three fungal pathogens, including Alternaria and Fusarium species, that contribute to the problem.

"We believe that the infection occurs during flowering, so preventing it in something like capsicums where the flowering period is really long is an issue," explains Dr Ekman.

Investigations into infection mechanisms turned up one of the project's key findings. Unexpectedly, still wind conditions were found to correlate with a higher prevalence of internal mould. Contrary to initial assumptions, high wind resulted in fewer infections, and wind has proven to be the only environmental factor to have a consistent affect.

"We had a very wet season and yet there was no internal mould, which is not what we were expecting at all," said Dr Ekman. "Then we had a dry season and we got a lot of mould. So what we found recently is that whether it's hot, dry, cold, wet, that doesn't seem to matter – it's whether there's wind that's the critical factor."

Further investigation of wind's role in internal fruit rot is the focus for the final year of the project, and project provider AHR is considering using fans or strategically selecting crop locations to affect wind conditions.

Detection and Treatment

Detecting internal mould has proven challenging. Some growers have implemented near-infrared (NIR) scanning units to assess the fruit's interior, but this method is not foolproof. NIR technology can often mistake a physiological disorder called brown seed for internal mould.

"You can certainly detect internal mould with an NIR machine, but you're likely to throw out an awful lot of good fruit because it will also pick up fruit with brown seed," explains Dr Ekman.

Prevention is clearly better than cure, but that has proven just as challenging.

The research team has conducted numerous trials, testing various fungicides and plant defence solicitors, such as chitin, salicylic acid and gibberellic acid. Unfortunately, none of these treatments has exhibited significant benefits in controlling internal mould.

"These products are intended to turn on the plant's own defences so it's more able to resist the pathogen," Dr Ekman said. "None of them in our trials have so far shown any significant benefits."

Applying fungicides to cover the extended flowering period of capsicums is also proving difficult.

Where to Next?

The next step for the project involves more field trials, likely in Bundaberg and Bowen, where researchers will focus on measuring wind speeds within the crops and their influence on internal mould rates.

"We're going to try to do some heat mapping of a crop where we can look at plants in the centre of the crop, plants at the outside edges and then possibly increasing or decreasing the wind around those plants and seeing if that increases internal mould," says Dr Ekman.

As the project enters its final season, the team is determined to conclude this research on a high note and find practical solutions that growers can apply to mitigate the impact of internal mould.

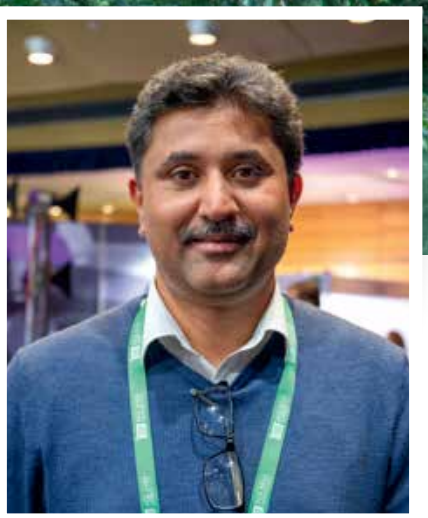
Above. Internal fruit rot of capsicum.

FOR MORE INFORMATION
Head to ahr.com.au/vg17012-internal-fruit-rot-of-capsicum

Hort Innovation VEGETABLE FUND

Internal fruit rot of capsicum is a strategic levy investment under the Hort Innovation Vegetable Fund.
Project Number: VG17012

Tracking and Cutting Down Microbial Contamination in Leafy Vegetables



In 2025 new food safety standards for leafy vegetables, melons and berries will be coming into effect. Developed by Food Standards Australia New Zealand (FSANZ), the new standard will regulate the production and processing of those crops in the interest of improving food safety for consumers.

Helping growers prepare for the standard is one of the goals of a new levy-funded project, *Identifying and managing the sources and routes of microbial contamination in leafy vegetables* (VG22002). The project is being run by the New South Wales Department of Primary Industries (NSW DPI) under their 'Safe Leafy Veg' initiative.

The New Standard

The origin of the new standard is in response to a number of high-profile microbial contamination events in Australia and internationally, explains project lead Dr Sukhvinder Pal Singh, known to most in the industry as SP.

"This standard has been developed by FSANZ to further improve food safety practices in the industry and to create a level-playing field for all growers with its implementation," Dr Singh explains.

Coming into effect from 12 February 2025, the standard for the vegetable industry is called the Primary Production and Processing Standards for Leafy Vegetables 4.2.8.

"All leafy vegetable grown and processed in Australia will be covered. The definition of 'leafy veg' for this standard is any vegetable of a leafy nature that is green and eaten raw, so it covers a whole range of commodities, including all types of lettuces, spinach, Asian vegetables, herbs, cabbage, spring onions, kale, chards etc".

Regardless of the scale of growing and method of production – field versus protected cropping, soil or hydroponic – this standard applies to all operations involved in commercial growing and processing of leafy vegetables.

"The standard also applies to processing of these, which means if you are trimming, sorting, washing or sanitising, that is all considered processing and falls under the standard," says Dr Singh.

Getting Growers Ready

Dr Singh's new project is largely aimed at getting the industry prepared for the new standard's introduction in 2025.

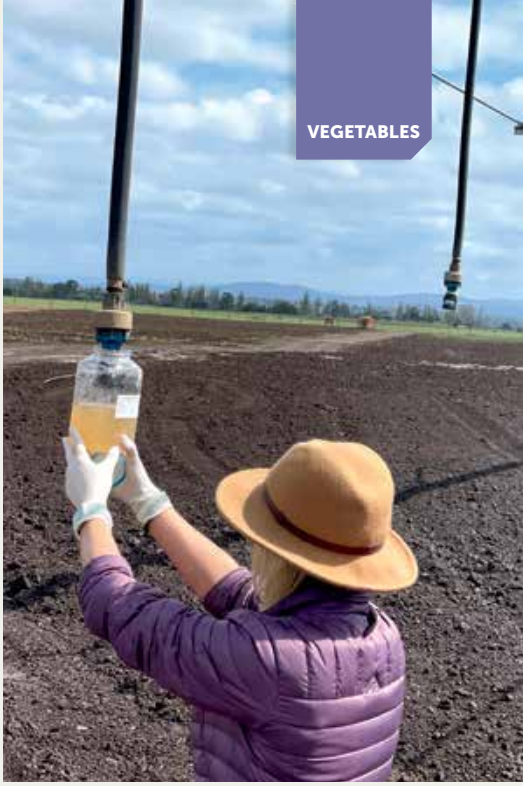
"Currently we don't know the nature and the magnitude of the microbial contamination risk, so this project is looking at how best we can define where those risks are and how big they are," says Dr Singh.

The project will be collecting data from industry to develop a national snapshot of industry practice to help identify areas which need improvement.

"Industry has been doing a great job in managing food safety risks on farm and post-harvest, so what we're exploring is the possibility of taking food safety to

Your participation will help shape future food safety guidelines and practices

Inset. Dr Sukhvinder Pal Singh is leading the project.



the next level in preparation for the new standard," says Dr Singh.

The project will examine the whole leafy vegetable supply chain to identify potential risks, from the farm through post-harvest to retail.

"We will be looking at the potential sources and loads of contamination that are currently unaddressed. We're looking at a range of pathogens, like *Salmonella, Listeria monocytogenes and Shiga toxin Escherichia coli (*STEC). The prevalence and distribution of these pathogens will be mapped in production and postharvest systems across Australia. The major focus will remain on microbial contamination routes via soil and water."

"Once we know the sources and routes of those microbial contaminants, we can address them."

The project will use the latest technology, such as pattern recognition and whole genome sequencing, to join the dots of where pathogens are sitting and how they are transmitted in the supply chain.

From Melons to Leafy Veg

This project looking at leafy vegetables follows a similar levy-funded project run by the NSW DPI in the melon industry, also led by Dr Singh.

The Safe Melons initiative has helped the melon industry reduce the incidence of microbial contamination significantly, and has been widely considered a success. Ongoing industry-led microbial surveillance is proving effective in real-time verification of food safety controls and best practice adoption. As a result, the melon industry has achieved zero product safety incidents and zero product recalls in the past five years.

Dr Singh's new project in leafy vegetables will follow the same research, development, and adoption model.

Grower Cooperation and Confidentiality

Grower involvement is an important part of the project, and the NSW DPI is acutely aware of the need for confidentiality for any information shared with the project by growers. More than 20 growers from major leafy vegetable production regions – Gippsland, Greater Melbourne, Virginia, Riverina, Lower Murray, Greater Perth, and Lockyer – have participated in the project so far and have received business-specific food safety advice.

"We are encouraging growers and processors to come forward and participate in the project and let the team come to their farm and packing operations, look at their practice and collect microbiological samples," Dr Singh says.

"By participating, you will gain access to the latest research findings and best practices in food safety. Your participation will help shape future food safety guidelines and practices. We respect your privacy, and any information provided will be used in full confidentiality and presented anonymously."

Any growers who would like to participate in the project can contact SP Singh at the details below.

Left. Jenna Hofman (L) and Amy Lesiow (R)- collecting samples from a lettuce field.
Above. NSW DPI's Amy Lesiow collecting a water sample.

FOR MORE INFORMATION
Contact Dr Sukhvinder Pal (SP) Singh on 02 4348 1935 or email:sp.singh@dpi.nsw.gov.au.

To read a copy of the new standard visit tinyurl.com/28ydw32m

Hort Innovation VEGETABLE FUND

Identifying and managing the sources and routes of microbial contamination in leafy vegetables is a strategic levy investment under the Hort Innovation Vegetable Fund. **Project number: VG22002.**

Data for Success

Ellement Produce is one of the first companies to embark on the *Level Up Hort Benchmarking Program.*

David Ellement is a vegetable farmer in Western Australia who for the past five years has been in the West Australian pilot business analysis and benchmarking program, Building Horticulture Business Capacity Program (BHBC). He and his brother Ben run Ellement Produce, a small-to-medium-sized business. They took over the family business as a partnership when their parents retired.

"Ben looks after everything off the concrete, and I look after everything on the concrete," explains David.

With a background in business management and consultancy to growers, including chief executive officer of the WA Wine Industry and 15 years as WA's vegetable industry development officer, he is well acquainted with accounting systems, spreadsheets and understanding figures. On the eve of the launch of the Hort Innovation-funded national *Level Up Hort Program*, we ask him how the program impacted his business.

When did you enter the BHBC Program?

I entered the pilot program in the second year of its six-year duration (2018). I was actually a little bit apprehensive when the program was first announced. Handing over your own information and having your business figures looked over by external eyes is quite confronting.

What has been the biggest win in being part of the program?

It sharpened us. It really made us make some hard decisions. All our cards were put on the spreadsheet. We could see where we were making money, where we were breaking even, where we were doing well and patterns emerged. We could see a clear path forward in the figures. It made us focus.

It's been described as a 3D view of your business where you can see the opportunities to drive your business forward.

Above. David Ellement, centre, with brother and business partner Ben and Planfarm's BHBC project lead Sophie Alexander. *Photography: Frances Andrijich / courtesy vegetablesWA.*

It's been described as a 3D view of your business where you can see the opportunities to drive your business forward.

That is correct, and it's definitely done that for us. I probably spend more time on finding those one-percenters to drive our business forward. And I probably always have. I run a lot of spreadsheets; I measure everything. It's just part of my business background. But this program gives us more rigour. It helps tie the whole picture together: the fixed costs of your business, the variable costs, the cost of all your lines, the return per hectare.

It really creates that big, holistic picture that allows you to find where you need to invest and how you need to address different areas of your business. We could identify our highest priorities to our lowest priorities.

How has it impacted how you run your business?

It gave us a chance to analyse every crop in detail – our production across our entire farm throughout the year. As we are just-in-time suppliers, we don't always take a pause and reflect on our business as required. There is no stop in vegetable growing. What this program does is make us pause once a year, analyse our business in detail and set up our business for the next 12 months.

How did you feel about your data going into an industry-wide analysis?

It was one of the big concerns for us. We didn't want our data handed over to other growers. But the way in which the data is collected and collated, it stays completely confidential. So, our intellectual property is protected, which I think is very, very important.

How important is the benchmarking side of the program?

One of the biggest things for us is setting ourselves targets and objectives. So each year we sit down with our consultant and look at our benchmarks and those of the industry. We talk over where we are at as a business, where the wider industry is at and what marks we want to hit. This process defines our goals and objectives.

What would be your tip for how other businesses should approach the program?

If you do get involved, you need to be involved. Don't sit on the sideline. I didn't actually put in the energy I needed to during the first year. I pretty much just sat back and gave the consultants the data I had. When the consultant came back and went through the analysis, it was better than I thought it was going to be. So during the second year, I provided more quality data. Then I got even more out of it. I do regret that I didn't do enough hard work the first year, and I missed an opportunity.

Having gone through the program is it something you will continue with?

Yes, we're continuing with it. We made that decision pretty quickly. We're out of the fully funded phase now in the BHBC program. We now pay a fee for that service, but we see value in it and it is viable. We wouldn't put our money into it unless we thought there was going to be a benefit. Level Up Hort is a fully funded national program over five years, so that's a huge win for the growers entering that program.

Hort Innovation VEGETABLE FUND

Hort Innovation ONION FUND

This multi-industry project is a strategic levy investment in the Hort Innovation Onion and Vegetable Funds

Project Number: MT22009

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.

The R&D Levy is payable on potatoes, vegetables and onions that are produced in Australia. This levy is 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 in the case of R&D –into strategic R&D initiatives.

How are levy investment decisions made?

Investments specific to Hort Innovation are guided by the 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 interest of the industry. The most important function of the SIP is to make sure that levy investment decisions align with industry priorities. In 2021, SIPs were refreshed to reflect the current needs of the respective industries. The refresh involved close consultation with growers, industry participants and the wider research community in each relevant sector.

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

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

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

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

The reports provide an overview of key achievements delivered through each levy investment, and how they relate to the industry's SIP outcomes and strategies. **While this performance report provides a five-year review of the vegetable SIP 2017-2021, going forward an annual performance report will be provided for the vegetable SIP 2022-2026.**

R&D LEVY RATES

Potatoes

48cents PER TONNE

Unprocessed Potatoes

Vegetables

0.485%

of the gross sale value at the first point of sale

Onions R&D AT

$2.90 PER TONNE

marketing at $1.00 per tonne

Hort Innovation POTATO – FRESH FUND

Hort Innovation VEGETABLE FUND

Hort Innovation ONION FUND

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

LEVY-FUNDED COMMUNICATIONS PROGRAMS

Australian potato industry communication and extension project (PT20000); *PotatoLink*. National vegetable industry communications program (VG22000)
Accelerating the adoption of best management practices for the Australian onion industry (VN21000)

	OUTCOME 1	OUTCOME 2	OUTCOME 3	OUTCOME 4
	Extension and capability	**Industry supply, productivity & sustainability**	**Demand Creation**	**Business Insights**
	To manage knowledge, relationships, systems and processes required to communicate effectively with internal and external stakeholders	To accelerate the application of production practices that optimise returns and reduce risk to growers	To maintain and strengthen consumer demand as the foundation for sustainable expansion of production and consumption in domestic and international markets	To deliver data and insights that is foundational to achieving success in the other three outcome areas of demand creation – supply, productivity and sustainability as well as extension and capability
POTATOES 	A change in knowledge, attitude, skills, aspiration (KASA) and practice for grower/industry profitability and sustainability through use of best practice and innovation. • Growers, value chain, media and governments being well informed on industry initiatives and achievements as a vital part of regional communities and networks. • Increased on-farm use of R&D outputs which will build a more resilient industry in addition to improved networks and cross-industry collaboration. • Proactive strategic and evidence-based decision making in businesses and for industry on investment, priorities and risk management.	Accelerating widespread use of existing and new R&D findings and proven management practices that will help growers to reduce the costs and impacts associated with pests, weeds and diseases. • Advances in productivity and biosecurity through a proactive and prepared industry. • 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. • Proactively monitoring potential crop protection regulatory threats and having access to a broader suite of effective, socially acceptable and environmentally sound crop protection solutions.	Support product positioning with consistent quality, evidence of beneficial product nutrition attributes and responsible industry production practices. • Identify and prioritise export and domestic market niches where there is demand and growth potential for competitive supply of quality Australian fresh potatoes.	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.
VEGETABLES 	A change in knowledge, attitude, skill, aspiration and practice for grower/industry profitability and sustainability through use of best practice and innovation • Maintaining and improving industry cohesiveness, with the majority of businesses and the industry supply chain actively engaged in implementation of this strategy; • Growers, supply chain, media and governments being well-informed on industry initiatives and achievements as a vital part of regional communities and networks; • Increased on-farm use of R&D outcomes that will build a stronger, more resilient industry – in addition to improved networks and cross-industry collaboration; • Proactive strategic and evidence-based decision making in businesses and for industry on investment, priorities and risk management.	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; • Responding to environ-mental change and climate variability; • Advances in biosecurity and the management of pests and diseases through a proactive and prepared industry; • Optimising the supply chain to improve quality and traceability, as well as reduce wastage and improve sustainability of vegetable production systems; • Improvements in protected cropping and intensive production technologies; • Proactively monitoring potential crop protection regulatory threats and having access to a broader suite of effective, socially acceptable and environmentally sound crop protection solution.	Grow the value of Australian vegetable exports by supporting industry to market premium products, targeting higher value market segments; • Articulate the value proposition for Australian vegetables and pursue more targeted market and channel growth opportunities; • Develop strong relationships across the supply chain with a shared goal to grow the category; • Enhance opportunities for value-adding and packaging; • Improve stakeholder engagement with the foodservice sector and the education of health benefits to consumers.	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.

	OUTCOME 1	OUTCOME 2	OUTCOME 3	OUTCOME 4
	Extension and capability	Industry supply, productivity & sustainability	Demand Creation	Business Insights
ONIONS 	Increasing knowledge, attitude, skills, aspiration (KASA) and practice for grower and industry profitability and sustainability through use of best practices and innovation • Maintaining and improving industry cohesiveness, with most businesses and the industry supply chain actively engaged • Growers, value chain, media and governments being well informed on industry initiatives and achievements as a vital part of regional communities and networks • Increased on-farm use of R&D outcomes which will build a stronger, more resilient industry, in addition to improved networks and cross-industry collaboration • Proactive strategic and evidence-based decision-making in businesses and for industry on investment, priorities and risk management.	Developing fit-for-purpose sustainable pest and disease management strategies • Biosecurity awareness and preparedness • Continuous improvement in soil health • Improved input management that reduces costs while maintaining yield and quality • Proactively monitoring potential crop protection regulatory threats and having access to a broader suite of effective, socially acceptable and environmentally sound crop protection solutions.	Broaden consumer awareness so that onions are more top of mind and purchased more frequently • Develop strong relationships across the supply chain with a shared goal to grow the category • Identify and prioritise domestic and international market niches (market segmentation) where there is demand and growth potential for competitive supply of quality Australian onions.	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.

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 twelve 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.

Minor Use Permits

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.

Permit ID	Description - Chemical / Crop / Pest or use	Date Issued	Expiry Date	Permit Holder
PER87164 Version 3	Dimethoate / Specified citrus / Various fruit fly species	01 Mar 2019	30 Sep 2028	Hort Innovation
PER81867 Version 3	Cyromazine / Various vegetable crops / Leaf miner	02 Dec 2019	30 Sep 2026	Hort Innovation
PER14038v3	Products containing copper / Various vegetable crops / Various diseases	01 Apr 2023	30 Jun 2028	Hort Innovation
PER10918 Version 4	Imidacloprid / Carrot, leafy lettuce, silverbeet and spinach / Greenhouse whitefly and aphids	30 Jun 2015	31 Oct 2026	Hort Innovation
PER81131 Version 4	Prochloraz present as the manganese chloride complex / Leafy and open-head lettuce / Anthracnose	02 Feb 2016	31 Dec 2028	Hort Innovation
PER86599 Version 2	Bifenthrin / Celery / Red legged earthmite	13 Dec 2018	31 Oct 2028	Hort Innovation

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.** 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 h**orticulture.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)** to confirm if there are MRL established by the Australia New Zealand Food Standards Code.

Current Projects

HORT INNOVATION VEGETABLE, ONION AND POTATO FUNDS

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

CODE

O Onion P Potato V Vegetable M Melon

O Onion International Study Tours - Inbound and Outbound

Vn22000

KEY RESEARCH PROVIDER: AUSVEG

What's 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.

O Optimising Chemical and Cultural Control of Onion White Rot

VN20007

KEY RESEARCH PROVIDER: ARVENSIS

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.

O Epidemiology and Management of Fusarium Basal Rot in Onions

VN20006

KEY RESEARCH PROVIDER: THE UNIVERSITY OF ADELAIDE

What's it all about?

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.

O Onion Nutrition Education Program for Health Professionals and the Food Service Industry

VN20002

KEY RESEARCH PROVIDER: BITE COMMUNICATIONS

What's it all about?

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.

OVM Multi-industry Export Program

Vegetables, Onions and Melons

MT21009

KEY RESEARCH PROVIDER: AUSVEG

What's it all about?

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

Current Projects

HORT INNOVATION VEGETABLE, ONION AND POTATO FUNDS

industry capability and achieve sustained export growth. This cross-industry collaboration is a first for the horticulture sector and will leverage the progress made under the Vegetable industry export program (VG16061).

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

The export program comprises the following activities:

1. Export skills and capability development
2. Market planning and market entry
3. Market engagement and trade facilitation
4. Market intelligence and trade expansion
5. Trade policy, protocol and risk management
6. Communication and industry engagement
7. Assistance, advice and resource development
8. Export strategy implementation

With differing export maturity of businesses across and within the vegetable, onion and melon industries, tailored approaches and pathways will be implemented.

OPV Industry Minor Use Program

Onions VN16000, Potatoes PT16005, Vegetables VG16020

KEY RESEARCH PROVIDER: HORT INNOVATION

What's it all about?

Through these projects, levy funds and Australian Government contributions are used to submit renewals and applications for minor use permits for the onion, potato and vegetables industries as required. These submissions are prepared and submitted to the Australian Pesticides and Veterinary Medicines Authority (APVMA).

For more information on minor use permits, and to see a list of all permits for the horticulture industry visit Hort Innovation website. The permit list is updated on a quarterly basis.

All current minor use permits for the industry are searchable at **portal.apvma.gov.au/permits.** Permit updates are also circulated in Hort Innovation's Growing Innovation e-newsletter, which levy-paying members receive monthly.

O Accelerating the Adoption of Best Management Practices for the Australian Onion Industry

VN21000

KEY RESEARCH PROVIDER: AUSVEG

What's it all about?

This investment ensures the onion industry is equipped with the information and resources they need to adopt best management practices. Onion growers will be brought into the existing VegNET 3.0 program for the vegetable industry to support increased awareness and adoption of R&D.

VegNET is a nationally-coordinated, regionally-delivered extension program that increases the industry's awareness of and engagement with best practices in high-priority areas. The program has regional development officers (RDOs) in ten key vegetable-growing regions around Australia.

A vital component of the program is the establishment of five regionally-based onion grower groups in Tasmania, Queensland, New South Wales, Western Australia and South Australia. The relevant RDO will work with each group to identify regionally-specific issues facing onion growers and work with them to host seasonal activities, including demonstration sites, field days, and grower walks.

A wide range of communications outputs will also be delivered to onion growers, including:

- The quarterly *Australian Grower* magazine, with dedicated onion content
- The AUSVEG Weekly Update e-newsletter, with onion content
- A range of onion-focused content such as videos, podcast, case studies, factsheets, media releases and social media
- An annual disease alert poster.

O Enhancing the Usability of Onions

VN22001

KEY RESEARCH PROVIDER: THE GROWTH DRIVERS

What's it all about?

This investment is providing the onion industry with short- and long-term recommendations to increase the use of onions in the foodservice sector.

The project team will engage with key suppliers and users of onions in the foodservice sector to evaluate their current use of onions and any barriers to using more onions. They will also scan relevant global research on successful strategies to overcome these barriers.

VO National Vegetable and Onion Benchmarking Program

MT22009

KEY RESEARCH PROVIDER: PLANFARM

What's it all about?

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.

Current Projects

HORT INNOVATION VEGETABLE, ONION AND POTATO FUNDS

CODE

O Onion P Potato V Vegetable M Melon

P Australian Potato Industry Communication and Extension Project

PT20000

KEY RESEARCH PROVIDER:
APPLIED HORTICULTURAL RESEARCH

What's it all about?

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.

V Internal Fruit Rot of Capsicum

VG17012

KEY RESEARCH PROVIDER:
APPLIED HORTICULTURAL RESEARCH

What's it all about?

Beginning in late 2019, this investment is investigating the causes behind internal fruit rot in capsicums and developing management techniques for growers to both prevent infection and minimise the risk of sending damaged fruit to market. Ultimately, this project aims to deliver capsicum growers with an integrated disease management strategy to control internal rot, as well as developing a predictive model that will help growers identify crops at risk and diagnose infection early.

Internal fruit rot can be a significant issue for capsicum growers, as although infection occurs during flowering, the disease can remain latent in the fruit until it starts to ripen. Once capsicums are harvested, development can accelerate, with fungal growth spreading into the seed and the edible flesh. As the disease cannot be detected externally, infected fruit can be sent to market resulting in waste and loss of consumer confidence. Several different fungi can cause the disease, including species of Fusarium and Alternaria, however it is unclear which are the primary organisms that are responsible for this disease in Australia.

VOP Nuffield Scholarships

VG14065, MT22003

KEY RESEARCH PROVIDER:
NUFFIELD AUSTRALIA FARMING SCHOLARS

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.

V Management Strategy for Serpentine Leafminer, *Liriomyza huidobrensis*

MT20005

KEY RESEARCH PROVIDER: QUEENSLAND DEPARTMENT OF AGRICULTURE AND FISHERIES

What's it all about?

This project is developing and delivering targeted R&D specifically for serpentine leafminer in response to the incursions detected in late 2020.

The project is building on the initial work of recently completed RD&E program for control, eradication and preparedness for vegetable leafminer (MT16004).

Areas of work include:

- Identifying and monitoring parasitoids
- Refining development and validation of surveillance and diagnostic protocols
- Using predictive forecasting to manage and assess the risk of serpentine leafminer
- Delivering an industry communication program
- Developing an industry management plan, grower guides and industry focused workshops.

VO Consumer Behavioural Data Program

MT21004

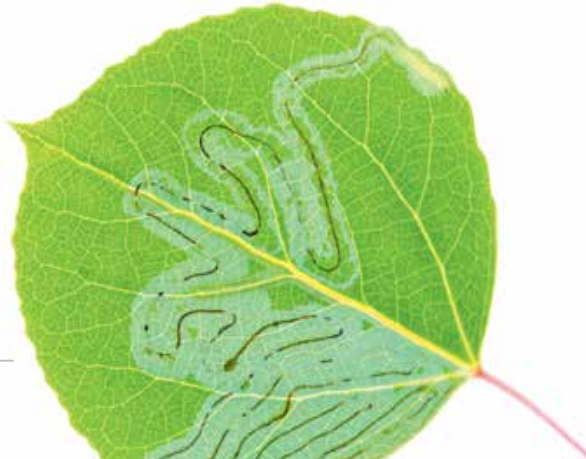
KEY RESEARCH PROVIDER: NIELSEN

What's it all about?

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 - **harvesttohome.net.au**.

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.



Current Projects

HORT INNOVATION VEGETABLE, ONION AND POTATO FUNDS

V National Bee Pest Surveillance Program: Transition Program
MT21008

KEY RESEARCH PROVIDER:
PLANT HEALTH AUSTRALIA LIMITED

What's it all about?

This investment is delivering a national coordinated bee-pest surveillance program to help safeguard honey-bee and pollinator-dependent industries in Australia. The National Bee Surveillance Program was established in 2012, supported by the previous ***National Bee Pest Surveillance Program*** (MT12011) and ***Enhanced National Bee Pest Surveillance Program*** (MT16005).

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

Several levy industries are contributors to the work, and the program is part of the Hort Frontiers Pollination Fund. Hort Frontiers is Hort Innovation's strategic partnership initiative, with more information available at **hortfrontiers.com.au**.

V Co-developing and Extending Integrated *Spodoptera frugiperda* (fall armyworm) Management Systems for the Australian Vegetable Industry
VG20003

KEY RESEARCH PROVIDER: QUEENSLAND DEPARTMENT OF AGRICULTURE AND FISHERIES

What's it all about?

This project will support the rapid co-development of an integrated fall armyworm management strategy that will deliver better outcomes for those regions currently affected by fall armyworm as well as for those regions that may experience an incursion in the future.

This investment seeks to provide the support needed by the Bowen, Bundaberg, Burdekin, Gumlu and Lockyer Valley vegetable industries, their advisory networks, support industries and researchers to capture, develop and use their experience of managing FAW on-farm in 20/21 and 21/22 seasons.

Through this investment, the vegetable industry will work closely with researchers to identify management gaps and trial a range of strategies on-farm. Outcomes from these trials will be shared with the Australian vegetable industry and will inform future fall armyworm research investments. This investment will work closely with project ***Identifying potential parasitoids of the fall armyworm, Spodoptera frugiperda, and the risk to Australian horticulture*** (MT19015).

VO VegNET 3.0
VG21000

KEY RESEARCH PROVIDER: AUSVEG

What's it all about?

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

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

VOP Horticulture Trade Data
MT22005

KEY RESEARCH PROVIDER: IHS GLOBAL

What's it all about?

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.

VOP Annual Vegetable Industry Seminar
VG21003

KEY RESEARCH PROVIDER: AUSVEG

What's it all about?

This project is delivering the Annual Vegetable Industry Seminars from 2022 to 2024 through a combination of in-person events, online webinars and video resources. All activities will be used to highlight outcomes from vegetable grower's levy investments.

As with previous investments, the in-person seminar will be run concurrently with Hort Connections while also providing access for those unable to attend in-person through digital platforms. This ensures the outputs from the project will cater to growers from around the country and from all backgrounds. The seminars and webinars will ultimately assist growers in increasing their profitability and efficiency by highlighting the latest global technology and innovations.

Current Projects

HORT INNOVATION VEGETABLE, ONION AND POTATO FUNDS

CODE
O Onion P Potato V Vegetable M Melon

V Vegetable Industry Communications Program
VG22000

KEY RESEARCH PROVIDER: AUSVEG

What's it all about?

This investment is responsible for effectively communicating the findings of levy-funded R&D and other relevant industry news, issues and data to vegetable growers and other industry stakeholders. The goal is to increase awareness of project outcomes and inspire on-farm adoption of new learnings and technologies.

Several regular communication channels continue to be produced and maintained by this project, including but not limited to:

- Weekly e-newsletter Weekly Update, sign up at **ausveg.com.au/news-media/subscribe-to-ausveg/**
- Quarterly *Australian Grower* magazine, with current and back issues available at **ausveg.com.au/news-media/publications**
- Social media updates in AUSVEG channels
- Media relations for R&D-related news
- Videos and podcasts
- New online hub as a 'one-stop-shop' for vegetable growers to access information on research outcomes, industry news and events, and VegNET-related activities
- Quarterly R&D case study packages that will be used in articles, videos, podcasts, social media, and media releases

This investment will also translate key R&D articles into languages other than English, including Vietnamese, Khmer, Mandarin, and Arabic, to engage a diverse range of vegetable-growing communities.

VOP Soil Wealth and Integrated Crop Protection - Phase 3
MT22004

KEY RESEARCH PROVIDER:
APPLIED HORTICULTURAL RESEARCH

What's it all about?

The Soil Wealth and Integrated Crop Protection program assists melon, potato and vegetable growers to improve the management of their soil and crop health, to drive their productivity, profitability and sustainability on-farm.

Building on the success of the previous investment ***Soil Wealth and Integrated Crop Protection – Phase 2*** **(VG16078),** the new project will focus on:

- Soil health, which underpins sustainable farming systems and the production of healthy crops. Improving soil management practices will assist vegetable growers to have a more productive and resilient natural resource base with a focus on soil care, increasing organic material and improving grower margins.
- Crop health, driven by improved soil health and crop protection measures. Improving crop protection management practices will assist vegetable growers to produce healthier and more profitable crops through managing insects, diseases and weeds to maintain healthy plants.
- Optimising inputs for healthy soils and crops, and profitable vegetable businesses. Increasing skills in the effective use of nutrients, water, chemicals and other resources (e.g. plastic to minimise waste) will assist vegetable growers to maintain market advantage and demonstrate sustainability.
- Carbon and climate. The climate influences what, when and how soil and crop health can be managed, including associated input use. Increasing awareness of changes in climate, both in extremes and longer-term averages, will be important for adapting production systems. Understanding the role of carbon will assist vegetable growers to remain profitable and sustainable into the future.

V Identifying and Managing the Sources and Routes of Microbial Contamination in Leafy Vegetables
VG22002

KEY RESEARCH PROVIDER:
NSW DEPARTMENT OF PRIMARY INDUSTRIES

What's it all about?

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

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

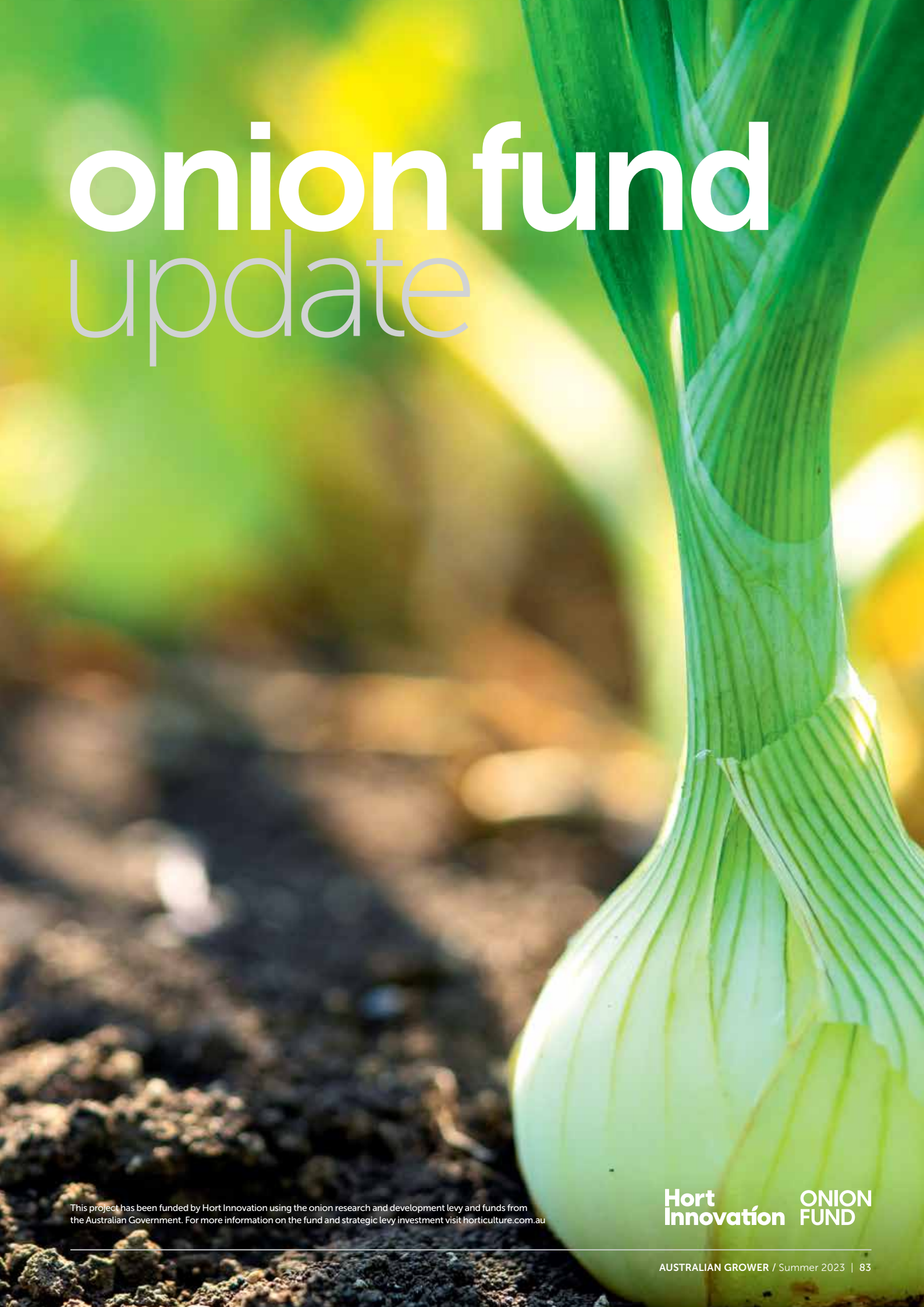
Known as 'Safe Leafy Veg', the initiative is founded on an innovative research, development and adoption model that has already proven effective in other Australian horticulture industries, such as melons.

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

Knowing the potential sources and routes of contamination is the first step towards any risks. The project will provide an independent review of current industry practices and monitor the critical food safety practices during production and postharvest processing. An understanding of 'the most critical gaps' in industry practice and implementation of 'the most effective measures' will ensure food safety risks are managed effectively.

Industry-led microbial surveillance will be undertaken as part of the risk management activities. The primary purpose of surveillance is to empower the growers to lead and manage their food safety by providing timely, data-based evidence and scientific support. This process will also allow the identification of hotspots for microbial contamination in the production and supply chain. These hotspots will become the target of best practice interventions. Other industries (such as melons) have successfully used microbial surveillance to verify and monitor the effectiveness of preventative food safety controls.

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

Hort Innovation ONION FUND

Driving Onion Culinary Inspiration and Nutrition Awareness among Health and Culinary Professionals

The Hort Innovation onion nutrition education program for health professionals and the food service industry (VN20002) has continued building momentum over the past six months. Designed to improve the awareness, knowledge, attitude and culinary uses of professionals regarding the nutrition and health benefits of onions, the program encourages recommending onions to their patients, clients and patrons as part of a healthy and nutritious diet, ultimately helping increase onion consumption.

Above. Head Chef Arin Ellis from Camperdown Commons finishing caramelised onion, Gorgonzola cream and walnut calzone served straight from a wood-fired oven.

The program is in its third year and continues to strengthen connections with health and food service professionals. The program has an amazing breadth of activity, as can be seen from the following overview of activity in the last six months:

The Australian Onions digital hub has been built up with content during the course of the program and now houses a comprehensive library of educational resources and evidence-based research and information on the health and nutrition benefits of onions.

The food service section of the digital hub contains inspiration on how to feature onions as the hero in a wide range of dishes and demonstrates how to include onions in many recipes and menu offerings.

The digital hub also provides a suite of tools to directly support members of the Australian onion industry. Visit the hub australianonions.com.au/health-professionals and click on the Industry Portal button to access the password-protected industry section of the website (the password is AOIP). Search for new ideas and inspiration regarding the wonderful health and nutrition claims that can be made about onions. The health claims in this document are consumer-friendly versions of officially permitted claims that comply with the Australian New Zealand Food Standards Code.

Another core program activity is the representation of Australian Onions at health professional conferences across the country. Australian Onions created a trade exhibit at its second trade exhibit at the General Practice Conference and Exhibition (GPCE) on 19-21 May 2023 at Sydney's International Convention Centre. Australian Onions showcased the Onion digital hub along with a raft of new educational and patient resources.

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The conference was well represented with more than 800 general practitioners attending during the three-day meeting.

Nearly 300 GPs signed up to our digital e-newsletter and more than 3,000 hard copies of the new onion information resources where distributed. Delegates were also treated with culinary inspiration and taste testing of some newly created onion recipes for onion relish, pickles and dukkha, by chef Tawnya Bahr - Straight To The Source co-founder.

The second onion *'Farm to Plate Farm Tour'* curated by Straight To The Source with a group of influential nutrition and culinary professionals took place at Mitolo Family Farms in South Australia last month. The Mitolo team showed us first-hand how onions are grown and exactly what it takes to get this humble hero from farm to fork – harvested, graded, packed and delivered fresh to retailers.

The team learned how to enjoy 75 grams of onion every day with a range of creative and innovative usage ideas. Catch some inspiration and insights in our video from the day. See more at australianonions.com.au/food-service/news-and-events/farm-tours/

Above. GPCE Conference, May 2023. **Below L-R.** Virgin Bloody Mary with pickled onions. Burnt Onion Caramel Chocolate Mousse. Leading Australian ferment expert Holly Davis presenting on flavour and zero-waste with onions.

Our fourth food service industry onions workshop took place recently at the unique inner west Sydney venue called Camperdown Commons where we delivered a dynamic and hands-on Australian Onions workshop for some of Sydney's leading chefs. Head Chef Arin Ellis from Camperdown Commons - along with fermenting expert Alex Howery-Smith from Cornersmith Cafe & Picklery, and chef Tawnya Bahr from Straight To The Source - inspired our guest chefs with unique ways to showcase onions on their menus.

FOR MORE INFORMATION
Contact the program visit australianonions.com.au/health-professionals or contact Bite Communications Program Manager, Penny Eustace, via penny@bitecom.com.au

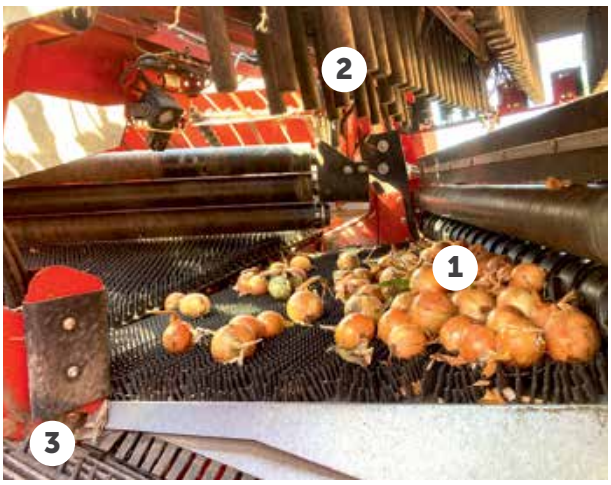
Hort Innovation ONION FUND

This project has been funded by Hort Innovation, using the onion research and development levy and contributions from the Australian Government. Hort Innovation is the grower-owned, not-for-profit research and development corporation for Australian horticulture.
Project: VN20002

Interchangeable Separator called 'ChangeSep'

Complete flexibility with the choice of a second separator

When using the 'ClodSep', it is still possible to use the trash conveyor.



View onto the second separator. When using the 'EasySep' **(1),** the rubber fingers of the 'ClodSep' **(2)** can be lowered into the crop flow to achieve a more even distribution of the potatoes resp. onions on the following picking table **(3).**

Reflecting changes in consumer demand, farmers have diversified their crops and production processes in recent years. In addition to growing a wide range of potatoes for various uses (fresh and processed products), there is increasing production globally of onions and other vegetables.

In addition to the progressive specialisation and expansion of farms, cultivation is taking place on more and more areas and different soils. As a result, the requirements regarding the variability of options within commercial potato harvesters are growing. The focus is particularly on specific separators, for which there has been no practicable solution up to now for switching between deflection rollers and finger webs.

The hydraulically interchangeable separator 'ChangeSep' enables a convenient change of the second separator on modern GRIMME harvesters with two separators, such as the EVO 290. Within less than two minutes, the changeover between finger web ('ClodSep') and deflection rollers ('EasySep') can be carried out hydraulically from the cabin. The levelling adjustment of the first and second separator is still possible without restrictions. In addition, the speed of both separators can be adjusted individually and continuously, allowing the harvester to be adapted to the different conditions and crops at any time almost without compromise.

Thanks to the TerraControl intake with half diablo rollers, which can be used to pick up potatoes from the ridges and windrowed onions, the potato harvester can be converted into an onion harvester at the push of a button. Without any additional assembly work required on the crop-intake or the separator.

The road transport width does not change due to the new type of separator. In addition, the integration of both separator types in one machine enables better remarketing of stock and used machines.

The new ChangeSep is already in use on a GRIMME EVO 290 and will be used extensively on other trailing harvester models this season.

FIND OUT MORE
For more information Landpower Vegetable Centre - Product Manager, Haydon Martin
Phone. 0447 184 250. vegetablecentre.com

Compostable Net Bags Now Available for Fruit & Veg

The well known net bag commonly used for onions, avocados and citrus is set to have a makeover with the introduction of compostable netting.

The use of knitted net bags for fresh produce has been around for decades, particularly in the meat industry for products such as the Christmas Ham and smallgoods. For fruit and vegetables, net bags have been a mainstay for retail for customers wanting to purchase pre-packed bulk items such as five avocados, or a dozen onions.

Traditionally made from plastic, the fruit and veg net bags are now available in a compostable material.

Plastic net material has been a bane for many growers keen to lower the use of plastic in their product offering to retail, with no other material on offer.

With the forthcoming Covenant on packaging to reduce plastic by 2025, Ennio International recognised that the plastic netting – a single use plastic item – is on the way out.

Importing the compostable yarn, Ennio have the capability to produce net bags for fruit and vegetables, and have full Australian accreditation for its compostable status.

PLASTIC STATS

1 Million Tonnes
of Australia's Annual Plastic Consumption is Single-use Plastic

84% of all Plastic used is sent to Landfill

Required by 2025
70% of Plastic Packaging to be Recycled or Composted

"To be accredited, the product needs to comply with Australian standards that are the most stringent in the world," said James Mercuri, general manager of Ennio International.

"Firstly, it needs to break down within 180 days to meet the Home Compostable standard or 12 weeks to meet Commercially Compostable standards. It then needs to pass what is referred to as the 'worm test' which means that no toxins are released into the soil that will adversely affect worms so it is safe for our soils. The soil is also checked for the presence of any heavy metals. The product we are manufacturing passed those tests with flying colours."

The net bags are suitable for both commercial composting, and for home compost systems. Made from a cellulose wood pulp, it has the same strength and integrity as its plastic equivalent. The wood pulp is sourced from sustainable forestry timber, in keeping with the sustainable approach of the product.

The net bags can be integrated into standard packaging lines, however, heat shrink systems for labels and seals, will damage the netting. Ennio offer packing equipment to suit those packers who use heat shrink systems.

"The plastic net bags that we are familiar with tend to be bright, shiny colours and artificial, but the compostable ones will be a natural colour, in keeping with its plant-based origins. We have trade marked a new weave pattern – a leaf shape – to reflect the fruit and vegetables that it contains.

"For growers and packers, there is scope to use the compostable bags not just for reduced plastic use, but also as a marketing point of difference.

"We have seen when plastic cutlery and straws were phased out that some customers preferred to get their take out meals or coffee only from cafes that supplied compostable cutlery, coffee cups and straws, so we see that this will have the same attraction.

"It has been a long two years to gain accreditation, but we are proud that Australian fruit and veg consumers can now have the choice to buy produce in a compostable bag."

Who is Ennio International?

Ennio International is a third generation netting manufacturer, based in South Australia. The company was started by Italian immigrants as a fashion knitwear company, but as clothing tariffs were removed, the company transitioned into netting for the meat industry.

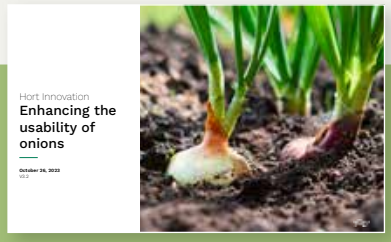
During the pandemic, the company was able to provide mask manufacturers with the loops to keep up with soaring demand.

The introduction of compostable net bags for the fruit and vegetable industry, is the next step for the company as a proud Australian owned endeavour.

Above. Ennio compostable vegetable net bags on display.

FOR MORE INFORMATION
Visit enniofruitennveg.com.

The Import Market Share of Onions in Foodservice



2022/23 by the Numbers

266,428 Tonnes
Australian Onion Production

$240m Revenue

6,334 Tonnes
Imported Fresh/Chilled Onion

4,570 Tonnes
Imported Dried Onion
Principally Country of Origin: USA, the Netherlands

9%
Imports in Domestic Supply

Enhancing the usability of onions (VN22001) aims to clarify the potential of Australian onion products to capture market share currently held by imports.

Australian onion growers may be able to replace imports of fresh processed and dried onion products, according to recent research, but successfully displacing imports will take commitment to the opportunity from growers and buyers alike.

Recent research conducted by The Growth Drivers to gain insight into food service and manufacturing supply chains, plus quantitative data on trade data and commodity pricing trends, aimed to give clarity on the presence of imported onion products in Australia.

Overall, the investigation showed that Australian onions held a commanding position in the market, however, the used of imported onions are 'unequivocally price driven and often transient', leading to larger businesses to opt for imported onions as a longer term strategic decision.

This project is primarily centred on evaluating the usage of imported onion products among major suppliers/users within the foodservice and manufacturing sector. The project's focus is directed towards value-added onion products, which encompass the entirety of imported products classified under HS code 071220, 'Dried onions, whole, cut, sliced, broken, or in powder', as well as 78 percent of products under HS code 070310, 'Fresh or chilled onions and shallots'.

By understanding the characteristics and preferences of import users, it gives an insight into potential opportunities and the barriers to local producers.

Imported Onion Formats

Whole Onions – Skin on
Primarily from US, the Netherlands, China
Shelf life 2-3 month

Whole Onions - Peeled
Import ban China
Shelf life Short

Individual Quick Frozen (IQF)
Fully processed, sliced or diced
Frozen at -40°C, transported at -20°C
Retains flavour and texture

Dehydrated/Dried Onions
Shelf life Long (4-12+ months)
Granulated, flaked or powdered

Quantitative and Qualitative Insights

The volume of imports for fresh or chilled onions is predominantly found to be sourced from China, however with a lack of data regarding the value of onions grown in Australia entering the processing supply chain, it is difficult to judge the price differential between locally produced and imported product. The report suggests it could be 38% cheaper to use onions imported from China.

Analysis of trade for the past eight years indicates that a steady supply of 2-6 tonnes annually from China is typical and rebounding well after a downturn driven by COVID-19. As a market, Australia is ranked 11th for China exports, which focus more on the markets of Vietnam and Japan.

Further, the value available for domestic production and sales of onions within Australia suggests that Australia is more than capable of satisfying the current demand met by imports and likely to be more lucrative for Australian growers.

For dehydrated onion products, the majority of imports are sourced from China, however India commands a higher unit value for the same commodity.

The key findings from trade data suggest that:

- The majority of the market share for onion products (fresh and processed) is Australian grown;
- To match imported product (excluding processing costs), Australian products would need to be at least 38% cheaper;
- Imports hold a larger market share for dehydrated products than fresh or chilled onion products.

From a qualitative perspective, country of origin is important to local foodservice channels. Quality and flavour are also contributing factors, particularly in the ready meal sector where meals are reheated and the integrity of reheated onion is valued.

The use of whole-peeled onions offers a lower labour cost for processing using imports, and an attractive proposition for volume users. Price, however, remains the primary driving force for using imports over locally grown onions, whether fresh, chilled or dehydrated.

Opportunities for Australian Growers

1. **Optimising production costs**
   The researchers suggest that production costs may be improved through the introduction of automation to identify quality issues such as mechanical damage, disease issues (fusarium, mould) and out of spec onions.
2. **Strengthen industry collaboration and leverage tools for value agreements**
   Establishing long term contracts may bolster the position of Australian processors to compete against IQF imports.
3. **Developing and marketing new products for targeted use cases**
   - Australian growers do not currently grow onion varieties specifically for the dehydrated market;
   - Other options may be to explore breeding and marketing strategies to cater to distinct usage scenarios.
4. **Future farm credentials**
   Consumer expectation on quality and social license is increasing across many sectors particularly in sustainable practices and anti-slavery.

The research key recommendations suggest four avenues:

1. Establish a means to monitor changes in market share of imports and the differentiation between fresh, chilled and dehydrated onion products.
2. Improve knowledge sharing and communication through collaboration between supply chain members to better understand weak market signals that could translate into opportunities.
3. Ensure processors are considered in research, many of whom utilise second grade onions that will be an important revenue stream for growers.
4. Better understand import macroeconomics and how it affects the importer market in Australia and the forces that shape the industry.

FIND OUT MORE
For more information on how Hort Innovation invests grower levies, visit horticulture.com.au/growers/onion-fund

Hort Innovation ONION FUND

This project has been funded by Hort Innovation, using the onion research and development levy and contributions from the Australian Government.
Project: VN22001

Round the Grounds in Onions

Herbicide resistance remains a challenge for onion growers across Australia, find out how the Onions Communications & Extension project is supporting growers to combat this issue.

Above L-R. Agronomists Rob Snare, Sam Jones, Naomi Palombi discuss onion issues. Pub in the paddock discussion George Griffin property.

Input and feedback from regional grower groups is essential for the *Onions Communications and Extension project* and enables growers and industry to have input into how their levies are invested. As part of the needs analysis completed earlier this year, herbicide resistance (particularly in nut grass, ryegrass, and oxalis) was identified as one of the biggest issues for Australian onion producers.

A Tasmanian onion grower group met at Forthside vegetable research station in November, with Ian Layden, Queensland Department of Agriculture and Fisheries giving a presentation on weeding machinery options for Australian onion growers including autonomous, spot spraying, laser weeding and mechanical machines.

Weeding machinery offers new and exciting ways to manage weeds which is especially important in onion crops due to their poor competing ability and herbicide sensitivity. Growers discussed the options and concerns and were able to get a great overview of the different options available.

In the afternoon, growers and agronomists attended a 'Pub in the Paddock' event. The event was held in an onion paddock in Boat Harbour with known ryegrass resistance issues.

We had a great turnout and an interesting and informative discussion on the complexity of managing herbicide resistant ryegrass, particularly in onions.

Peter Boutsalis from Plant Science Consulting gave some great insight and local agronomists Sam Snare and Rob Jones added an important local perspective. This event really highlighted that managing resistance must be multi-pronged and farm specific. It also showed how quickly ryegrass can become a serious issue, especially given one plant can produce tens of thousands of seeds. The importance of strategic rotations in resistance management was also emphasised.

Our last 2023 onions event was on the 27 November in Murray Bridge, SA. Presenting on the day was renowned US researcher Lindsey du Toit to discuss her project 'Stop the Rot' and how her research and experience in American and South African onion production systems can be applied to the South Australian onion industry.

Lindsey has 23 years of experience in plant pathology and is a professor at Washington State University, and most recently being appointed chair of WSU's Department of Plant Pathology. Dr Sam Kleemann from Plant Science Consulting also presented herbicide pot trials displaying the efficacy of herbicides on South Australian ryegrass and the importance of managing weeds in non-onion crops.

Hort Innovation ONION FUND

FOR MORE INFORMATION
For more information on the Onion C&E project contact: Grace Winkler Engagement and Extension Support Officer, grace.winkler@ausveg.com.au

This project is a strategic levy investment in the Hort Innovation Onion Fund.
Project: VN21000

Onion Fund Annual Report 2022/23 Snapshot

Here are some highlights from what was delivered during the year:

2022/23 by the Numbers

$1,290,678
Invested in R&D

$141,275
Invested in Marketing

$1,000,666
In Levies Collected by the government and passed on to Hort Innovation for Investment.

Onion growers are being equipped with the resources needed to adopt best management practices through the inclusion of the onion industry in the VegNET program – a nationally-coordinated, regionally-delivered extension program – for more see hortinn.com/vn21000.

Development of more effective integrated pest and disease management strategies for diseases such as onion white rot see hortinn.com/vn20007 and fusarium basal rot see hortinn.com/vn20006.

New research into how to increase the use of onions in the foodservice sector involving engaging with key suppliers and users of onions – read more at hortinn.com/vn22001.

Support for future leaders in the onion industry through investment in a People Development Strategy see hortinn.com/mt22002 and a 2024 Nuffield Australia Scholarship see hortinn.com/mt22003.

Involvement in a multi-industry effort to develop and deliver targeted R&D for serpentine leafminer, in response to incursions detected in 2020 – see hortinn.com/mt20005.

Investigation into developing a national surveillance and diagnostic framework for soilborne pathogens of vegetables, melon, onion, potato and sweetpotato is underway – see hortinn.com/mt21016.

Collaboration between the melon, onion and vegetable industries on an export program to build export capability and capacity – see hortinn.com/mt21009.

Access to consumer insights through multi-industry investments to understand consumer behaviours, attitudes and purchase intentions – see horticulture.com.au/onion-fund.

Support for the National Bee Pest Surveillance program to help safeguard honey-bee and pollinator-dependent industries in Australia – read more at hortinn.com/mt21008.

Delivery of evidence-based information about the health benefits of onions to health and foodservice professionals in Australia – see hortinn.com/vn20002.

The onion Harvest to Home dashboard providing regular household purchase data and insight reporting at harvesttohome.net.au.

Visit horticulture.com.au/onion at any time to access information on new, ongoing and completed projects, and to download resources produced by levy investments. From the Onion Fund page, the Annual Investment Plan 2023/24 is also available which includes details on current and proposed investments, as well as key financial information and a five year forecast.

Hort Innovation ONION FUND

Onion Marketing Campaign

The onion marketing plan was designed to inspire people to create dishes that stimulate the senses and taste buds, and showcase onions' unique benefits – taste, health, affordability and versatility.

The consumer goal was to shift consumers' usage of Australian onions from being a base ingredient in dishes, to more of a feature ingredient, and in doing so driving category volume growth.

The campaign had three strategic pillars underpinning all activities:

- Build brand love
- Build health credentials and education
- Inspiration for meal occasions

Achievements

- Earned media opportunities delivered 27 million+ opportunities to hear or see messages inspiring Australians to buy and to eat more onions.
- Social media and influencer engagement delivered more than 11 million opportunities to hear or see messages inspiring Australians to eat more onions.
- Media partnership with Mum Central reached 950,000+ mums and generated 9300 clicks to the Australian Onions website.

Onion SIAP Refresh

As part of the Hort Innovation's recent reset of advice mechanisms, the refresh of the Onion Strategic Industry Advisory Panel (SIAP) was completed in November 2023 with nine industry representatives selected for the panel moving forward.

The onion industry advisory mechanism was agreed to and laid out in the Memorandum of Understanding (MOU) signed between Onions Australia and Hort Innovation and now AUSVEG as the Peak Industry Body (PIB) for the onion industry.

A co-design process was undertaken between Hort Innovation and each commodity PIB to develop an advice mechanism that is fit-for-purpose for industry while also meeting Hort Innovation's governance requirements.

Each advice mechanism was designed to meet the following principles:

- Clearly defined governance arrangements.
- Engagement and consultation with a wide range of levy payers.
- Identification of RD&E priorities using a matrix that takes into consideration relevant strategic industry statements.
- Consideration of a balanced portfolio of RD&E.
- Allowance for collaboration across industries where the same RD&E priorities have been identified.
- Utilisation of timely, accurate financial information regarding levies.
- Provision of advice in a timely, professional and cost-effective manner.
- Communication methods for RD&E priorities back to levy payers
- Co-ownership of the refreshed advice mechanism between PIBs and Hort Innovation.
- Moving forward, Hort Innovation will conduct pulse checks of the advisory models to ensure each mechanism remains relevant and fit-for-purpose.

The Onion SIAP recruitment panel made up of a former Onions Australia Board Member, AUSVEG Board Member and Hort Innovation representative interviewed candidates who submitted their Expression of Interest earlier this year.

The refreshed Onion Strategic Investment Advisory Panel (SIAP) includes the following industry representatives:

- **Tim Groom**
  Wynyon, Tasmania
- **Scott Hill**
  Sumich, Tasmania
- **Jarryd Dolling**
  Dolling Produce, South Australia
- **Renee Pye**
  Zerella Fresh and AUSVEG,
  South Australia
- **Josh Tselekidis**
  The Mitolo Group, South Australia
- **Lauren Patane**
  Patane Produce, Western Australia
- **Lisa Mengel**
  Moffats Fresh Produce, Queensland
- **David Moon**
  Moonrocks, Queensland
- **Michael Rettke**
  SARDI (NHRN representative),
  South Australia.

Hort Innovation ONION FUND

FIND OUT MORE
For more information on how Hort Innovation invests grower levies, visit horticulture.com.au/growers/onion-fund

export+ trade update

International Business Innovation Mentoring Program

CASE STUDIES

The International Business Innovation Mentoring Program (IBIMP) included in the Multi-Industry Export Program (MT21009) aims to support Australian vegetable, onion, and melon growers with one-on-one mentoring and direct strategy assistance that strengthens business innovation, value adding and international trade opportunities.

The program is designed to run for three years, from 2022 to 2025, and a limited funded positions available each year for this strategic focussed program. Growers can gain access to 12 months of service and assistance through support activities to achieve strategic milestones for the business once registered.

The primary objectives of the program are focused on:

- Assistance with innovation and value adding opportunities post-harvest
- Receiving strategic advice and support on international marketing, sales and branding strategies
- Identifying potential export opportunities that significantly expand your business that improves your bottom line while improving risk management
- Upskilling your business to export directly
- Uplifting business, market and customer engagement skills
- Leveraging data with commercial support that turns ideas into actionable business plans
- Provide assistance from cross leveraging opportunities that promotes reciprocal trade strength
- Entrepreneurship guidance to personal mindset development and growth
- Overcoming the challenges of Covid-19 and getting back to business

A total of five growers have received the support from IBMP at the conclusion of year one of MT21009, profiled are Arahura Farms, Dicky Bill, Moonrocks and Zerella Fresh.

Arahura Farms

SWAN HILL, VIC

Sean Croft is the General Manager for Arahura Farms. Sean and his family have been growing organic vegetables in Swan Hill for over 15 years, producing organic carrot, celery, beetroot, and other commodities for the Australian retail market as well as the export markets.

With the rapid change in the organic market landscape in Australia, Sean has engaged the IBIMP Program to provide support to his business for a breakthrough in the international innovation space.

"The organic market landscape in Australia is changing quickly. We identified the need for business advice, mentoring and innovation on how to adapt to the current landscape locally and internationally, with the hope to anticipate and tackle what is coming in the future, especially in the organic markets," he said.

"Working with the IBIMP Program enabled us to get on the front foot with new product strategies for domestic and international markets utilising a fresh set of eyes and objective analysis from someone outside our business. We have been so busy on the day-to-day operation and this support was refreshing to help us to work through the challenges and opportunities".

During the 12 months of support, the program delivered a few step changes for Arahura Farms, including the development of a diversification strategy for domestic and international markets, as well as the execution of new products developments that suit local and export markets. Other critical aspects were taken into consideration, such as international marketing and product positioning, international consumer and market insights and a refreshed, fit-for-purpose risk management plan for the business.

"The new products we are developing now, and hope to be in market in 2024, is an exciting time for our business. We now realise the importance of business innovation, through having an external support during our business transition and a guidance for the step changes we have needed."

Arahura Farms is planning to execute their innovation road map for export markets in the next 12 months with their new product offerings.

"Export has always been on our radar, and we have been exporting periodically in previous years. The organic fresh produce market share in international markets has increased over the years, but it is still considered a niche market for organic fresh produce growers. The steep price for organic produce is the main hurdle for us. However, we are confident that we will be able to offer our new products to international markets utilising greater scale, once we have cemented the new offerings with Australian retailers, with the confidence in repeat sales is accomplished."

"The support we received through the program brings a wealth of knowledge around product innovation, development, and R&D marketing. Having this support available to help guide us through a due diligence stage right through to packaging design and international marketing plan has been instrumental. I highly recommend the program and encourage growers that are seeking to diversify their business to enrol into the IBIMP program".

Dicky Bill

MAFFRA, VIC & DRINAN, QLD

Ryan and Tahirih McLeod are Directors of Dicky Bill, a vertically integrated farming and processing company that delivers value added fresh cut salad products to retailers, wholesalers, manufacturers, and food service companies both nationally and internationally.

Dicky Bill runs two operations across the country, with one operation based in Maffra, Victoria and another one based in Drinan, Queensland.

"We were going through a re-direction of our business, after a recent business ownership restructure when the IBIMP program was introduced to us. In fact, the support we received from the program came at a very pivotal time in business operations, having access to external business support as a peer and mentor, has assisted us greatly into rethinking the way we run our business and make changes in our product development," Tahirih said.

"Most of our conversations and discussions were difficult, but the program has greatly assisted us in defining what is important to the success and growth of our business for our domestic and international market customers. These discussions enabled us to develop clear strategic plans for execution, and have already seen significant positive outcomes."

Dicky Bill has been supplying pre-packaged and value-added fresh cut salad products to domestic and international markets over the years. As the market landscape has evolved rapidly, the business has quickly adapted to the change in consumer preferences.

"The support from the program has provided us with the confidence to initiate supply conversations with multiple retailers, both domestic and international, around our innovative product range, EZ Herbs, as well as our existing leafy lines. The continued guidance throughout the negotiation process was invaluable, when the advice and guidance came from someone with extensive experience, knowledge, and an understanding of the retail space. It enabled us to implement the building blocks for future proofing the business, from robust process and product development to frequent reporting on what actually matters, so we can better respond to business and industry pressures."

The one-on-one delivery mechanism intimately supports business owners through the process and enables future aspirations and goals to be incrementally realised. The step changes within the Dicky Bill's operations underscores the commitment of business owners to drive change, especially in the context of expanding their international footprint. The program's personalized approach provides invaluable support to business owners, facilitating the realisation of their long-term aspirations and international growth goals.

"Being in an intense horticultural industry means our daily involvement in the business is relentless. However, being able to take the time to strategically focus on the future, embrace critical thinking, and challenge the status quo has been refreshing with support of the program," Ryan said.

Moonrocks

ST GEORGE, QLD

Moonrocks, a generational farming business based in Western Queensland, has been growing for nearly 25 years and is now in its sixth generation of succession. The business has undergone a continuous evolution, transitioning from cropping to horticultural product offerings. Today, its primary focus is on the production of broccoli, onions, garlic, and an expanded range of value-added garlic products.

Led by Andrew and David Moon, the Moon Family is dedicated to advancing their business through innovation, risk mitigation, and diversification strategies, with a strong emphasis on expanding their international market presence.

"We initially engaged with the program with the aim of refreshing our business mindset during a difficult time in farming with inflationary pressure and changing market conditions. At the start of the program, we conducted a GAP Analysis to identify the bottlenecks in our business." Andrew said.

Moonrocks has made substantial investments in s pre- and post-harvest technologies for their onion and garlic product lines. They sought to ensure that their business vision aligned with their capabilities, capacity, innovation, market demand, and risk management.

"Sitting down with Trent and our Moonrocks team to work through our strategic objectives, priorities, and product development plans has been incredibly rewarding. Our day-to-day operations keep us busy, and it's invaluable to pause, reflect, and plan with external support," added Andrew.

Moonrocks is committed to vertical integration and expanding its portfolio of value-added offerings.

"The technical product support provided through IBIMP has given us the confidence to expand our product range under the G'Day Garlic Brand, including peeled garlic and onion products, for our customers. We are advancing daily with increased domestic penetration and actively exploring international markets."

"The technical product support, R&D marketing advice, product positioning strategies, risk management insights, and critical thinking gained from this program have helped us with a number of transformative changes in our business, which will materialise in the coming years."

"We believe that more programs like this one should be made available to our horticulture industry. We extend our gratitude to AUSVEG to design this program and Hort Innovation for their investment into this model. It has benefited our business substantially and we look forward to the realisation from the support provided."

The entrepreneurship guidance has been a game changer for me personally, profoundly reshaping our mindset and exploring dynamic development.

Zerella Fresh

PARILLA, SA

Renee Pye is the General Manager of Zerella Fresh. Zerella Fresh, based in Parilla, South Australia is a second-generation family-owned business that grows, packs, processes, wholesales and distributes potatoes, carrots, and onions. The business, which owned by the Pye Family, has a vision on continual development and evolution of their business into new opportunities.

"The IBIMP program has been a great value to our business. It has helped us in getting our heads out of the weeds, looking above for new and exciting opportunities within our business. Having the opportunity and someone external that has the experience really opens your eyes to other innovations and value adding opportunities that can help our business be sustainable long term," she said.

"Growing fresh produce puts us in the business area of tight margins. In this competitive landscape, every aspect of our operations must be optimised to ensure profitability. We also operate at the mercy of unpredictable environmental factors. These challenges can affect our production, quality, and supply chain. To succeed in the global market, we must not only manage these factors but also adapt to them effectively."

Zerella Fresh is currently in the process of developing a range of value-added products, which they anticipate will enter international markets within the next 12 to 24 months.

"The entrepreneurship guidance has been a game changer for me personally, profoundly reshaping our mindset and exploring dynamic development. We are actively capitalising on emerging opportunities, especially those with a strong export potential, and have already observed tangible growth as we passionately pursue these avenues."

FIND OUT MORE

There are currently four remaining spots for vegetable, onion, and melon levy-paying growers to undertake the IBIMP program in 2023-2024. For registration and further information on this program, please contact **Trent De Paoli at** trent.depaoli@ausveg.com.au.

Hort Innovation VEGETABLE FUND

Hort Innovation ONION FUND

Hort Innovation MELON FUND

This multi-industry project is a strategic levy investment in the Hort Innovation Melon, Onion and Vegetable Funds.
Project Number MT21009

Visy Continues to Grow and Re-Invest

From Australia's first drum pulper to our new state-of-the-art box factory in Hemmant, Visy is investing to support Australian growers, farmers and agriculture.

Sustainability is at the heart of everything we do. We are using recycled content to power Australia's food and beverage packaging industry. We manufacture everything from cardboard boxes, water bottles, jam jars and food and beverage cans, all using recycled content.

Since the beginning, we've worked closely with farmers and growers—working to develop innovative and sustainable packaging solutions to meet your needs. Our partnerships and sponsorships—AUSVEG, Australian Banana Congress and Fruit Growers Tasmania, to name a few—are one way we're supporting the sector.

We were again well represented at Hort Connection 2023, said Wayne Dunne, National Sales Manager Visy Board.

"It is an event we look forward to every year so as we can showcase new and trending offerings as well as enjoy the company of our customers outside of our day-to-day work environments," Wayne said.

Together we've developed sustainable packaging solutions for the sector including fibre punnets for fresh fruit and temperature-controlled cardboard packaging to ensure your produce arrives fresh, well presented and protected.

As an Australian business with a network of operations across the country—including in many regional areas—our scale and expertise is your advantage.

Our impact goes beyond employment and manufacturing sites to the social fabric of regional towns, the well-being of the employees and the broader community. We contribute to regions with a strong primary agricultural presence. In these regions, we have been a key supplier of packaging and related services for generations of farmers. We have fostered long-term business relationships and become a trusted partner to local industry.

Above L-R. Federal Minister for Industry and Science Ed Husic; Queensland Treasurer Cameron Dick; and Visy Executive Chairman Anthony Pratt.
Image credit: visy.com.au

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

In 2021, we committed to invest $2 billion over the next decade to transform Australian recycling and remanufacturing. This year, we commissioned three major projects which are reducing landfill, cutting emissions and creating hundreds of green collar Australian manufacturing jobs.

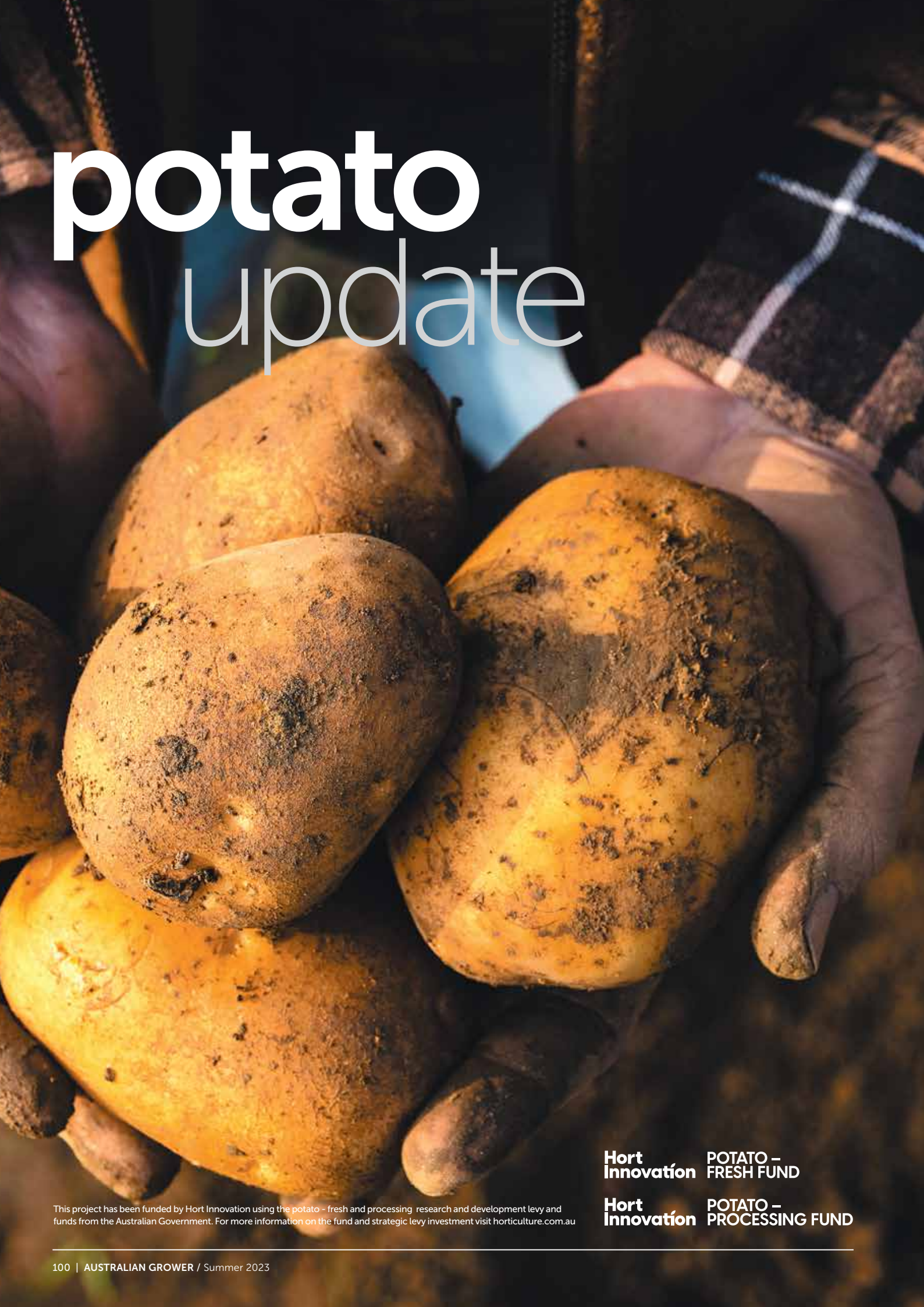
- In May, we opened a $48 million upgrade to our recycling and remanufacturing facility on Gibson Island. The project will divert up to 39,000 tonnes of material from landfill every year, covering the equivalent of approximately 2,500 Suncorp stadiums—using a new state-of-the-art paper optical sorting plant.
- Then, in August, we opened Australia's first drum pulper—a $42.5 million upgrade to our paper recycling and remanufacturing campus in Coolaroo, Victoria. It will double our kerbside recycling capability in Victoria, diverting the equivalent of approximately an extra 400 Olympic swimming pools of mixed paper from export and landfill every year.
- Finally, in October, we opened Australia's most advanced corrugated box factory in Hemmant, Queensland. It will take 100% recycled paper from Gibson Island and turn it into new boxes for our customers. This $175 million investment in Queensland manufacturing will make up to 1 million boxes a day for Queensland's thriving food and beverage companies, farmers and growers.
- We're also opening new—more sustainable—global opportunities for food and agricultural producers in the Riverina, home to 21% of New South Wales' agricultural production. Operating all rail services from the Riverina Intermodal Freight and Logistics facility in Wagga Wagga, we provide terminal to port rail services and global forwarding to export markets.

Our closed loop packaging processes mean we're not only manufacturers, but we're actually in the landfill avoidance business. Our investments are diverting millions of tonnes of material from landfill. Recycling is an important weapon against climate change because as things decay in the landfill they emit methane gas which is 84 times more potent than CO^2 in creating greenhouse gasses over a 20-year period.

Our 75 year partnership with Australia's food and agricultural sector, positions us for strong future growth, together.

FIND OUT MORE
For more information about visit visy.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

Hort Innovation POTATO – FRESH FUND

Hort Innovation POTATO – PROCESSING FUND

Perfecting the perfect chip for your fish

©Craig Moodie Photo

The potato processing sector in Australia is substantial and well established, but relative newcomer Lamb Weston has cornered the fish and chip shop market, and helps to create the perfect chip to go with the fish.

Arriving on Australian shores around five years ago, Lamb Weston is one of the bigger processors in its home country, USA, established in the 1950s. It now has facilities around the globe including China, the Netherlands, Austria, Argentina and the UK. The product offering is hash browns, wedges, waffles and a variety of chip cuts such as short, straight cut and curly.

While most QSR retail outlets will prefer long, straight cut chips, the fish and chip shop market prefer a thicker, shorter cut. The thicker cut requires a slightly different cooking methodology, and needs to be more forgiving to the cooking style of a fish and chip shop, compared to the highly controlled cooking regimes of QSRs.

Lamb Weston work with growers in Victoria, South Australia, Riverina and Tasmania to utilise three sizes of potatoes: small for hash browns, medium for wedges and thick cut, and large for straight cut and crinkle styles.

Sam Teale is Head of Agronomy at Lamb Weston Australia and works with growers to get the best possible outcomes for both the grower and the company.

"We use public commons potatoes – Russet Burbank and Atlantics principally – they are versatile, reliable and easy to grow and give a good outcome for chips," said Sam.

"By using a number of locations for growing, we can use potatoes fresh from the field for a lot longer. However, these varieties keep well in cool storage for a number of months until the next season's fresh potatoes are available.

"Our team of agronomists is out in the field with our growers every couple of weeks to see how things are going, providing advise them if they need it. It means we can get on top of any issues early before they become a problem.

©Craig Moodie Photo

There is a lot of knowledge between all our growers, so it is a great opportunity to learn and share within our own community the best way to grow the best potatoes."

When seeking new growers, Sam says they look for people who are open minded in their farming habits, to try new technologies and adopt learnings from other growers locally, or through the Lamb Weston global network.

A typical example of new technology is around irrigation, where traditionally a lot of growers would use a gun irrigator, but many have transitioned to automated pivots, making the grower's life easier, and the crop more productive.

"A lot of potato varieties have much the same growing requirements, it comes down to the region they are in. For example the Mallee and South Australia are far more sandy soils than the clays of Ballarat. As an agronomist, working with those regions you need to be mindful of the location needs – sandy soil doesn't hold water well, but in a wet year the clays will stay heavy with water."

Creating the chip

As the potatoes arrive from the grower, the potatoes are graded and any mud, rocks or foreign material is removed and then washed. For products where the skin is removed, the potatoes are steam peeled, and then cut into chips using high speed water jets – a Lamb Weston invention.

Visual and camera inspection is used to detect defects and to remove unwanted chips. To minimise waste, those that are usable are turned into mash products and hash browns. Chips are a twice-cook product – the first cook is done at the processor, the second at the retail outlet. Once cooked at the processor, the chip is dried and frozen ready for distribution.

"A good potato chip will have the right amount of snap, good potato content and once it has the second fry, a good colour.

"To achieve that we need a potato where the water content is lower than the starch content, which is measured by the specific gravity.

"Most of the products Lamb Weston produce have the skin removed, so any blemishes are not present in the final product. After that, it is up to the local fish and chip shop to do the second fry."

LAMB WESTON
THORPDALE BULK STORE

Lamb Weston's investment in a large-scale state-of-the-art potato raw storage facility in the important growing region of Thorpdale, Gippsland was completed earlier this year. The facility is equipped with globally advanced food storage technology designed and proven in Europe.

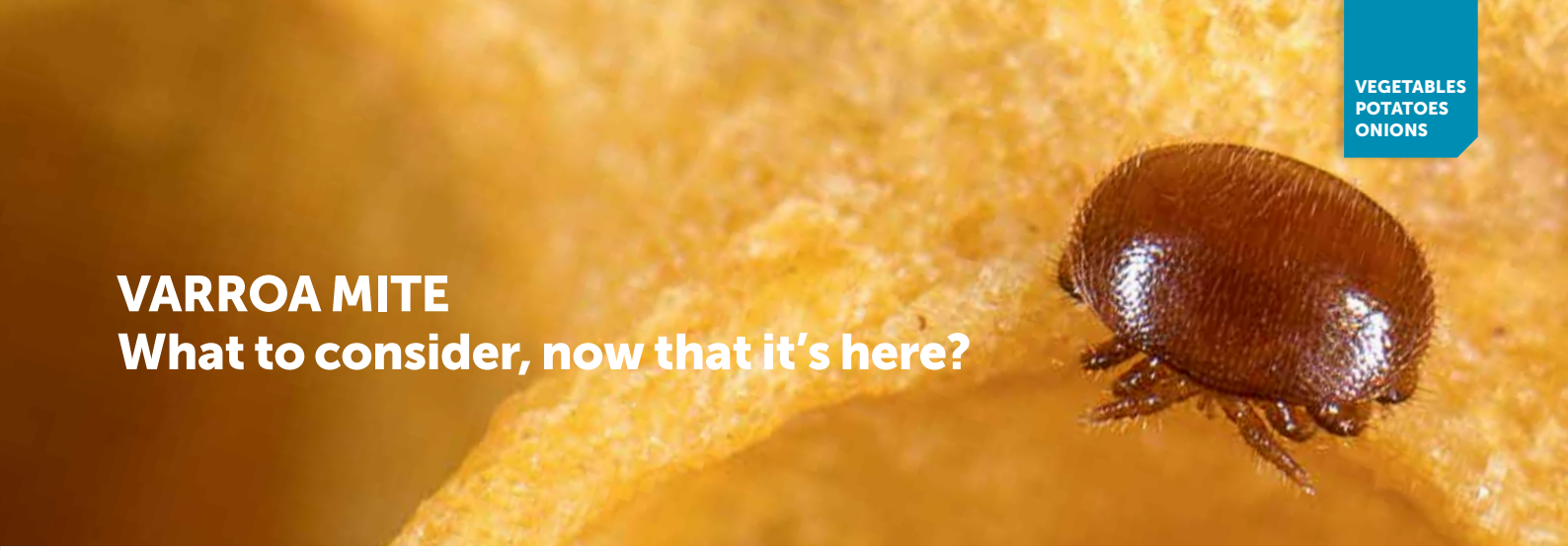
The innovative development has increased Lamb Weston's long term storage capacity of raw potatoes by 10,000 metric tonne (MT).

The bulk store's design includes the latest in climate, humidity and environmental control, providing the best possible chance for the potatoes to hibernate, which is critical to being able to manufacture year round.

Drawing on international expertise, as well as local skill, the Thorpdale bulk store has been designed and constructed by European company Tolsma-Grisnich, a Netherlands-founded world leader in cool storage with 75+ years in the industry.

Lamb Weston has been partnering with growers in the Gippsland region for four years as Lamb Weston and more than 20 years when including the Melbourne-based operations they acquired.

Creating employment for three people, the opening of the Thorpdale facility marked the first Lamb Weston Australia owned bulk storage site operating in Australia.



VARROA MITE
What to consider, now that it's here?

Until June last year, Australia was one of the few countries that remained free of Varroa mite. After 15 months of attempting to eradicate Varroa mite, the Response is now transitioning to management. What does the presence of Varroa mite in Australia mean for pollination-dependent vegetable growers?

Varroa Destructor *Image: Scott Bauer, USDA Agricultural Research Service, Bugwood.org*

The Response so far

Varroa mite was discovered on sentinel hives near the Port of Newcastle, New South Wales, in June 2022. The detection was the result of routine surveillance by NSW Bee Biosecurity Officers and resulted in Australia's largest ever plant biosecurity response.

Since the initial detection, the lead agency, NSW Department of Primary Industries (DPI), the Consultative Committee on Emergency Plant Pests (CCEPP; the technical advisory committee made up of representatives from affected industries and state, territory and federal governments) and the National Management Group (NMG); have continued to meet and discuss the response progress.

The Response Plan, which aimed to achieve complete eradication, was endorsed by the NMG in June 2023 with associated costs to be shared between the Australian, state and territory governments, and affected industry parties based on a Category 2 Emergency Plant Pest (EPP).

On 19th September 2023, the NMG with advice from the CCEPP agreed that it was no longer practically feasible to achieve eradication and that the Response will transition to management. At the time of writing, the details of the transition to management phase are still being determined. The transition to management phase is designed to equip affected industries (both beekeeping and pollination dependent) to manage Varroa mite in the longer term. The transition will aim to slow the spread of Varroa mite and prepare industry via training and education, identification of options for management and support for pollination security.

While the immediate and direct impact of the Varroa mite Response has been on bees and beekeepers, many horticultural crops require pollination for optimal fruit set and quality. Pollination-dependent industries and beekeepers will need to work together to mitigate the impact and maintain effective pollination as we all adapt to this new pest.

What is Varroa Mite?

Varroa mite *(Varroa destructor)* is a tiny parasitic mite that feeds on European honey bees (native Australian bees are not known to be affected). It is one of the most serious threats to honey bees and pollination dependent industries. Infection of hives results in weakened bees, reduced drone fertility and decreased honey production.
If left untreated, entire hives can die.

Image Credit: Stephen Ausmus, USDA Agricultural Research Service, **Bugwood.org**

Representation by AUSVEG

AUSVEG, in its role as the peak industry body representing vegetable crops, as well as a signatory to the Emergency Plant Pest Response Deed (EPPRD) and a member of Plant Health Australia (PHA), has worked with NSW DPI, state and federal jurisdictions, PHA and other impacted Plant Industry Bodies to develop the Response Plan through the CCEPP and NMG. AUSVEG has also worked to include Owner Reimbursement Costs (ORCs) in the budget for vegetable growers who are reliant on pollination and have been affected by the varroa response eradication activities under the Response Plan. The due diligence process of Owner Reimbursement Costs (ORC) is now underway.

AUSVEG has also worked with Hort Innovation to fund a research project that will investigate the potential of alternate pollinators (e.g. hover flies) for cucurbit crops that show potential for development through mass rearing or enhancement of wild populations near crops as well as strategies for habitat augmentation to support alternative pollinators.

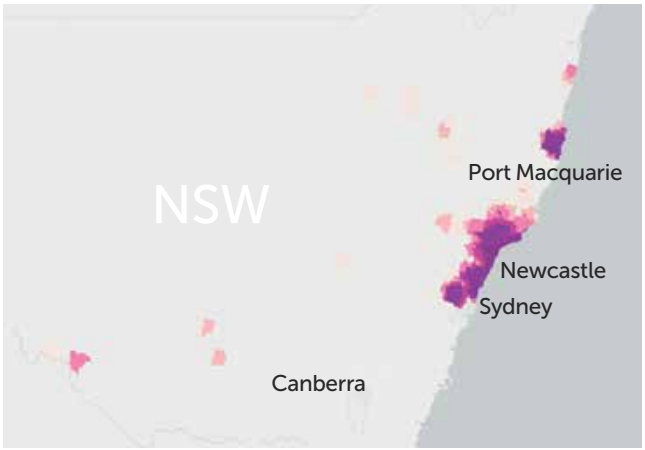
Varroa spread across the Landscape

During the eradication Response, several measures were put in place to limit the spread of Varroa from areas known to be infected. These measures have been lifted in NSW and hives can now be moved in NSW with fewer restrictions. Check the NSW DPI website at: dpi.nsw.gov.au/emergencies/biosecurity for current regulations.

As we transition to management, Varroa is expected to slowly spread across the landscape. The NSW Department of Primary Industries website has a heat map that shows the mite load or number of infected premises where Varroa has been confirmed across NSW. This may assist industry to understand the risks for hives being moved around.

Do you rely on wild honey bees for pollination?

The spread of Varroa mite is also likely to impact on wild European honey bees and pollination services provided by those wild honey bees. Australia has among the highest wild honey bee densities in the world, estimated to range from 0.1 to 1.5 colonies per square kilometre depending on vegetation type (*Hinson* et al. 2015). This means pollination services are often provided for 'free'. As Varroa mite spreads across the country, many of these wild bee populations are likely to die, meaning they may no longer be available to provide pollination services and many growers may need to consider employing commercial pollination services.



Considering your Pollination Requirements

1. Talk to your pollination service provider, bee broker or beekeeper and plan ahead to meet your requirements. Hives move around Australia to correspond with availability of floral resources and seasonal pollination demand, and you may need to make sure they are available in your area. Consider discussing the pest and disease-free status of honey bees with your provider, and the best management practices required by both you as the grower, and the bee keeper to help maintain bee health.
2. Encourage native bees and other pollination insects by planting bee friendly crops or refuges that can provide nectar and pollen sources as well as habitat throughout the year.
3. Manage your own hives to help supplement your pollination needs. Contact your local agricultural department apiary or bee officer for more information.

Further Information

For information on Varroa Mite updates and regulations in other jurisdictions please use the following links:

NSW	dpi.nsw.gov.au
QLD	business.qld.gov.au
VIC	agriculture.vic.gov.au
TAS	nre.tas.gov.au
SA	pir.sa.gov.au
ACT	legislation.act.gov.au
WA	agric.wa.gov.au
DAFF	daf.qld.gov.au

Australian Honeybee Industry Council
honeybee.org.au.

What to do if you suspect Varroa mite

The public can report wild European honeybee nests and varroa mite detections to the national Exotic Plant Pest Hotline on 1800 084 881.

New Team Set to Bring Meteorology to the People

BY CLAIRE HARRIS

Recognising that growers nation-wide are hugely dependent on information provided by the Bureau of Meteorology, the BoM has recently unveiled a new team specifically to address and assist the needs of those in agriculture.

Above. Bureau of Meteorology's Jonathan How outlined the Bureau's commitment to providing greater service to agriculture. *Image courtesy of Andrew Beveridge*

Launched in early 2023, the Agriculture Decision Support Team will aim to generate $300 million in economic and social value for the agricultural sector, by delivering targeted and relevant weather information to producers and demystifying forecasts.

The team has a number of segment leads, each responsible for spearheading sectors including horticulture (led by Rachel Davis), broadacre, livestock, forestry, fishing and emerging industries.

Agriculture Decision Support Team specialist and senior meteorologist Jonathan How attended the Annual Vegetable Industry Seminar (AVIS) in Adelaide in June 2023 to share information about the team.

"We recognise that agriculture is a huge part of the Australian economy, and weather and climate can really make or break a season," Jonathan said.

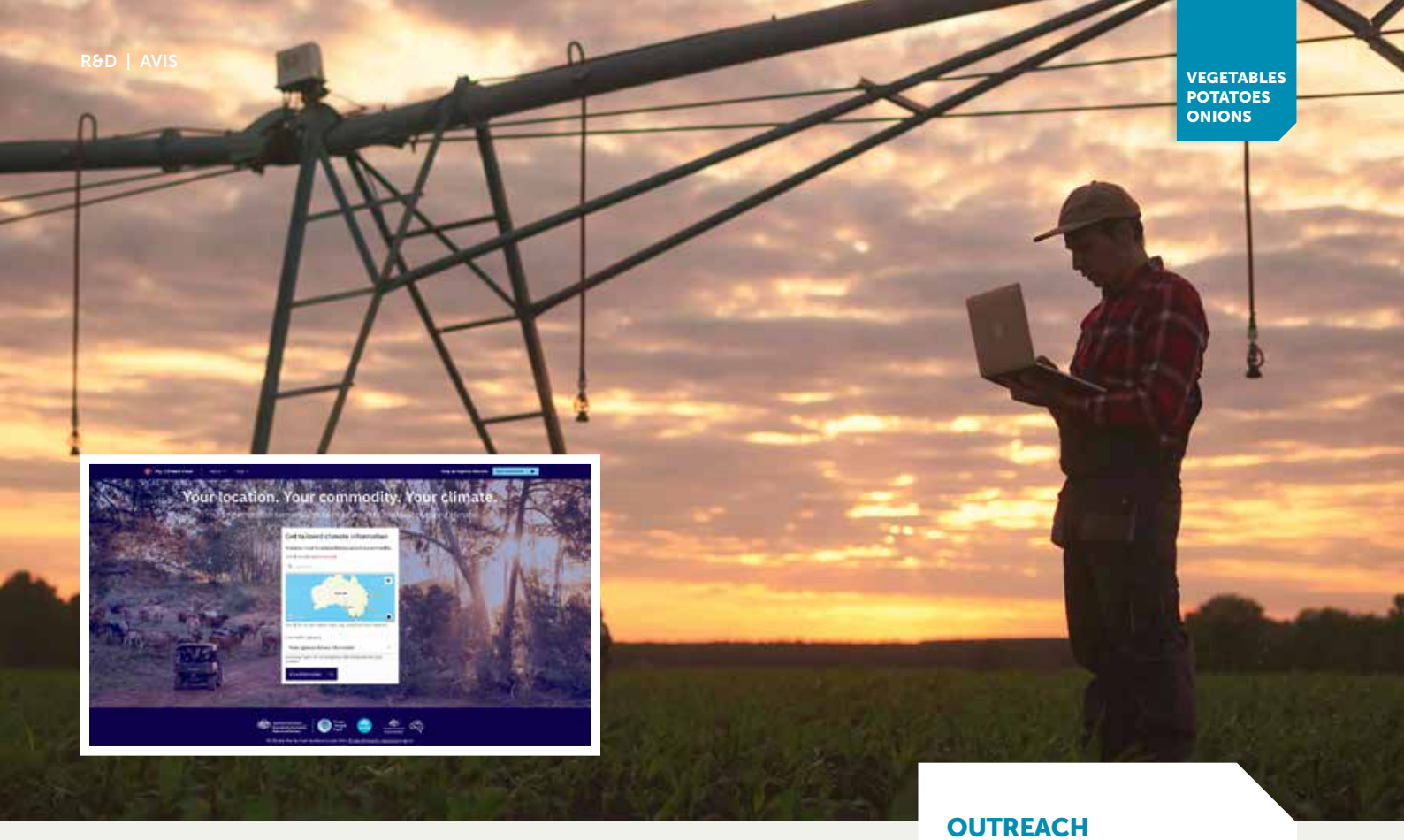
"We're here to help agriculture as a whole, and we think we can do a lot to help the horticulture industry. We know the Bureau website is an absolute minefield – there are tens of thousands of pages, so where do you even start?" Jonathan said.

"If producers have a particular question, the team try to work out if there is anything on the website that can immediately help the situation. If we can't do that, we try to coordinate different tools for your specific needs.

"Failing that, we get all the feedback, and then put our heads together to work out how to help these particular industries."

Evolving Services

Jonathan said existing interactive services on the BoM website such as the Australian Water Outlook (providing hydroclimate information) and MetEye (seven-day wind, wave, rain, and weather forecast maps) would continue to be useful for producers, while a number of new services are also in the making.



Climate Services for Agriculture (CSA) is one such new initiative, jointly developed by BoM and CSIRO and financed by the Future Drought Fund.

CSA has developed an online tool, *My Climate View*, which has been designed to help farmers build resilience for future droughts and climate risks by providing historical climate data, seasonal forecast, and future forecast predictions at a five-kilometre resolution right across Australia. Outcomes based on different emission scenarios are also taken into account for the predictions.

Jonathan said the tool was tailored to different commodities.

"You can get onto the website, scroll down to your region, and select your commodity to get information very specific to your situation," he said.

Horticultural commodities with information on the site currently include potatoes, avocados, mangoes and oranges, but Jonathan said there were plans to expand moving forward.

Another evolving service being spearheaded by the Agriculture Decision Support Team is Agri-Climate Outlooks, a follow-on from the Meat & Livestock Australia and CSIRO Forewarned is Forearmed project which wrapped up last year.

"Using the forecast maps produced in Forewarned is Forearmed, our goal is to help farmers take these maps and use them for their benefit.

"We are working in partnership with Agricultural Innovation Australia and a number of RDCs to help farmers understand the forecast. We're not here to tell farmers to make a particular decision, we're here to give them the information so they have all the insights needed to make the best decision."

The third evolving service outlined by Jonathan in the presentation was *ObsCheck*, a data checking service.

"ObsCheck is all about doing quality checks on private weather stations so insurance companies can trust all those weather stations," Jonathan said. "There are thousands of private weather stations, and only hundreds of bureau ones."

OUTREACH

While working towards developing new services, the goal of the team was to continue meeting with farmers and those in the agricultural industry.

By engaging with farmers, to understand what is needed, with investment and expansion, the Bureau aims to meet customer needs, and bring the meteorologists to the people.

FOR MORE INFORMATION
Contact the Agriculture Decision Support Team at agriculture@bom.gov.au

Hort Innovation VEGETABLE FUND

The Annual Vegetable Industry Seminar 2022-2024 (VG21003) is a strategic levy investment under the Hort Innovation Vegetable Fund.
Project Number: VG21003

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FROM THE BUREAU OF METEOROLOGY

Climate Outlook
DECEMBER TO MARCH

Long-range Forecast Overview

December to February rainfall is likely to be below average across much of northern Australia, including most of the NT, Tasmania, and the west coast of WA.

December to February maximum and minimum temperatures are very likely to be above average for almost all of Australia. Unusually high temperatures equate to the warmest 20% of November to January periods from 1981 to 2018.

The long-range forecast is influenced by several factors, including the active El Niño and positive Indian Ocean Dipole events, and record warm oceans globally.

Temperature

Warmer December to February days and nights for almost all of Australia

For December to February, most of Australia is at least 2.5 more likely than normal to experience unusually high maximum and minimum temperatures. The chance of unusually high maximum temperatures increase to 4 times more likely than normal for parts of western WA, NT, Queensland, and the north coast NSW. The chance of unusually high minimum temperatures increases to 4 times more likely than normal for most of northern Australia (excluding north-west WA and central coastal Queensland) extending into the southern interior of WA, and the north-eastern half of NSW.

Rainfall

- For December, below median rainfall is likely to very likely for the northern coastal regions of mainland Australia, Tasmania, far south-east SA and most of Victoria and below median for much of WA, excluding its interior; large parts of the NT; northern and eastern parts of Queensland; northern coasts of NSW; southern parts of SA; and Tasmania.
- For December and December to February, large parts of the interior have a near equal chance of above or below average rainfall. However, if above average rainfall occurs, it is unlikely to be widespread.

Climate influences

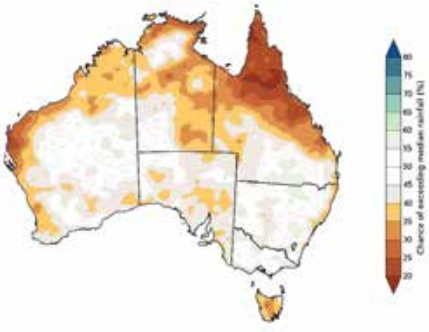
The long-range forecast reflects known impacts from several significant climate drivers:

- El Niño continues in the tropical Pacific. Models indicate some further warming of the central to eastern Pacific is possible, with SSTs remaining above El Niño thresholds into the southern hemisphere autumn 2024. During spring, El Niño typically increases the chance of below average rainfall for eastern Australia and warmer than average days for the southern two-thirds of Australia. In summer, El Niño increases the likelihood of drier than average conditions for the north-east of Australia and warmer than average days across much of the eastern half of the country.
- The positive Indian Ocean Dipole (IOD) continues. All models indicate that it is likely to persist into December. A positive IOD typically increases the chance of below average spring rainfall for central and south-east Australia. IOD events typically dissipate in December as the monsoon trough shifts into the southern hemisphere, however models indicate this will occur later than usual, with the onset of the Australian monsoon also expected to be delayed.
- The Southern Annular Mode (SAM) index is weakly negative. Forecasts indicate is likely to remain at weak negative values for the coming fortnight.
- Australia's climate has warmed by ~1.48 °C since 1910, leading to an increase in the frequency of extreme heat events.

FIND OUT MORE
For the full outlook go to bom.gov.au/climate/ahead/outlooks/

Chance of exceeding the median maximum temperature for December 2023 to February 2024

Chance of exceeding the median minimum temperature for December 2023 to February 2024



Chance of exceeding the median rainfall for December 2023 to February 2024

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"There's no other planter in Australia that can do what the Kubota does, and we are very happy with the results."

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For Earth, For Life
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40 years of potatoes and onions brings equipment to industry where it is needed

Onions and potatoes have been the lifeblood of the Dobson family for the past 40 years, Mark Dobson reflects on the industry – and the machinery that have moved the industry forward.

A farming accident more than 40 years ago, saw the Dobson family transition from a family farm for potatoes into a business that has served the industry ever since.

Having a trade as a boilermaker, Philip Dobson (Mark's Father) soon realised that with his injuries it would prevent him from farming as he had and was asked to modify some farm equipment for a local machinery distributor. Enjoying the work, Philip developed a company to modify farming equipment that suited the northern Tasmania conditions for potato and onion growers.

That company is known as Dobmac Agricultural Machinery and now, celebrating 40 years in the industry, is a well respected provider of potato, onion and farming equipment suited to Australian conditions.

"One of the products Dad developed was the Dobmac Clamp potato planter, which is still in use today," says Mark Dobson.

Knowledge grows

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"In the first 20 years, if you wanted a slasher, front end loader or planter or potato grader, Dad would build it. A lot of the work grew into importing and modifying machinery from Europe and USA to better suit our conditions. Our steeper terrain, heavier soils and rocks meant that the machinery needed greater strength and better accuracy for planting up, and down hills."

"For onions, the challenge in South Australia in particular, is the sandier conditions, meaning considerations like flotation tyres, it's easy to get bogged in sand. More gentle separation, given the flowing nature of the sand and shorter/medium day onion varieties."

Mark says that while the principles of planting and harvesting potatoes and onions hasn't really changed in 40 years, the technology has.

Where once tractors were 50-60hp, it is now commonplace for more than 150hp for a two-row planter, with greater seed holding capacity. The introduction of GPS guidance and rate control systems, rather than chains and sprockets means that plant spacing, fertiliser and chemical rates can be altered from the cab in situ, allowing the farmer or contractor to be more time efficient.

As potato and onion varieties improve, the need to work with chemical companies to ensure that machinery can deliver the right dosages based on their own local conditions has also been a consideration for Dobmac with development of specific potato chemical applications systems.

"A lot of our work is a custom build. We take the best features of equipment, and create something that has the best technology and strength to suit a particular customer.

"We had one customer 12 years ago who wanted to increase from a two row planter, but a four row was too big, so we created the three row planter. It was a new idea at the time, but is now one of our most common designs for Tasmanian conditions. As the tractors got bigger, the development of the three row planter has met the challenge."

40 Years of Industry

Since the inception of Dobmac 40 years ago, Mark says the industry has seen a lot of evolution and focus in areas of seed potato management in handling and storage systems to give more vigorous crops, longer storage times, as well as variety development that are more resistant to pest and disease.

Onions are a major export for Tasmania and present an opportunity for market access for the northern hemisphere off season. Mark commented that while technology can make the Australian onion industry more competitive, weather can still have an impact.

With the younger generation coming into farming, Mark is seeing a greater interest in soil health, yield mapping and climate monitoring. He says they are more interested in understanding the why, and how to use that knowledge to improve their productivity. Technology is playing a large part in their understanding. Knowing when to plant or harvest by monitoring conditions can make or break a season.

"We are celebrating a big milestone this year, with 40 years in the industry, pretty much my whole life.

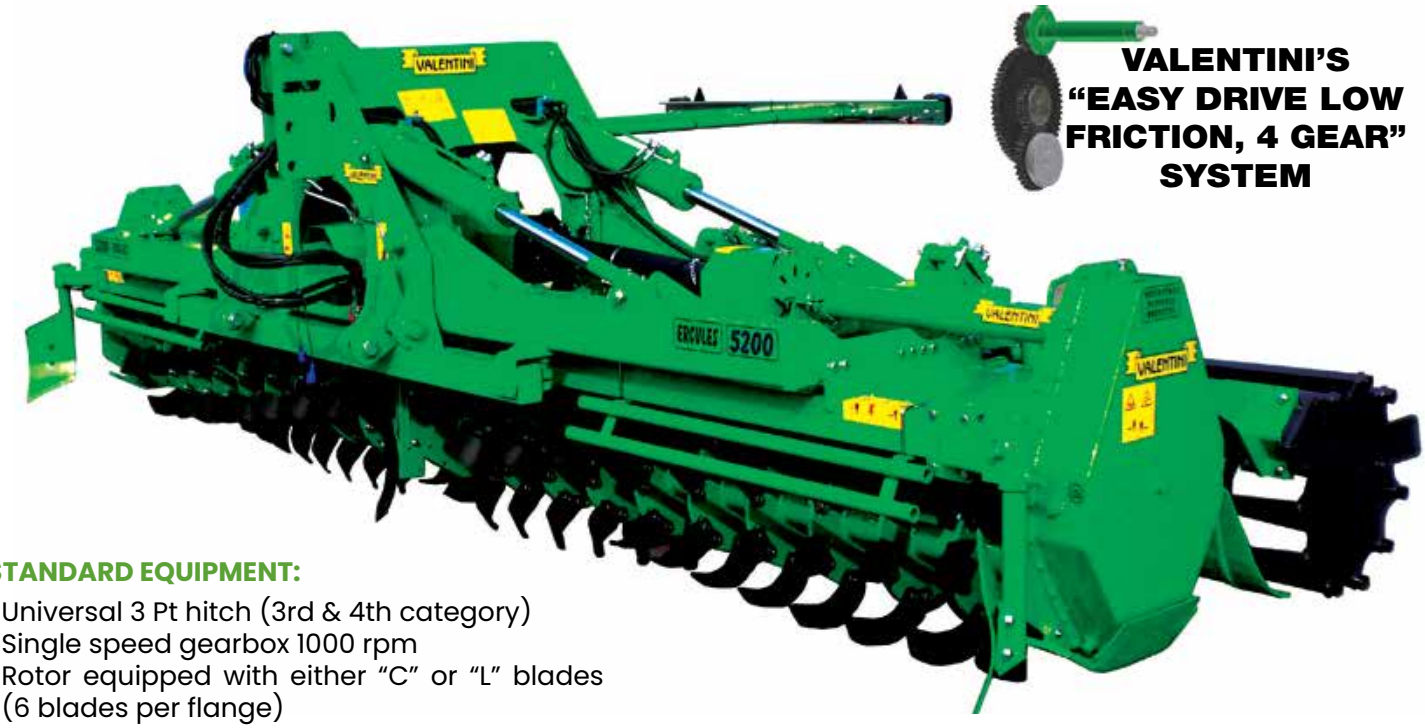
"It is amazing to see a family business that started in the shed on the farm to be at a point where we work with leading international companies to push the boundaries of agriculture.

"Mum and Dad are still business mentors, and are excited to see the journey that Dobmac is on, it will be good to see where the next 20 years take us. It has been great to work with so many family farms, and commercial companies in the potato and onion industries and we would like to extend our thanks for your support and belief in what we do."

HERCULES ROTARY HOES

For tractors between 180 and 400 hp

The Valentini Hercules is the machine for professional users. Designed to work on tractors up to 400hp, with a working width up to 7.7 metres cultivating large areas quickly. With hydraulic folding rams the Hercules can be transported on public roads. The tiller has a working depth up to 28cms which is adjustable from the tractor.



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- Central coulter
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- Safety manual bar for transport
- CE safety shields
- Safety shields for transport
- Automatic hydraulic device with safety locks for transport
- Skids or Cage Rollers or Packer Rollers

ERCULES	Power Required	Working width	N° Tools	Working Depth	Rotor RPM	Overall Width	Weight cage roller
Model	HP / kW	mm	n°	cm	RPM	mm	Kg
4200	180/400 HP 133/296 kW	4280	96	28	244	2870	3530
4700	190/400 HP 140/296 kW	4780	108	28	244	2870	3780
5200	200/400 HP 148/296 kW	5280	120	28	244	2870	4050
5700	210/400 HP 155/296 kW	5780	132	28	244	2870	4200
6200	230/400 HP 170/296 kW	6280	144	28	244	2870	4500
6700	250/400 HP 185/296 kW	6780	156	28	244	2870	4760
7200	300/400 HP 222/296 kW	7280	168	28	244	2870	5060
7700	350/400 HP 259/296 kW	7780	180	28	244	2870	5250

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Where Service is Part of the Sale!

Commercial Manager, Farming Services with Incitec Pivot Fertilisers Phil Hoult.

Beefing up Potato Production and Quality

In his role as Commercial Manager, Farming Services with Incitec Pivot Fertilisers, Phil Hoult is based in Geelong, Victoria but works with potato growers right across Australia, using his 35 years of experience to drive better outcomes for growers.

He has seen firsthand the impact Enhanced Efficiency Fertiliser (EEF) products can have for potato production across the value chain and believes their versatility makes them appealing.

"I work with potato growers and processors right across the IPF footprint to help drive efficiencies in existing fertiliser programs with EEFs, assessing product choice, timing, rates and potential operational efficiencies to (hopefully) generate greater outcomes for all stakeholders," Phil said.

EEFs are formulations that control fertiliser release or alter reactions that lead to nutrient losses. EEFs like eNpower® and Trigger® help to manage nitrogen (N) efficiently, reduce loss and optimise fertiliser use.

"For some growers, it's about nitrogen management to reduce losses and enhance nitrogen use efficiency (and yield), while for others it's about improving soil productivity, addressing salinity issues or high pH with a humic product like Trigger," Phil said.

"Growers are seeing results in terms of higher yield and better quality, but the opportunity to minimise their environmental footprint is a significant incentive as well, especially with eNpower and improved nitrogen management.

Phil and his expanding team at IPF run demonstrations for growers, where they compare potato performance with Trigger or eNpower against that without, across key metrics like yield, total weight and specific gravity.

"We are seeing and hearing from growers that these products are helping deliver yield, quality and size improvements in some challenging soils," Phil said.

"From our large-scale demonstrations, growers using eNpower in Langhorne Creek, SA and Koroit, VIC achieved yield increases of 7% and 8% respectively in the 2022/23 growing season. Anecdotally, we have regularly seen improved tuber set and more even size of tubers as well.

"We take a stepped approach. Soil testing to understand the starting point is key, and from there we look at current nutrition programs, variety and operational specifics, end market and where improvements can or might be made, or where there's opportunity to implement an EEF product like eNpower or Trigger," Phil said.

EEFs in Potatoes

eNpower® is a nitrification inhibitor based on the active ingredient dimethyl pyrazole (DMP) that is applied to the granular fertiliser as a spray on technology. DMP works by inhibiting nitrifying bacteria in the soil, slowing down the conversion of ammonium N to nitrate which is prone to losses like denitrification and leaching. Incitec Pivot has developed its own, unique formulation (DMPG) to deliver maximum benefits in application, handling and use over and above standard DMP products.

By achieving equivalent or higher yields with improved N use efficiency or potentially, lower total nitrogen rates and reduced GHG emissions, eNpower® can help you produce the same with less and do your bit for the environment.

Trigger® is a new, low dust, air seeder quality, humic granule introduced by IPF containing both humic and fulvic acid. Increasing humic content in soils has the potential to improve localized CEC, buffer against salinity and pH, improve uptake of specific nutrients such as P and overall soil health resulting in healthier crops that are better able to withstand biotic and abiotic stress.

Humic substances are a mixture of organic materials, created by the decay of plant and animal residues. As organic materials, they are a good source of carbon and provide a food source for soil microorganisms, bacteria, algae, fungi and earthworms.

Humic substances are made up of three distinct groups: humic acids, fulvic acids and humin. Humic acids can have beneficial effects on soil function such as improved biological activity, nutrient activity, cation exchange capacity, pH buffering, carbon sequestration, soil water relations and plant biomass.

FOR MORE INFORMATION
Contact Phil Hoult, Commercial Manager – Farming Services, Incitec Pivot Fertilisers
0457 897 992 or phil.hoult@incitecpivot.com.au

VEGETABLES
POTATOES
ONIONS

Management of recently established *Lyriomyza* Leafminers

QUICK FACTS

Three new species of *Lyriomyza* leafminer flies are now present in Australia:

American Serpentine Leafminer
ASLM - *Liriomyza trifolii*

Serpentine Leafminer
SLM - *Liriomyza huidobrensis*

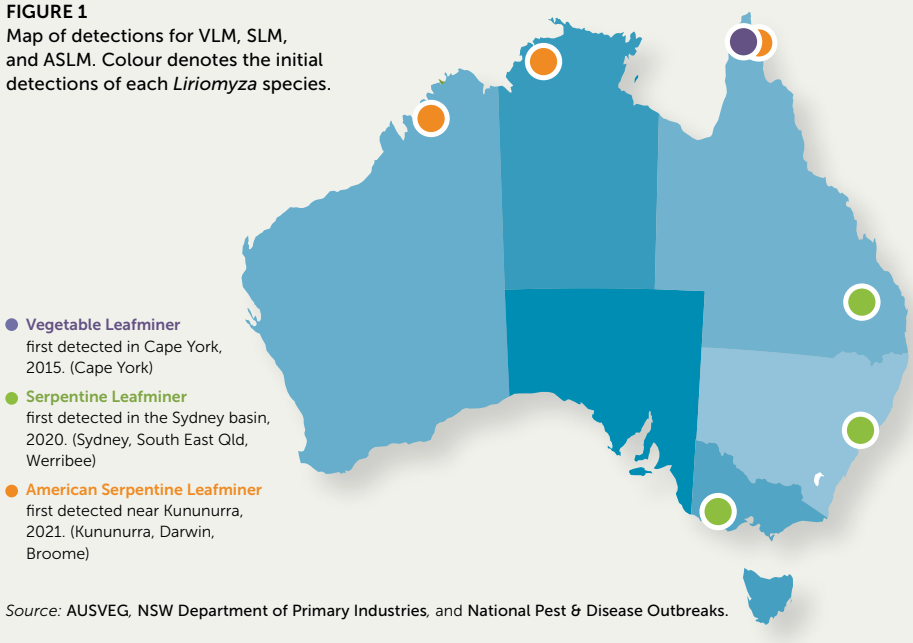
Vegetable Leafminer
VLM - *Liriomyza sativae*

- *Liriomyza* Leaminer feeds on many of plants and will likely affect most commercial crops.
- Damage on some commercial crops has been in Queensland, NSW, NT, WA and Victoria.
- Experience from other countries shows that overuse of chemical controls leads to resistance
- IPM approaches are the most likely to successfully manage these insects.

Current known Distribution of the New Leafminers

Vegetable Leafminer was first detected in 2015 at the tip of Cape York Peninsula in Queensland. No further detections have been made. Serpentine Leaf Miner (SLM) was first detected in western Sydney, New South Wales in October 2020 and a month later in Queensland's Fassifern Valley. ASLM was detected in July 2021 in the Torres Strait Islands and across northern Western Australia. There have since been further detections in Kununurra (WA), Darwin and Katherine in the Northern Territory, and the Northern Peninsula Area of Cape York (QLD). There has been a single detection in Broome (WA).

FIGURE 1
Map of detections for VLM, SLM, and ASLM. Colour denotes the initial detections of each *Liriomyza* species.



Source: AUSVEG, NSW Department of Primary Industries, and National Pest & Disease Outbreaks.

Risk of Spread and Establishment

Major risk pathways of leafminers into and across Australia is by the importation of infested ornamental host plants and cut flowers. Leafy vegetables and seedlings can move leafminers across Australia. Natural pathways (such as wind) or human-assisted entry can also occur at the borders (e.g., on plant material illegally imported).

Globally, *Liriomyza* leafminer dispersal and establishment has rapidly occurred, with populations found on most continents. Many important vegetable production regions in Australia have the climatic conditions suited to *Liriomyza* spp. establishment.

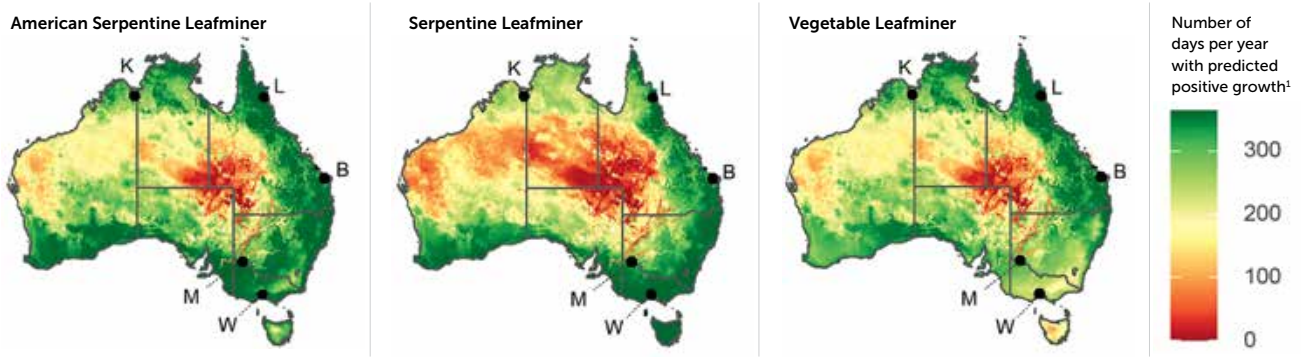
Climate models and existing pest knowledge have been used to determine the pest's establishment risk in regions across Australia. A predictive model based on temperature, moisture constraints and predicted dominant stressors (cold, heat, desiccation) was created by Cesar Australia as part of a levy funded project, MT16004 which developed a contingency plan for each pest (see further reading at the end of this article).

Each of the new leafminer species has a preferred climate suitability. Modelling has been prepared to show where and when each species is likely to be at its most active *(Figure 2)*.

Leafminer Climate Suitability

FIGURE 2

The aggregated yearly establishment potential of ASLM, SLM and VLM as the number of months across the year with increasing population sizes based on temperature and moisture constraints.



KEY REGIONS
B. Bundaberg | C. Cairns | K. Kununurra | M. Mildura | W. Werribee

[1] Maino, J. et al. (2023) Austral Entomol, **62 (1), 118-130.**

Insect Lifecycle

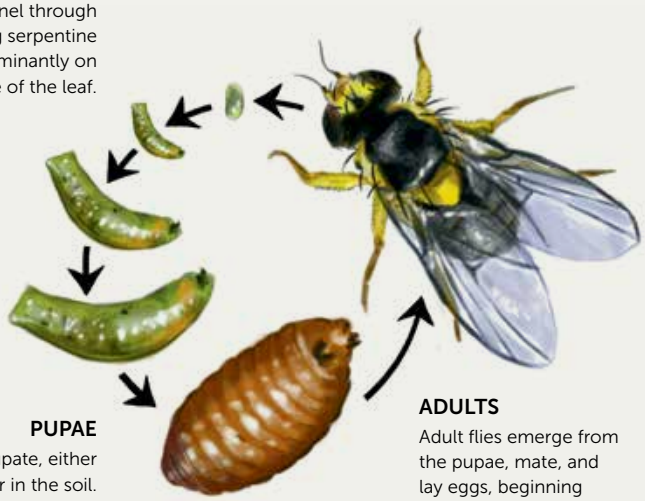
The lifecycle for *Liriomyza* leafminers is generally consistent across species. The typical leafminer lifecycle takes 13 to 43 days from eggs to adult emergence. The time taken to complete each life stage varies depending on temperature. Development rates become quicker as temperature increases, leading to overlapping generations. However, lethal temperature limits exist for each of these leafminer species:

- ASLM 10°C and 35°C
- SLM 5°C and 32-35°C
- VLM 10°C and 40°C.

Lifecycle Stages

EGGS
Adult females create holes (stippling) when feeding and/or laying eggs.

LARVAE
These eggs hatch after 2-5 days and the larvae tunnel through the leaves creating serpentine leaf mines predominantly on the upper surface of the leaf.



PUPAE
The larvae then pupate, either on the leaf or in the soil.

ADULTS
Adult flies emerge from the pupae, mate, and lay eggs, beginning the cycle again.

Illustration by Elia Pirtle.


3A


3B


3C

Impact

Damage from leaf mining and feeding can cause premature leaf drop leading to sunburn of fruit, and also create points for secondary infection from fungi and bacteria

'Stippling' damage *(Figure. 3A),* caused by adults feeding and/or laying eggs, is visible in the early stages of infestation and can lead to a high risk of plant fungal and bacterial infection. Eggs are too small to be seen by the naked eye, so a healthy-looking plant may harbour the pest. Inside the leaf tissue, larvae begin to feed creating tunnels or mines that become larger as the larvae mature *(Figure. 3B)*. These leaf mines can reduce photosynthetic activity, causing premature leaf drop. The most severe infestations usually occur late in the season and can affect large areas of the leaf *(Figure. 3C)*. In warm areas and greenhouse production, damage may be more severe.

ABOVE L-R. Damage caused by *Liriomyza* leafminers feeding on host plants. **FIGURE 3A** Stippling damage caused by adult feeding and egg laying *(Image credit: Bahram Fayaz, H.M.Clause)*. **3B** mines caused by larvae feeding on *(Image credit: John Duff, Queensland DAF)*. **3C** Mines caused by larvae feeding potato leaf and opportunistic secondary infection *(Image credit: John Duff, Queensland DAF).*

Integrated Pest Management

Cultural

Monitor pest and parasitoid activity to inform management decisions.

To detect and monitor adults, look for new stippling on leaves indicating adult leafminers. Yellow sticky cards can be placed at plant height (mid to lower portion) and inspected at least twice weekly.

Deep soil cultivation before planting to destroy infested weeds and plant material from the previous season can reduce the severity of leafminer outbreaks.

Non-host cover crops to exclude adult flies from laying eggs may also help in some cases. Alternate weedy hosts such as pigweed, lamb's-quarters (*Chenopodium album*), chickweed, and nightshade should be destroyed to reduce overwintering populations.

For severe, yearly infestations, consider:

- Tilling or cultivating the top 5cm of soil in early spring to disrupt the lifecycle and kill overwintering pupae.
- Check transplants for signs of leaf mines and white stippling before planting; destroy infested plants.
- Clip and destroy infested leaves to prevent larval development.
- Avoid excessive levels of nitrogen fertilisation, as this can increase leafminer infestations.
- Use adequate irrigation to keep plants healthy and reduce stress.
- Immediately after the final harvest, remove plants and deeply plough crop residues to remove food sources and inhibit pupal development.

Beneficials

Conserve beneficial natural enemies such as parasitoids, learn the signs of parasitism to determine if visible leafmining damage is associated with active parasitoid wasps controlling the leafminer population.

International management of *Liriomyza* leafminers includes using natural enemies such as parasitoid wasps that attack larvae. Overseas research has indicated that Agromyzid parasitoids rapidly target exotic *Liriomyza* leafminers. Field mortality rates can reach up to 80%. Australia has at least 50 species of these wasps that attack native and exotic pests. Their lifecycles vary and can be classified as 'larval/pupal' or 'larval.'

Chemical

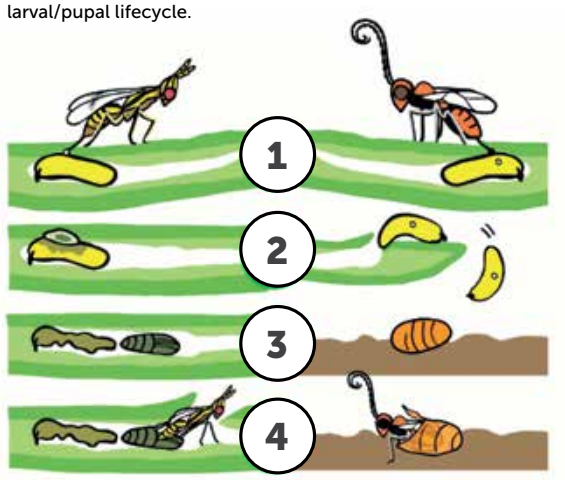
Avoid broad-spectrum insecticides and reduce the evolution of resistance to insecticides

Worldwide, SLM and its related species have been reported to be resistant to many insecticides, including organophosphates, carbamates, synthetic pyrethroids, cyromazine, avermectin and spinosyns. An integrated approach is needed to avoid further insecticide resistance development. When using chemical treatments, rotate the mode of action groups. Chemical management must be carefully planned, and broad-spectrum pesticides must be avoided.

Contact, systemic, and translaminar pesticides are effective at different stages *(Figure 5).* As leafminers are protected within the plant, foliar insecticidal control is often difficult. Foliar protectants must be applied before egg deposition on the crop. The window of activity is a concern and may require several applications for adequate control of the emergence of leafminer. Biological control with parasitoid wasps is more effective. Avoid harming beneficial wasp populations.

FIGURE 4

Lifecycles of parasitoid wasps: a) larval lifecycle versus larval/pupal lifecycle.



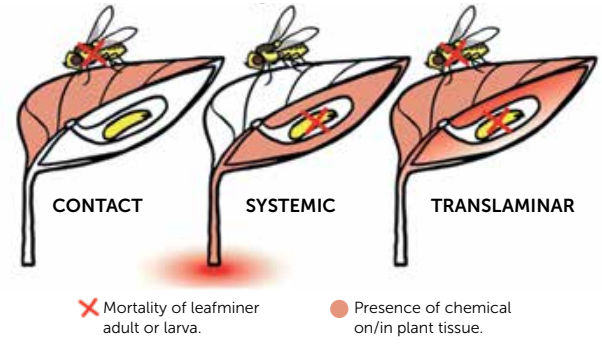
LARVAL

1. Female wasp lays an egg on or in fly larva.
2. Wasp egg hatches and feeds on fly larva.
3. The wasp pupates inside the leaf mine after consuming the fly.
4. Adult wasp emerges from the leaf mine.

LARVAL/PUPAL

1. Female wasp lays an egg on or in the larva.
2. Wasp egg stays dormant until fly larva emerges and pupates.
3. Wasp egg activates consuming pupating fly.
4. Wasp emerges from otherwise healthy looking fly pupa.

FIGURE 5 Insecticide Modes



Illustrations by Elia Pirtle.

FURTHER READING

Resources for management of leafmining flies in Australia.
ausveg.com.au/biosecurity-agrichemical/biosecurity/mt20005

Chemical management of leafminers from NSW DPI.
dpi.nsw.gov.au/biosecurity/plant/insect-pests-and-plant-diseases/serpentine-leafminer/chem-man

AUSVEG Biosecurity Alerts: bit.ly/3hjOjTo

Plant Health Australia – *Liriomyza* spp.
Factsheets, diagnostic protocols and contingency plans:
- Vegetable Leafminer: bit.ly/3tuLDau
- Serpentine Leafminer: bit.ly/2X59Rfj
- American Serpentine Leafminer: bit.ly/38P6gEE.

FOR MORE INFORMATION
Contact AUSVEG Extension & Engagement Team on 03 9882 0277
or email: science@ausveg.com.au

This project has been funded by Hort Innovation using the fresh and processing potato, melon, onion and vegetable research and development levies and contributions from the Australian Government. **Project Number: MT20005**

Hort Innovation VEGETABLE FUND | Hort Innovation POTATO – PROCESSING FUND | Hort Innovation POTATO – FRESH FUND | Hort Innovation ONION FUND | Hort Innovation MELON FUND

ISSUE 10

SPRING 2023

POTATO LINK

supplement

NEW RESEARCH FROM THE JAMES HUTTON INSTITUTE

USING BIOLOGICALS IN A COMMERCIAL FARM SETTING

FEATURE ARTICLE

POTATO BREEDING

ahr applied horticultural research

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POTATO LINK AUSTRALIAN POTATO INDUSTRY EXTENSION PROJECT

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AUSTRALIAN POTATO INDUSTRY EXTENSION PROJECT

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Cover: Dr Ingo Hein from the James Hutton Institute in Scotland - *Photo by J. Ekman*

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NEW RESEARCH FROM THE JAMES HUTTON INSTITUTE, SCOTLAND

When you think about potato production, most people will likely think immediately of Ireland. However, if it is seed potatoes that you're after, you are more likely to think Scotland. Scotland has a reputation as being the world's best producer of seed potatoes. So why is that? Is it the pure waters of the highlands, the famously damp weather, the resonance of bagpipes in the air or simply hard graft and science. Dr Jenny Ekman reports

Scots eat a lot of potatoes. Annual consumption of potatoes in the UK is 60 – 70kg per person annually, compared to a mere 17kg/pp in Australia. More than 90% of Scots are said to eat potatoes at least once a day, and chips (or hash browns) are offered with pretty much every meal.

Although a small country, approximately 28,000 ha of Scotland is planted to potatoes[1]. Nearly half of this is high value seed (approx. 12,000 ha). The potato industry not only contributes at least £250 million directly to the Scottish economy, but also supports potato growing in Britain valued at £928 million, with multipliers for processing running into billions[2].

Until Brexit, the Irish and potato industry also largely relied on Scottish seed potatoes. However, EU regulations struck as part of the 'soft border' agreement meant that Scottish seed potatoes were not only prohibited from export to Ireland, but even to Northern Ireland – despite it being still part of the UK. Fortunately, this was recently reversed, and Scottish seed can again be grown in Northern Ireland. Moreover, new export markets were found, with Scottish product now finding its way to a diverse range of countries including Türkiye, Kenya and even Saudi Arabia.

Given the importance of potatoes in Scotland, it is unsurprising that it also hosts major potato research and extension activities.

Research and development is focussed at the James Hutton Institute, Dundee.

THE JAMES HUTTON INSTITUTE (JHI)

JHI is internationally renowned for potato science, with a focus on breeding programs, integrated pest and disease management, sustainability in a changing climate and other applied research. They are also custodians of the Commonwealth Potato Collection, a unique source of potato germplasm.

In July this year I was fortunate to visit JHI and meet some of the potato researchers. The institute is currently expanding; JHI is not only a leader in potato R&D, but also soils, barley, crop development and environmental research. A massive new construction was underway which will house the International Barley Hub as well as an Advanced Plant Growth Centre.

THE NATIONAL POTATO INNOVATION CENTRE – PROFESSOR IAN TOTH

Excitingly for the potato industry, the next proposed development is a National Potato Innovation Centre (NPIC). Based in Dundee but expected to include national and international partners, the NPIC is planned as a state-of-the-art innovation centre. The three pillars of the NPIC are:

1. **Breeding new cultivars** with traits to address climate, disease and quality issues
2. **Sustainable and climate resilient production systems** using precision agriculture, below ground phenotyping, improved disease management and reduced waste
3. **Innovative potato products** such as functional foods, plant based medicines and plastic alternatives

The NPIC will be headed by potato pathologist Professor Ian Toth.

"Although funding for the NPIC has not been confirmed, there is a strong economic case for the project and we have had much positive feedback on the plan. We see the NPIC as a creative cluster for potato research and innovation, building on the existing potato R&D at JHI."

The Centre would be similar in scale to the International Potato Centre (IPC) in Lima.

"However, whereas the IPC is focussed primarily on potatoes for development, the NPIC would be involved in commercial, applied research," explains Prof. Toth.

"Examples include application of new technologies for rapid development of improved potato varieties, net zero production strategies to reduce waste, and high value functional foods".

Plans for new facilities include a greenhouse complex, a pilot processing plant and below ground phenotyping systems.

Future opportunities

With its exit from the EU, the UK Government is looking to partner up in research projects with other countries, especially those that operate similarly.

"There are lots of opportunities, and possibly even Government funding, for collaborative arrangements that would allow UK academia and industry to work with Australian academia and industry on joint projects."

That would give Australian researchers the opportunity to use and work at the JHI facilities, to the benefit of both. A great adaptation in the current cost-saving climate.

Prof. Ian Toth, Director of the proposed National Potato Innovation Centre, inspects some of the other construction currently occurring at the James Hutton Institute, Dundee.

POTATO GROWTH AND STORAGE – PROFESSOR DEREK STEWART

In the meantime, other new facilities are already going in. Derek Stewart is Director of the Advanced Plant Growth Centre, a £27 million flagship project hosted at JHI. As Derek explains, the project has four pillars:

Postharvest storage

Six sparkling new cold rooms had just been installed at the time of my visit. The rooms have been designed to mimic the conditions inside large potato storage environments, each room being sized to store eight half tonne Standard Potato bins.

They can be used for either seed potato trials, or for extending the storage life of fresh and processing potatoes. Potential projects include testing the effects of different cooling rates, storage times and storage temperatures on seed potato ageing and performance, as well as examining the cold tolerances of different processing varieties. The first planned trial involves a comparison of different anti-sprouting agents (see box out on page 7 for further detail).

Prof. Derek Stewart in the new storage facility.

Controlled environment facility

While the JHI already has some plant growth chambers, this new facility will enable much finer control of environmental conditions, as well as greatly expanding capacity. Everything can be controlled – the atmosphere, light intensity, even rain and wind.

The focus of research here will be adapting to climate change; subjecting plants to heat, drought, flooding and other stresses, then seeing how this affects development.

"The objective is to look at today's varieties, and how they will cope with tomorrow's environment. We aim to find plants which can survive difficult conditions and put that information into breeding programs," explains Derek.

"We can even look at disease problems, as todays' bugs and microbes might not be the same ones as cause problems in the future".

Plant phenotyping centre

This centre is also currently under construction. It is designed to allow potatoes grown in the controlled environments to be examined in incredible detail. A whole array of sensors will be integrated to monitor growth and development including infra-red, hyper-spectral, chlorophyll fluorescence, a 3D laser image scanner and possibly others.

"CO_2 and temperature effects on potatoes are really interesting," comments Derek.

"The potato plant likes a bit of warmth, but the tipping point where productivity falls away is sharp. I think that this needs a lot more work. Scientifically, you're juggling all these different effects from temperature and atmosphere, and how plants respond to those".

Vertical farming

Vertical growth towers are indoor ecosystems that allow extremely high plant densities and fast growth rates. They have found commercial application for city production of leafy greens and herbs. They are definitely not normally associated with potatoes.

However, Derek has other ideas.

"The system is fantastic for seed potato production," says Derek.

"Even with the need for energy to power it, the system is so productive that the costs balance out. The sums are even more appealing if renewable energy can be generated onsite. We are not talking microtubers but seed perhaps 30 to 50mm diameter."

When the vertically farmed seed were planted in the field they proved indistinguishable from conventionally produced seed.

"The other thing about vertical farming is plant health," explains Derek.

"You can pretty well eliminate viruses and other diseases from the system. I could imagine a grower group partnering on one of these systems to produce all their own seed".

SUPPRESSING SPROUTS

Up until 2020, 90% of all potato sprout suppression applications used worldwide included CIPC (Chlorpropham). CIPC is cheap and extremely effective. A single application can prevent sprout growth for up to 5 months, with second applications extending this period even longer[3].

However, breakdown products of CIPC have been associated with human and environmental toxicity. Compounds produced during thermal fogging are not only present in fresh potatoes, but are retained after processing and cooking. They are also highly persistent in the environment[4].

In 1996 the USA reduced the amount of CIPC residue allowed on fresh potatoes from 50ppm to 30ppm. The European Union banned use of CIPC outright in 2020, with this same legislation preventing use in the UK. Older storage facilities now cannot be used, due to contamination by this product. While CIPC is still registered for use in Australia, it seems possible that use patterns may be restricted in the future.

In response, a number of new sprout suppressants have become commercially available. These include 1,4-Sight/Dormir (1,4-dimethylnaphtalene), hydrogen peroxide, ethylene and a range of essential oils – clove, spearmint, caraway and orange oil to name a few. While there are individual efficacy trials on each, it is difficult to find data which compares these treatments against each other and for different potato varieties.

With new cold rooms ideal for this purpose, trials at JHI will examine the performance of different sprout suppressants on several of the most important potato varieties.

Prof. Derek Stewart in the vertical farm.

THE MANY FORMS (OR NOT) OF LATE BLIGHT – DR DAVID COOKE

For many people, when you think of potato diseases, you think of *Phytophthora*. Dr David Cooke is a late blight specialist at JHI. He has collaborated extensively in the past with our own Dolf DeBoer, recently retired from the Victorian DPI.

One of his key roles is genotyping samples that come in on FTA cards. These simple cards are used to collect samples of the disease by simply squishing a lesion into the FTA matrix, then sending it through the post. No plant material is included, so there are no issues with import or export.

It is through David that we have been able to confirm that Australia still only has the asexual form of late blight.

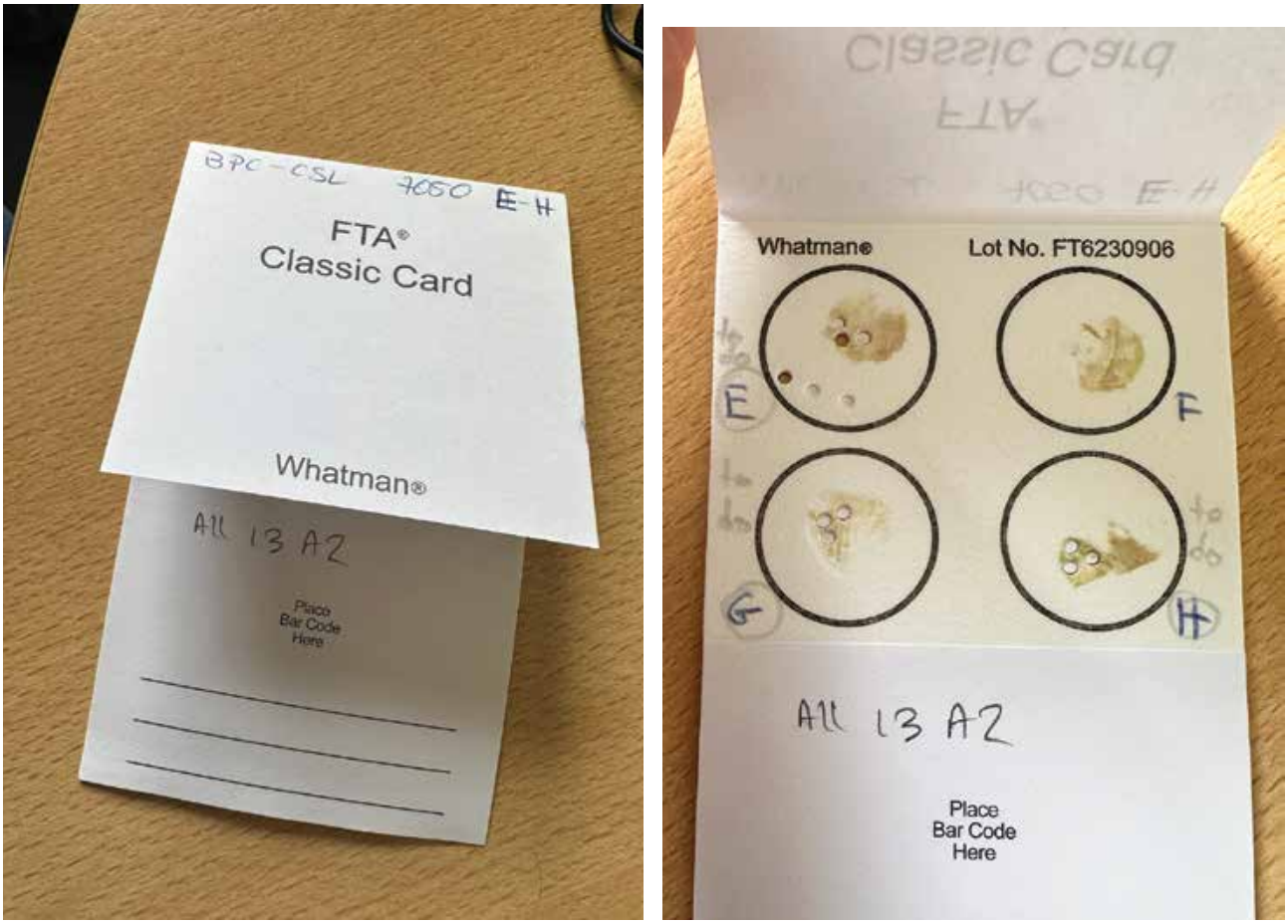
"The last introduction of late blight to Australia was probably before the 1940s," comments David.

"My message to your industry is don't soften the approach, as you're definitely doing a good job of keeping the new strains out".

Dr Cooke suggests every agronomist or agrochemical rep should keep a few FTA cards in their pocket, just in case.

"It's just good to keep checking that the population hasn't changed, and the existing fungicides will still be effective".

The cards themselves cost around $2, while the lab testing is about $55 for the four lesions included on each card.



FTA cards are used to take and stabilise samples of pathogens. As no plant material is included, they can be readily posted without affecting quarantine.

SHEDDING LIGHT ON LATE BLIGHT - DR ELEANOR GILROY

Dr Eleanor Gilroy is a molecular plant biologist with a special interest in how the late blight pathogen infects potato plants. *Phytophthora* is sensitive to UV light, so mainly infects potato plants at night.

Dr Gilroy has discovered that the late blight pathogen is not only affected by UV light, but that infection is reduced by exposure to red light. Her theory is that these wavelengths, which would normally occur at dawn and dusk, trigger plant defence responses.

While using light to control disease in field crops sounds futuristic, this is already a commercial prospect, at least for fruit crops. The company Thorvald provides commercial services in the UK, California and Norway. UV-C emitting robots that look like mobile sun beds are used to control powdery mildew in orchards and polytunnels. In the case of strawberries, a one minute treatment with UV-C light, when followed by a 4 hour dark period, has been demonstrated to almost fully control grey mould in greenhouses[5].

"In the case of *Phytophthora*, UV-C light kills it within a minute. During a blight period, maybe the irrigation boom arm could also carry UV-C lights which would kill the pathogen," suggests Dr Gilroy.

"Alternatively, red light could help prime the plant to fight disease."

Dr Ellie Gilroy is investigating the mechanisms by which late blight infects plants.

SOIL BORNE DISEASES AND THEIR HOSTILE NEIGHBOURS – DR JENNIE BRIERLEY

Dr Jennie Brierley works on soil borne potato diseases, including diagnostics, and has strong links with Australian researchers. Dr Brierley collaborated with the team that developed Predicta PT as part of an international diagnostics project, and has worked a lot on linking detection to disease risk.

"Actually, the South Australian group is ahead of us in some ways now, as they have commercialised the service. Here, commercial adoption is still relatively limited," she explains.

"More recently I've been looking at soil health and how that affects different diseases."

This is part of a major, long term project. The JHI has a site where they are growing potatoes on a six-year rotation. Each field has two halves, one with organic amendments added each year and reduced cultivation (integrated), whereas the other half is normal practice (conventional).

"So far differences have been hard to find, largely because the long rotations are doing a great job at controlling disease".

On the positive side, this suggests that adding organic matter doesn't **increase** disease, as some have thought it might.

Dr Brierley is now taking a different approach, screening soil samples from the different plots against pathogens in pot trials.

"We've found that soil from some of the plots does seem to suppress diseases like *Rhizoctonia* and common scab. So now I'm looking at all the different organisms which are in that soil, and the differences we can find in the soil microbiome".

It's still early days, but the objective is to find new ways to control those most elusive of pathogens – soil borne diseases.

Aerial view of the Centre for Sustainable Cropping site at JHI. Each half field is assigned to either conventional or integrated management.

Pot trials are being used to screen soil from conventional and organically amended plots against soil-borne pathogens such as Rhizoctonia and common scab.

WHERE DO TUBERS COME FROM? – DR ROBERT HANCOCK

It's the sort of question you usually need a child to ask – how does the potato plant decide it's time to make tubers?

Potatoes are perhaps the ultimate preppers of the plant world. From the plant's point of view, tubers are not meant to be eaten, but rather to allow it to survive a hostile winter, re-emerging once warmth returns to the cold soil.

For the original potato plant growing in South America, this was relatively straightforward – they responded to daylength. Shortened days trigger production of a protein signal called SP6A. This travels from leaves to stolons, effectively saying 'winter is coming; time to form tubers'.

However, modern varieties are day neutral, so can be grown at any time of year and any latitude.

"We still don't know exactly how that SP6A signal is integrated in day neutral plants. Presumably it relates to developmental age," explains Robert.

"One thing we do know is that high temperatures stop it in its tracks. As there's no production of SP6A, there are no tubers, no matter how well the plant is growing".

From an evolutionary point of view, flowering is a much better way to reproduce. Forming a tuber is essentially plan B. This may explain why warm, well-nourished, well-watered plants fail to form tubers.

"For example, we found that day/night temperatures of 28°C/18°C almost totally prevented tubers forming for Desiree," states Robert.

"But it's not really heat that's the problem for the plant, as they were still growing well. It seems likely that varieties considered 'heat stress tolerant' actually just have a stronger tuberisation signal."

Dr Rob Hancock at work in the lab, measuring photosynthesis using infrared gas exchange.

"What we're working on is finding the genetic triggers that either increase formation of SP6A or increase sensitivity to low levels of SP6A. Breeding programs can then select plants with genes that will trigger stronger or earlier tuberisation, increase yield, or allow tuberisation at high temperatures."

One of the other promising results Dr Hancock has had is working with Germin-like-proteins (GLPs).

High levels of GLPs make it easier for the plants to shift carbohydrates from the leaves into the tubers. Effectively, they open the gates of tuberisation wider, increasing the rate of tuber bulking.

While this research is still lab based, genes that up-regulate GLPs could be an important part of a future breeding target. They also increase our understanding of how and why potatoes form tubers. Potentially, we can help the 'preppers', but to our own advantage.

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POTATO BREEDING AND VARIETY SELECTION

Understanding potato genetics. By Dr Jenny Ekman

Drs Hein, Sharma and Chen work on potato genetics, genomics and breeding. Potatoes are particularly difficult to breed as they have four different copies (alleles) of each gene (tetraploid) instead of the normal two (diploid). This means there are a lot more possible outcomes from crossing varieties, with outcomes frequently unpredictable.

"A really big moment for us was the release of the potato genome in 2011. Sanjeev was an author on this publication, which was a big international effort with many institutes and researchers involved. It's a really big genome. If you were to print it out on paper, you would cover a distance of 2,600 kilometres, nearly the length of the Australian east coast," explains Ingo.

According to Dr Sharma, breeding before the potato genome was known was a bit like going to a library blindfolded and trying to find a book. Now, through genome sequencing, we know which book is where.

One of the puzzles the group has been examining is the genetics behind disease resistance.

"We've examined the genetics of 700 different potato varieties from around the world. We found that only a handful of genes are providing resistance to late blight, nematodes, viruses and other diseases. Most have these have been deployed since the 1960s, which is why resistance is often breaking down."

However, it's not all bad news, as the team has also identified many more genes that could be used. That means there's a huge opportunity to improve resistance by breeding these genes into new varieties.

This process is now easier due to the development of genetic markers for these resistance genes such as Single Nucleotide Polymorphisms (SNPs).

Potato breeders necessarily produce hundreds, if not thousands of new plants a year. Traditional screening by growing the plants, then exposing to disease or stress, requires space, time and lots of work. If we know what gene is wanted, it would be much more efficient to test if the desired gene was present through gene sequencing. This may be quicker, but the data is huge and cost still too high.

"Now we can simply scan for these SNPs," says Dr Chen.

"The markers we have developed are nearly 100% effective at detecting whether the desired gene is present. These are now being used by commercial companies. If the marker is detected, then that gene will certainly be expressed."

The trend now is to try to breed in as many resistance genes as possible. While a single gene may be able to protect the plant from a specific disease, such resistance is fragile. A tiny change in the pathogen may overcome it. Including a range of different resistance mechanisms makes resistance more durable.

According to Dr Sharma, many of the commercial traits of potatoes are controlled by multiple genes.

"Flesh colour, tuber shape, eye depth; these traits are mainly controlled by a single, dominant locus (gene). However, features such as yield and tuber dry matter are more complex, with many genes involved, each contributing a small amount to the trait. This is where machine learning and new genomic prediction models can help direct breeding programs".

Such advances are expected to massively increase the speed of new potato breeding. Such genomic data can be combined with growth information produced through the new JHI Advanced Plant Growth Centre (APGC). As a result, selection processes that used to take more than 10 years could now potentially be completed in two or three.

Dr Sanjeev Sharma (left) with Dr Glenn Bryan, on the sequencing of the potato genome.

COMMONWEALTH POTATO COLLECTION

One advantage specific to the team at JHI is that the institute hosts the Commonwealth Potato Collection (CPC). The collection has at least 1,500 potato accessions, stored as true potato seed. Every year 60 to 80 of these are grown, which means it takes around 20 years to refresh the whole collection.

This process also provides an opportunity to screen each accession against diseases and determine whether resistance is due to a known or novel gene.

Visiting the CPC greenhouse feels a bit like going to a botanic garden, yet all of the plants are *Solanum*. The range is truly extraordinary.

There are long, leggy plants with ridged stems, adapted to climb from the forest floor in their search for light. There are dwarf plants that come from cold, high mountains. Some plants are smudged dark purple, others are pale. Flower colours range from white to pink, purple and almost blue. Many are almost unrecognisable as potato plants, their leaves being anything from pointed daggers to broad ovals to fern like tassels and a wealth of others.

Many of the plants here are diploid, so they only have two copies of each gene. While this makes crosses more predictable, diploid potato flowers are typically not self-compatible. In order to preserve the diversity within accessions, one of the jobs of the staff here is therefore to collect pollen from plants within an accession and use it to pollinate the others. This is labour intensive but necessary.

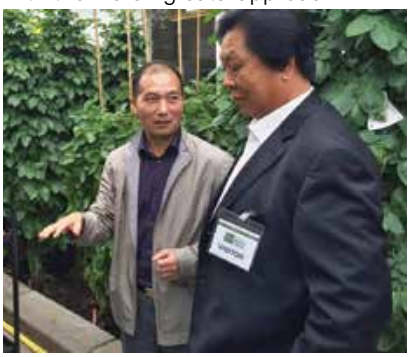
The variability of plants grown from cross pollinated seed within each accession was quite noticeable, with a range of flower colours and leaf shapes.

The only way to ensure a chosen plant propagates true-to-type is to clonally maintain it through cuttings or tissue culture, or re-grow it from tubers. Regrowing from tubers is not realistic, so that leaves tissue culture and cuttings. *More on that later in this issue.*

Staff at work in the Commonwealth Potato Collection (CPC). Each plant is carefully trimmed and staked, and the flowers hand pollinated using pollen collected from a plant within the same accession.

Some of the incredible diversity of potato plants on display at the CPC.

However, there may now be a fourth option. The potato community has found a way to overcome self-incompatibility in diploid plants by taking advantage of the 'SLI gene' used by Dr Chen. Introducing this gene allows a diploid variety to be self-pollinated. After a few generations of selfing, the plant becomes 'homozygous' that is, genetically more pure. When this variety is crossed with another such line the results will be predictable. This contrasts with the 'herding cats' approach in conventional potato breeding. Tomato breeding also uses homozygous lines.



Dr Chin (left) exchanges potato breeding strategies with Mr. Xisen Liang, the Chairman of Xisen Potato Group Ltd.

"Developing such material is very useful, especially adapting the diverse genetic resources that we have here at the CPC so they can be used in hybrid breeding programs, explains Dr Chen."

Of course, the outcome of any breeding program is to produce that's not only productive and easy to grow, but also that consumers want to buy. For example, there are potato varieties available that are highly resistant to potato cyst nematode. Unfortunately, they are not well liked by Scottish consumers so farmers don't grow them.

"I personally think this will change if supermarkets have to put a carbon footprint on products," suggests Ingo.

"If a variety uses less nitrogen, less water, less pesticide, and so has a smaller footprint, then we will see a shift where consumers are more willing to adopt them. At the moment farmers want to grow these new varieties, but they have trouble getting them into the supermarkets."

Dr Ingo Hein in the CPC greenhouse.

THE ROAD TO COMMERCIALISATION - DR JONATHAN SNAPE

James Hutton Ltd is the commercial arm of JHI. This structure has the advantage that it keeps business separate from research, yet lets the two work together.

Director Dr Jonathan Snape explains further: "Our program works closely with the researchers at JHI. So, for example, we can use the genetic markers that Ingo's team has found, taking them from where the science stops to where commercialisation begins."

JH Ltd employs two potato breeders, who work with customers to develop potato varieties with the characteristics they want.

"One thing we do is breed specifically for McCain frozen fries, working with them to determine the characteristics they want." says Dr Snape.

"Once selected, we can send germplasm to McCain trial sites around the world, and they decide which ones suit that environment."

Mayan Gold is one of the varieties developed at the JHI which was – briefly – commercialised in Australia. Unlike most commercial strains, Mayan Gold was a diploid (like the accessions growing in the CPC) and belongs to the cultivated group of Phureja. Phureja potatoes are the direct descendants of potatoes that grew in the Andes Valley, South America, and have little or no tuber dormancy. Compared to commercial tetraploid varieties, Phurejas also generally have lower yield and smaller tubers. However, they also have colour, flavour and texture combinations not found in their tetraploid cousins.

"The feedback we got from our partners in Australia was that Australian consumers aren't that interested in potato flavour, so Mayan Gold couldn't get the premium prices it needed."

"In contrast, one of our other varieties – Nadine – has been very successful in Australia. Nadine is incredibly productive. It wasn't popular here because it didn't have a strong 'potato' flavour. However, if you put tomato sauce on it then it's fine."

I guess Australians just like different kinds of tatties to the Scots!

FROM COMMERCIALISATION BACK TO RESEARCH – GAVIN PRENTICE, AGRICO UK

Just down the road from the JHI are the offices of Agrico UK, one of the many subsidiaries of Agrico BV. Agrico is an interesting company. Formed 50 years ago in the Netherlands, the company remains a co-operative, with more than 1,200 grower members. They now hold the licences of 80 different potato varieties, with a huge range of growing characteristics. One Agrico variety familiar to us is 'Carisma' low GI, otherwise known as Almera.

The company certainly invests strongly in its breeding programme. Agrico Research has its own 4,000m^2 greenhouse complex in Bant, the Netherlands. Here is where the research produced by Ingo's team really hits the road, as Agrico relies strongly on using DNA markers to test seedling DNA. The ability to test a tiny bit of organic material, instead of growing whole plants through to maturity, is clearly a game changer.

Current breeding programmes are focussed on resistance to PCN, PVY and late blight, as well as producing fast maturing varieties for the "early fries" processing market. There's no point breeding potatoes consumers don't like, so it's not surprising they conduct taste testing too.

In total Agrico BV produces more than 450 kT of seed potatoes annually, contracting an area of over 14,500ha. This sounds impressive, but still represents only 6% of the global market. Nearly all (92%) of this production is exported, and Agrico now has licensed potatoes growing in 80 countries on all continents.

Seed potato production in Scotland has declined slightly in recent times. However, according to Agrico UK's Technical and Procurement manager Gavin Prentice, they still count 60 growers among their members, producing up to 25kT annually of conventional seed, plus a smaller amount (150t) of organic seed.

Research to commercialisation then circling back to research, great to see.

Gavin Prentice, Agrico (right) with Prof. Ian Toth (left) and grower David Pate (centre) in Wester Meathie Farm's current seed storage facility; the company is currently constructing a much larger facility next door.

THE SASA POTATO STOCK COLLECTION

Disease control starts with clean seed. While this sounds obvious, the process of getting there is by no means short or easy. With multiple generations required from the time a new variety is produced to when it reaches a retailer shelf, every step must be carefully scrutinised to ensure no pathogen has crept in.

By Dr Jenny Ekman

In June this year I was fortunate enough to visit SASA – the Scottish Agricultural Science Agency. SASA staff are involved in a range of activities, from wildlife and environment to EU trade guidance. Importantly, they are also they key authority responsible for the Scottish seed potato classification scheme, as well as the keepers of the nuclear stock collection.

NUCLEAR POTATOES??

In this case nothing to do with energy or uranium, but rather the establishment of a core collection of 'motherstock' plant material, from which all else can be derived.

It is incredible to think that 95% of the potato seeds grown in Scotland have their origin in the tiny, test-tube-grown microplants held in the SASA Nuclear Stock collection refrigerators. The collection includes over 1,000 different varieties, each of which has been rigorously tested for a huge range of diseases. This ensures that the starting material is absolutely pathogen-free.

Nuclear Stock Manager Jackie Gibson explains how the system works

"Every year we get in around a hundred new breeding lines and varieties. Material from Scotland is usually supplied as tubers, whereas the European community tend to send microplants."

Tubers are initially tested for bacterial diseases, mop top virus and others using plugs taken from the heel ends. Eye plugs are also scooped out, these being grown into full size plants in the glasshouse. Similarly, if microplants have been supplied, the plant tissues are tested directly as well as grown into larger plants in clean growing media.

The glasshouse grown potato plants are then screened further, particularly for viruses. Scotland is free of many important viruses as well as potato spindle tuber viroid, ring rot and brown rot. It is essential that such diseases are not introduced, let alone spread on seed.

"Brown rot was detected in one of the tributaries to Loch Tay 20 odd years ago. Fortunately, it was eradicated, mainly by removing all the nightshade plants from the riverbanks. There are still surveys of all the rivers and tributaries every year to check that it's not there. A lovely job in good weather," smiles Jackie.

"Actually, PVY is the most common virus, but we can pick it up really early, so it's not a problem."

Virus testing uses ELISA (an enzyme-based assay) as well as indicator plant techniques. The latter involves taking

SASA Export Liaison Officer Jacquie Gibson with a small selection of the SASA seed potato nuclear stock collection.

samples of plant sap and spraying onto lightly damaged capsicum, tobacco and *Chenopodium* species, including quinoa.

Similarly, bacteria can be detected both by using plates of selective media and by directly injecting macerated tuber into young eggplant (ring rot) and tomato (brown rot) plants. This really does literally involve using a syringe to inject the stems of young plants.

"The plant-based assay is really useful for a couple of reasons," explains Jackie.

"As it's less specific than ELISA, it will pick up things not otherwise tested. For example, if a new virus strain is present, we still see symptoms in the test plants."

"Secondly, if only tiny amounts of the pathogen are present, it will bulk up in the indicator plants. The symptoms then become more obvious, making the pathogen easier to detect."

MAKING ONE INTO MANY

Once the source material gets the all-clear, it can be micropropagated. Sprouts from the tubers are dissected into nodes, each then planted into agar at a rate of six per tube. Placed under grow lights, each node develops into a microplant. After four to six weeks, the tiny plant can be re-subdivided and transferred to fresh medium, the process being repeated until a few plants become hundreds.

The microplants are then sent to the next stage of the multiplication process. This is performed by private micropropagation laboratories and 'pre-basic' growers. They grow on the tiny plants in sterile media in polytunnels or using aeroponics, producing millions of mini-tubers ready to plant in the field.

A few precious microplants are also added to the nuclear stock collection. At 14°C with 3% mannitol (a type of sugar) added to the media, the microplants can survive for up to a year before re-subdivision and addition to fresh media.

"Some of these plants might look dead, but once they are cut and given a dose of nutrients they come back to life," observes Jacquie.

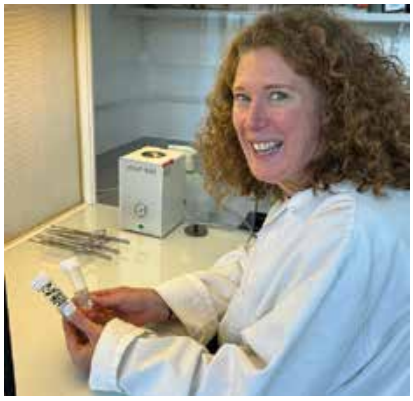
"What's more, most varieties will throw microtubers. These tiny little dried brown things will all grow, no problem. It's amazing really."

It's quite a job though. With four tubes each of 1,000 accessions, it takes the three staff two months to replenish the collection each year.

And that's not the only task. Every year, half of the stored varieties are re-grown at SASA's field site to check that no genetic changes have occurred during storage. The plants are grown right through to tuber bulking, with inspection at every step to make sure they remain true to type.

It's a lot of work. However, it's still a better and more efficient way to maintain varieties than annually replanting tubers in the field.

Microplants ready for propagation. The tube at right also contains sprouting microtubers (circled).



Microplants are cut into nodes, with six nodes planted into each new tube of media; Jackie Gibson demonstrates the tiny pieces of material used as initial plugs and the finished tube.

PLANTLETS ON THE MOVE

While most of the material generated by the unit goes to pre-basic growers, others are used by researchers, or exported overseas.

"These plants here are going to Indonesia" says Jackie, indicating a group of 20 tubes, "and these are for Africa."

The breeders at James Hutton have developed a lot of varieties for Kenya and other places in Africa.

"In this case, we're just sending 20 plants of each variety. They have to multiply them locally using tissue culture, then plant them in the field."

Amazing to think that those 20 tiny plantlets in their small glass vials could hold the key to potato production in Kenya, generating thousands of tonnes of PCN resistant potatoes.

From such a tiny thing, to one so large.

KEEPING SCOTTISH SEED CLEAN

By Dr Jenny Ekman

Another important role of SASA is to act as the Certifying Authority for seed potatoes. They also manage and administer the Seed Potato Classification Scheme. In this, they perform a role similar to our own AuSPICA, but are Government based.

In Scotland, all stages of seed production are regulated. These rules are stricter than countries within the European Union and certainly contribute to Scotland's excellent reputation; only the highest quality pre-basic and basic classes of seed are produced here.

Land must be tested and found free of potato cyst nematode before planting any seed crop. Rotations of seven and five years are mandated for pre-basic and basic category seed potatoes respectively, with virtually all paddocks de-stoned to ensure perfect soil conditions.

As in Australia, crops are regularly inspected for symptoms of virus, bacterial diseases, or failure to grow true to type. SASA employs around 80 inspectors, supervised by 30 Agriculture Department staff. Every seed crop is inspected at least twice, with officers searching for symptoms of virus, blackleg, varietal discrepancies, or other issues suggesting the seed is not as it should be.

New inspectors go through a rigorous seven-day training programme. Even existing inspectors need to undergo four annual days of refresher training. This training is conducted at the SASA Gogarbank Farm and – lucky me – was in progress at the time of my June visit.

The training plots are truly an amazing thing to behold. The site has over 3,000 individual plots with more than 1,200 potato cultivars, 150 examples of off types, 150 examples of viruses and mixtures of diseases with other disorders, including herbicide injury.

I was shown around by Dr Triona Davey, Head of SASA's Potato, Virology and Zoology, as well as the SPCS and Export Manager John Ellicott.

The Seed Potato Certification Scheme Inspector training plots at SASA's Gogarbank Road farm. Each tag indicates a different cultivar or other treatment.

"What we've got here are plots with all the varieties that are commercially grown in Scotland," explains John. "And these are our new inspectors. This year we've got 27 doing the course. They're a mixture of temporary summer staff and permanent staff who also do other jobs - such as inspecting cattle."

"New inspectors have to be able to identify the top 30 varieties by looking at the foliage alone. They also need to recognise symptoms of key diseases and disorders. Next Tuesday the returning inspectors come back for their refresher, and some of them can recognise up to 1,000 varieties! Knowing what each variety is meant to look like means the inspectors have the skills to spot differences, diseases, and rogues in the crop."

The trainees are quizzed daily to check how well they are going with their variety recognition skills. To me all the plants look a bit the same, but John is a great teacher.

"So this is Maris Piper, which was our biggest variety last year. And this is Cara. They're both lime-green on top, but Cara looks more like a palm tree and Piper is a bit more coarse, corrugated even. Hermes, the leaves tend to turn over when it's windy, as the stems are a bit twisted, so you see the pale underneath."

Triona helps as well.

"Desiree, Rooster and Lady Rosetta are the only red varieties, so have red stems. Rooster has the darker green leaves. Then there's Innovator which has stiff terminal leaves a bit like a shuttlecock," she explains.

Incredibly, I find I can soon tell the difference between the shuttlecock and the palm tree. However, even a seasoned inspector can find themselves duped by unusual rogues.

John tells the story.

"We had a case a few years ago where the entire crop was affected. It was an unusual variety the inspector hadn't seen before. It was only after two years multiplication that somebody, just by pure chance, knew the variety and said, this looks funny. Even though an initial DNA test came back as the correct variety, a small variation was picked up. That meant the crop could not be used for seed".

Dr Triona Davey (left) and John Ellicott (right) teach me how to tell my shuttlecocks from my palm trees.

ABOUT THE SCOTTISH AGRICULTURAL SCIENCE AGENCY

SASA is a division of the Scottish Government Agriculture and Rural Economy Directorate. Their primary role is to provide scientific services and advice in support of Scotland's agriculture and wider environment.

SASA occupies a world class laboratory, glasshouse and experimental farm facility on the outskirts of Edinburgh with a community of 100 scientists and their support staff.

More information available here:

https://www.sasa.gov.uk

Even more important is recognising the early signs of virus infection.

"You can see the leaf rolling at the bottom of the plant" observes John "then there's the shape of the whole plant. It can go a bit star shaped, pale, even hungry looking. You've got to have your wits about you."

The demonstration plots include so many cultivar plus virus combinations, and sometimes multiple viruses, that it's hard to get your head around. Inspectors also need to check for aphid vectors; if they exceed specified counts, then the seed may have to be tested for virus after harvest.

Detecting bacterial infections is also important. The bacteria block the vascular system, so the plants look soft and slightly wilted. This becomes most obvious under wet conditions.

"You can see it at the base there" says John, "even easier if you pull the plant out."

Then there are mutations caused by herbicide damage. These can easily look like a virus infection or a cultivar variation. However, in this case the crop may be able to grow through normally in the following generation, still producing good quality seed.

Being able to recognise the difference between symptoms, and having the testing service to back it up, can be the difference between a profitable crop and one that's dumped.

I came away with huge respect for the job seed inspectors do. The amount of knowledge they must keep in their heads, as well the different cultivars, diseases, and growth abnormalities they must be familiar with – it's quite a challenge.

Photographs, videos, diagrams have all been tried, but nothing is able to replace experience. Perhaps as John said, the best way is not to overthink it, but use first impressions.

One thing is sure, this is not a job that's going to be taken over by AI any time soon.

PVY symptoms in cultivars Marfona (left), Charlotte (centre) and Desiree (right).

Symptoms of damage by the herbicide Aminopyralid (left) and blackleg disease (right).

USING BIOLOGICALS IN A COMMERCIAL FARM SETTING

A demonstration by PotatoLink

A recent demonstration trial at Springbank near Ballarat (Victoria) investigated the impact of farm practices on the effectiveness of biologicals, including the application of fungicides, the influence of soil nutrient availability, and fertiliser applications.

PADDOCK CHARACTERISTICS AND CROP HISTORY

- Clay soil type.
- Olsen P 44ppm and Colwell P 150ppm.
- Paddock history: oat crop (saia oats) grown before planting of the Innovator potato crop in December 2022.
- Innovator crop harvested in mid-late August 2023.
- The crop received a base fertilisation of croplift 800 at 650kg/ac, supplemented with 10kg of humic acid.
- Additionally, in-furrow applications of sulphate of ammonia and fungicide (Metalaxyl and Azoxistrobin) were applied at planting.
- The same seed source was used in the entire paddock.

Amid high input costs, any opportunity to maximise nutrient use by the crop is worthy of further investigation.

A demonstration trial was established with the aim of improving crop health, quality and yield while also reducing inputs. To achieve this, we strived to increase the populations of beneficial microbes – mycorrhizal fungi – in the soil, which can help to improve nutrient availability to plants.

With many new biological products on the market, it can be a challenge for growers to effectively test the products in their farming system. Often, promising results are observed in pot trials, but the real challenge lies in scaling up these results to a commercial farming operation.

The demonstration explored the impact of in-furrow fungicides, and the influence of soil nutrient availability and fertiliser applications on the effectiveness of biologicals.

Given the many products available to growers, navigating and identifying the most suitable and effective options for their specific farming systems can be challenging. Although one demonstration trial is not enough, as we generate more data across seasons and soil types, the resulting database will help farmers make more informed decisions.

REMIND ME AGAIN – WHAT ARE ARBUSCULAR MYCORRHIZAL FUNGI AND WHY ARE THEY WORTH INVESTIGATING?

Arbuscular mycorrhizal fungi (AMF) play a vital role in plant ecosystems, forming mutually beneficial relationships with the majority of plant species. This unique partnership is a give-and-take arrangement, where both the plant and the fungi derive benefits. The plant provides food for the fungi, while simultaneously evaluating what the fungi can offer in return. The plant essentially acts as the gatekeeper of this relationship, deciding whether it's worth investing in.

AMF bring a multitude of benefits to the ecosystems they inhabit including disease suppression by protecting plant roots from various diseases.

Notably, different species of mycorrhizal fungi exist, and native mycorrhizal species may perform differently and be better adapted to specific environmental conditions. One crucial factor influencing AMF performance is the availability of phosphorus.

When phosphorus levels are high, plants may decide not to support AMF, making it more common to observe significant colonisation of the roots by mycorrhizae in soils with high phosphorus-fixing capabilities. Furthermore, AMF are not particularly fond of cultivation and do not like fumigation, although they can bounce back.

Additionally, AMF support a stable soil structure by excreting compounds through their hyphae, effectively helping to bind soil particles together. AMF also play a critical role in nutrient availability, particularly when it comes to phosphorus synchronisation.

THE TREATMENTS

Using the grower's standard practice, EndoPrime was applied and the following treatments were tested (Figure 1):

- EndoPrime (product containing mycorrhizal fungi, applied to whole paddock)
- No Endoprime strip
- No phosphorus strip + EndoPrime
- No base fertiliser strip + EndoPrime (rest of paddock received croplift 800 at 650kg/ac + 10kg humic acid)
- No fungicide strip + EndoPrime (rest of paddock received Metalaxyl and Azoxistrobin) applied in furrow)

ASSESSMENTS

The following were harvested and assessed to determine the effects of a particular treatment:

- Harvested 3 x 3m plots for EndoPrime, no EndoPrime, and no fungicide treatments
- Harvested 2 x 3m plots for no P and no base fertiliser
- Within the plot area, collected:
  - Number of plants
  - Number of stems
  - Number of tubers
  - Weight of tubers
  - Size of tubers in grades below, where <50 is considered out of spec for processing
    - <50mm
    - 50-100mm
    - 100-150mm
    - 150-200mm

RESULTS

In this field trial, the application of EndoPrime exhibited fascinating effects on potato crop characteristics.

The areas where EndoPrime was applied showed a reduction in both the number of stems per plant (Figure 2) and the number of tubers per plant (Figure 3).

Interestingly, despite these differences, the overall yield remained consistent across all treatments summarised as follows and in Figure 4:

- EndoPrime, no fungicide = 59t/ha
- EndoPrime = 55t/ha
- No EndoPrime 51t/ha
- EndoPrime, no P 49t/ha
- EndoPrime, no base fert 37t/ha

Notably, the EndoPrime-treated areas displayed larger-sized tubers, (100-150mm), while the no EndoPrime areas had a lower proportion of larger tubers (Figure 5).

Unsurprisingly, mycorrhizal root colonisation levels were notably higher in the treatments with no fungicide, no base fertiliser, and no phosphorus, compared to no EndoPrime and EndoPrime areas that both had the other inputs applied (Figure 6).

Additionally, treatments involving EndoPrime exhibited higher specific gravity, ranging from 1.079 to 1.088, in contrast to the no EndoPrime treatment, which had a specific gravity of 1.073 (Figure 7).

These results give some insights into the dynamics of plant-fungi symbiotic relationships. Root colonisation appears to be a reliable indicator of whether this partnership is genuinely established and how it impacts the plant's functionality.

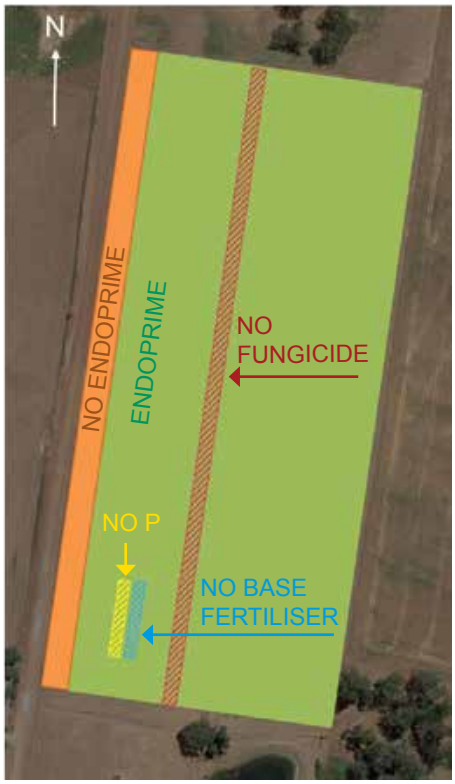


Figure 1. Demonstration treatment layout

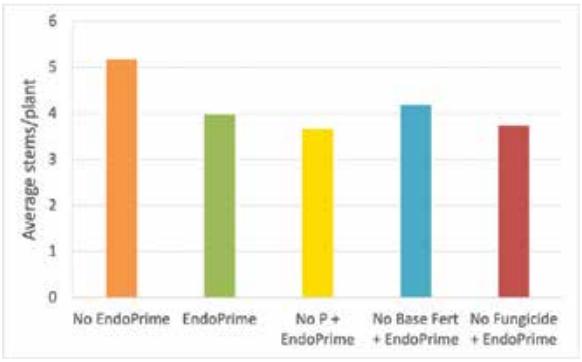


Figure 2. Stems per plant across different treatments - treated areas had 4 stems/plant compared to 5 stems/plant in the no EndoPrime areas.

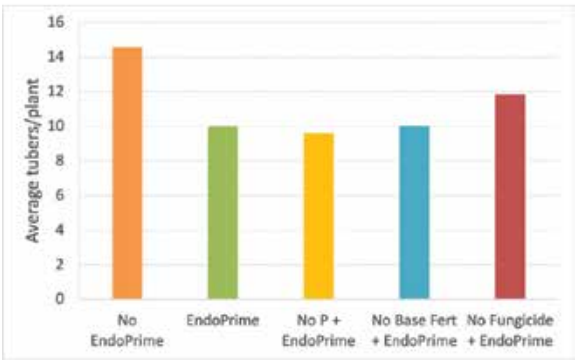


Figure 3. Tubers per plant – EndoPrime treated areas had less tubers with 10 tubers/plant compared to 14 tubers/plant in the no EndoPrime area.

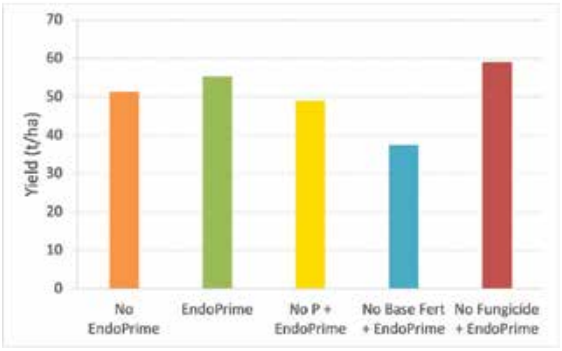


Figure 4. Average yield (t/ha) across different treatments.

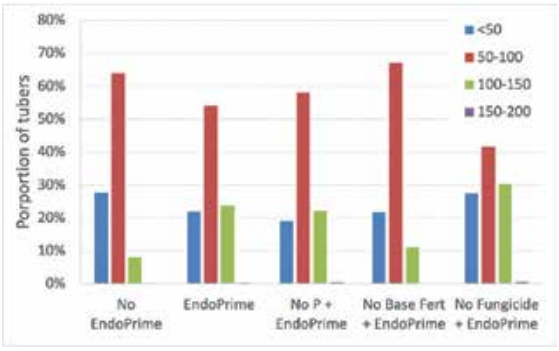


Figure 5. Proportion of average tuber size (mm) across treatments.

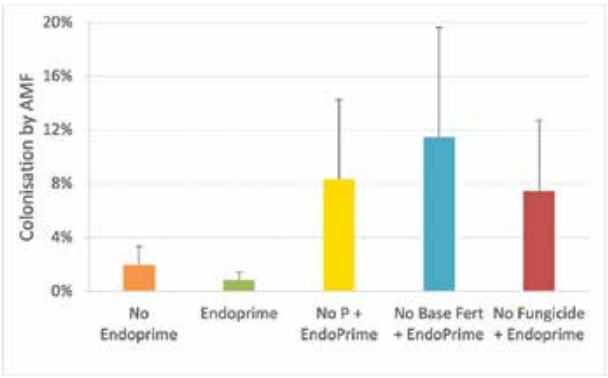


Figure 6. Average root colonisation by AMF across treatments – bottom to middle paddock. Bars indicate the standard error of each mean value.

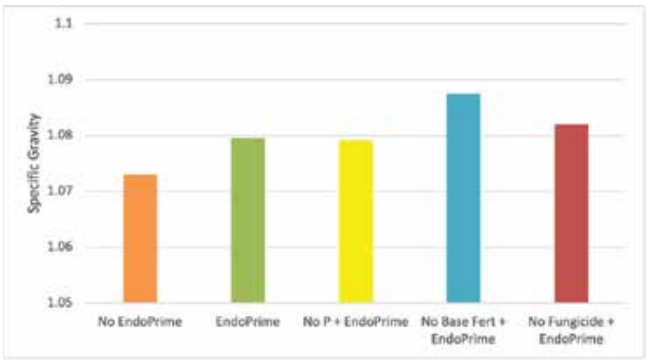


Figure 7. Specific gravity across different treatments.

THOUGHTS FROM THE GROWER

Demonstration site host and grower Neville Quinlan has observed similar trends across his whole farm in terms of tuber numbers and size. He notes that EndoPrime's inclusion of humic acid may have contributed to the promising results, particularly in terms of improved specific gravity, however this requires further investigation. The notable improvements in tuber size observed has led to Neville's strong inclination towards continued use of EndoPrime.

For growers, it is important to consider the following:

- It can be challenging to discern small, incremental improvements in the field, necessitating precise measurements.
- Understanding whether a product contains live organisms the appropriate storage and handling through the supply chain and before application is crucial.
- The quality of seed potatoes can significantly influence trial outcomes.

And a word of caution: changes observed in one strip may not solely be due to the treatment but could also be attributed to other factors including seed source and handling.

It's important to note that not all conditions may lead to observable changes, as outcomes are contingent on the specific environmental conditions. For a more complete and comprehensive understating of the impact of AMF on potato yield and quality, it is best to accumulate data from different farms and across different seasons.

Building a broader picture over time can provide valuable insights into the effectiveness of various agricultural practices and products.

KEY POINTS

- Where EndoPrime was applied showed a reduction in both the number of stems per plant and the number of tubers per plant.
- Overall yield remained consistent across all treatments.
- EndoPrime-treated areas displayed larger-sized tubers.
- The no EndoPrime area had a lower proportion of larger tubers and a higher proportion of smaller tubes.
- Treatments involving EndoPrime exhibited higher specific gravity.
- In this trial, the application of EndoPrime resulted in a decrease in stem and tuber numbers per plant, and an increase in tuber size. Similar patterns have been observed at other sites.

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.

PotatoLink team member Steph Tabone evaluating the trial results.

Trial paddock - left two rows between the bucket lids are no P + Endoprime, and the right two rows are no base fert + EndoPrime. Image date: 03 Feb 2023. Photo by Ryan Hall

Trial paddock when data was collected. Image date: 25 Apr 2023. Photo by Steph Tabone

YIELD MAPPING

For potato growers, predicting yield, and determining paddock variations or disease occurrence, can be a guessing game. New technology that combines gaming algorithms with agricultural science might (literally) be a game-changer, writes Dr Jenny Ekman.

WHY MAP YIELD?

Every morning, when a hydroponic grower enters their greenhouse, they confidently scan a flat ocean of uniformly green, uniformly sized, and uniformly productive plants. Counting the size and weight of cucumbers in one section should, in theory, provide a good estimate of the yield from an entire half hectare glasshouse (assuming it is well managed).

Growing in soil however is a lot less uniform. Added to this is the challenge of a crop developing unseen, below-ground.

An apple orchardist can inspect size, quality, and quantity of fruits on trees. They can visually inspect and identify which areas of the orchard are less productive, have disease issues, or physical damage due to wind or hail.

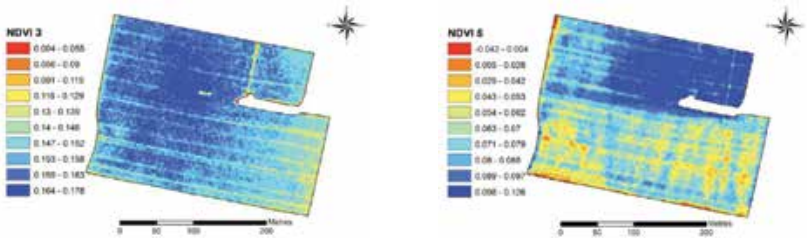
For the root crop grower, yield and quality are often first known at harvest. While every grower will have dug out a few plants here and there to look how the tubers are developing, extrapolating a few plants to a whole pivot is unreliable.

Associate Professor Brett Whelan, University of Sydney, is an expert in precision agriculture. In 2016 he completed a study (Project PT13000 Understanding spatial variability in potato cropping to improve yield and production efficiency) taking some of the lessons from grain and applying them to Tasmanian potatoes[1].

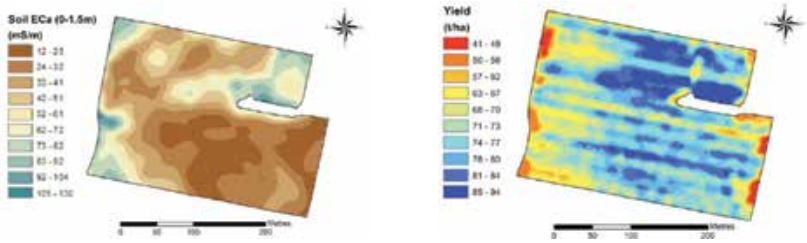
"We found that yield ranged from 28t/ha to 96t/ha, averaging around 64t/ha."

"Such three-fold variations in yield within a paddock aren't that unusual. We sometimes see similar results in grain crops."

"However, growing potatoes is expensive. At the time of our study the break-even point for potato production in Tasmania was around 42t/ha, so margins are extremely tight. Avoiding cropping unproductive areas could really help lift profitability of the whole crop."



NDVI maps of a Tasmanian potato field taken 14 (left) and 19 (right) weeks after planting. Source: Whelan and Mulcahy, 2015



Apparent soil EC (left) and yield map (right) of a Tasmanian potato field. Source: Whelan and Mulcahy, 2015

Yield maps can help identify these unproductive areas, either for remediation or removal from production. The maps can also be used to examine changes over time, and the effects of different agronomic treatments where these have been broadly applied.

YIELD MAPPING FROM ABOVE

Canopy measurements can provide clues as to what is going on underneath. For example, the NDVI (Normalised Difference Vegetation Index) produces a measure of crop greenness.

Several researchers have used multispectral and hyperspectral satellite images to generate NDVI values. Machine learning models combine this with weather and irrigation data, plus previous local yield information to predict total yield.

The method has been applied to estimate potato yield in diverse environments, including Mexico[3], Spain, Bangladesh and even Saudi Arabia (Figure 1). These models can also be used to detect water or nutrient stress, estimate nitrogen use, and alert growers to areas of disease.

Many of these studies have also concluded that images taken during tuber initiation and bulking are more predictive that images taken later during crop development[2].

In Dr Whelans' study, they found that NDVI measurements corresponded well with yield when taken at weeks 14 and 16. The images were less predictive early in crop growth as well as close to harvest (week 19).

The researchers also examined the influence of elevation, soil texture and apparent electrical conductivity (ECa). ECa varied most in the top part of the soil and tended to be higher in low parts of the paddock. ECa was negatively related to NDVI, meaning the crop was often greenest at high points in the field, where ECa values were low.

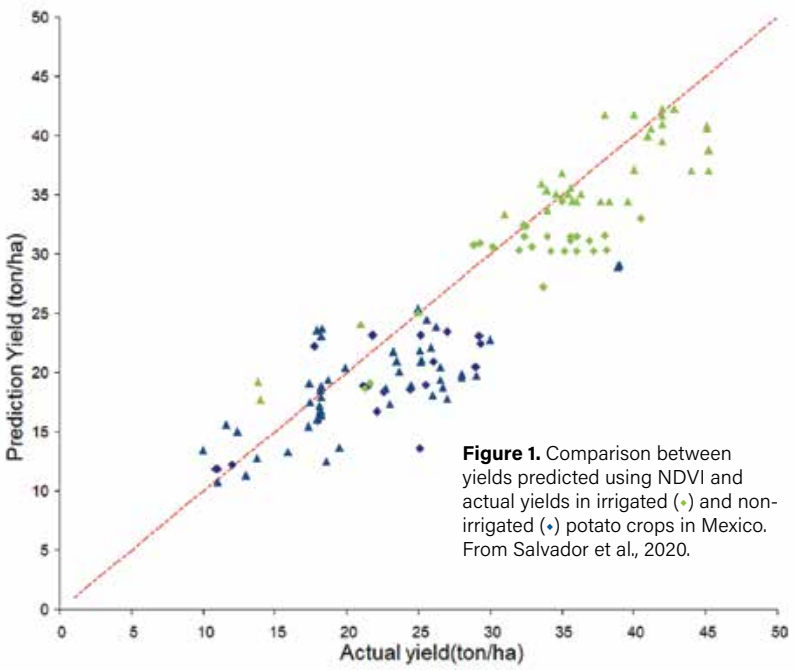
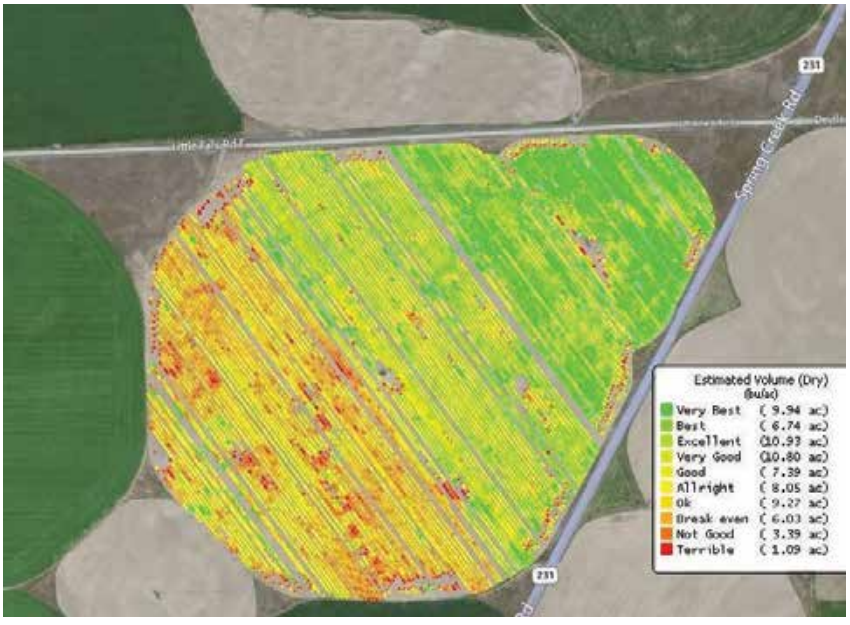


Figure 1. Comparison between yields predicted using NDVI and actual yields in irrigated (•) and non-irrigated (•) potato crops in Mexico. From Salvador et al., 2020.

Potato weight is usually recorded using a load cell on the harvesting belt. This is combined with GPS tracking data and conveyor speed to calculate total yield and generate a yield map.



Example of a harvest yield map created using a load cell system. Image by RiteYield (greentronics.com/products/riteyield/).

Despite this, only 36% of the crops studied had a statistically significant relationship between elevation and yield, with both positive and negative outcomes. In other words, none of these factors individually was a good predictor of yield.

YIELD MAPPING AT HARVEST

Pre-harvest estimates can be useful, but in the end there is no substitute for measuring potatoes dug out of the ground.

The most common method of measuring and mapping actual yield is using a load cell on the harvester machine. Data is combined with GPS tracking and conveyor speed, generating a yield map. Results may be viewed on a screen in the cab in real time and/or sent to the cloud for later analysis. Examples include

- The Casma Yield Monitor by HarvestMaster
- RiteYield by Greentronics
- YieldTrak by Topcon
- Advanced Technology Viticulture

Yield mapping using such systems is common for grain crops, and it has also been adapted to other mechanically harvested products, including tomatoes, grapes, almonds, and carrots.

Calibration of the yield monitor is one of the most important steps in ensuring data collection is accurate. It is not uncommon for the load cells to record weights significantly different to the actual weights recorded in bins. This can increase during harvest, as dirt builds up on the harvest belt.

For example, O'Halloran and van Sprang (2020)[4] tested the accuracy of yield monitoring of carrots. In this study, yield was consistently 20% lower than indicated by the load cell.

Calibration data for yield monitor. From O'Halloran and van Sprang, 2018.

Actual yield	Yield monitoring output (kg)	Accuracy
4043	5110	79
4161	5280	79
4074	5490	74
4202	5270	80

Project PT13000 also mapped yield using a load cell on the harvesting machine. Actual yield/paddock was compared with monitored yield. In 45% of fields the difference between the two was 3t/ha or less. However, in others it was 10 or even 15t/ha. In one paddock, total yield was underestimated by over 100T, a substantial difference.

According to Dr Whelan, load cells work well for grain crops. However, with potato crops there can be rocks and rejects, plus the tubers bounce around on the belt, making them harder to measure. He also noted that occasionally the harvester had to stop or backtrack, or even quit harvesting part way through a block due to weather or loading. All these factors make yield mapping far more difficult.

KEEPING AN EYE ON SIZE

When considering potatoes, it is not just yield that is important. The size and count of potatoes may often be a better indicator of crop value than simple tonnage.

Estimating the number of potatoes in different size bands effectively excludes unmarketable oversize and undersize potatoes from total yield. It can also help the grower determine the best markets, particularly if they have a mixture of contracted supply and 'freebuy' on the open market.

Understanding size and frequency may be particularly useful when harvesting seed.

"One of the biggest problems we have in managing seed supply is knowing what we have and where we have it," comments Abe Montano, Elders Sales Manager for seed potatoes.

"Knowing what size range we've got helps us market that as best we can."

Relatively new to the market, the HarvestEye system uses a camera mounted on the harvesting machine to monitor incoming potatoes. Machine learning and artificial intelligence are used to detect, count, size and calculate per tuber weight.

Applying camera technology during potato harvest is far from simple. The cameras need to operate in a harsh, dusty environment with a shaking belt. Furthermore, the 'harvest' is not potatoes alone, but likely includes clods, rocks, roots, and soil. Nor are the potatoes in a convenient single layer but sometimes stacked and come in many odd shapes.

The HarvestEye system uses AI to identify and separate objects within a single image. Vidyanath (Vee) Gururajan from HarvestEye gives an example of how a computer can be trained to identify the number of cows in a herd.

"We use instant segmentation technology that can identify individual cows, rather than just blobs, using instance segmentation. The same machine learning principal can be applied to potatoes. This allows us to differentiate 'potatoes' from 'not potatoes', such as stalks, soil and the hands of workers," Vee explains.

"One of the biggest challenges is stacking. If there are several layers, the system may count something as a small potato when it is actually the top of a big potato. In this situation the system can be optimised for size accuracy. The size accuracy setting only uses clear images for size band distribution but uses the full count to estimate yield."

Instead of a load cell, the HarvestEye system uses a camera mounted over the belt, plus control panel in the tractor cab.

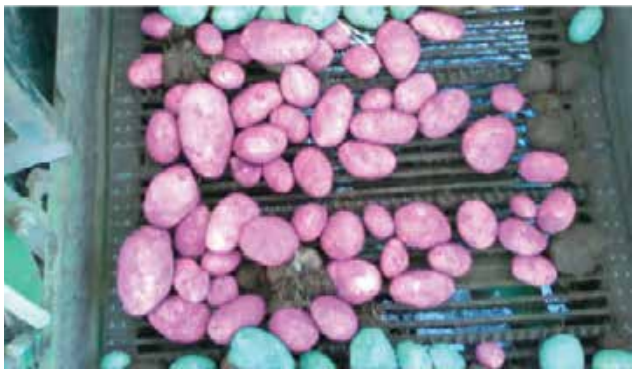
With thousands of potatoes streaming past the camera, the computer processing power needed is immense. According to Vee, the graphical hardware developed for gaming have proven a game-changer for this technology.

"This is what provides the computing power needed to process millions of pieces of data. The AI system has now been trained with about 2 billion data points, allowing it to accurately model weight from size."

While camera detection occurs on the harvester and monitored using a tablet in the tractor cab, most computing takes place in the cloud. The company claims that detection accuracy is 98% to 99.9%, while the per tuber sizing accuracy is around 98%.

The software allows the user to compare the number of tubers in each size band by year, by variety, and within different areas of the paddock. According to Abe Montano, using this data to decide the best variety for a specific location is a significant benefit.

"We can start to see the varieties that work best in different locations,



The HarvestEye system uses AI to separate potatoes within an image, then applies an algorithm to estimate size and weight.

Stacking is an issue for the HarvestEye system, as it is impossible to know whether what looks like a small potato is actually the tip of a much larger potato. To overcome this, the system combines the full detection image for count (left) with one that only records the size of clearly visible tubers (right). This size-band distribution can be used to estimate total yield.

The HarvestEye system can provide detailed information on tonnage by size band, as well as distribution of different sizes within the paddock.

especially in terms of marketable yield. It also helps with agronomy, working out which areas have been waterlogged, or underwatered, or where a spray has been missed."

The result may not only be better variety selection, but also understanding what parts of the farm need more input in terms of improving soil health, managing irrigation, or better plant nutrition. Alternatively, the grower may choose to cut their losses, and simply not grow potatoes in difficult parts of the paddock.

It may seem a long stretch from the virtual *World of Warcraft* to real life potato yields, however in this instance, farmers have the gamers to thank for significant technology advancements.

It is often said that you cannot manage what you cannot measure. With increasingly sophisticated tools available, growers can have more insight into costs and benefits than ever before.

LEARN MORE ABOUT YIELD MAPPING AND PRECISION AGRICULTURE

Webinar: Yield mapping with HarvestEye
https://bitly.ws/X7X6

Webinar: Precision Ag for the potato industry - Imagery is more than just pretty pictures
https://bitly.ws/X7Xd

Webinar: Precision Ag for the potato industry - practical soil mapping and adoption
https://bitly.ws/X2pQ

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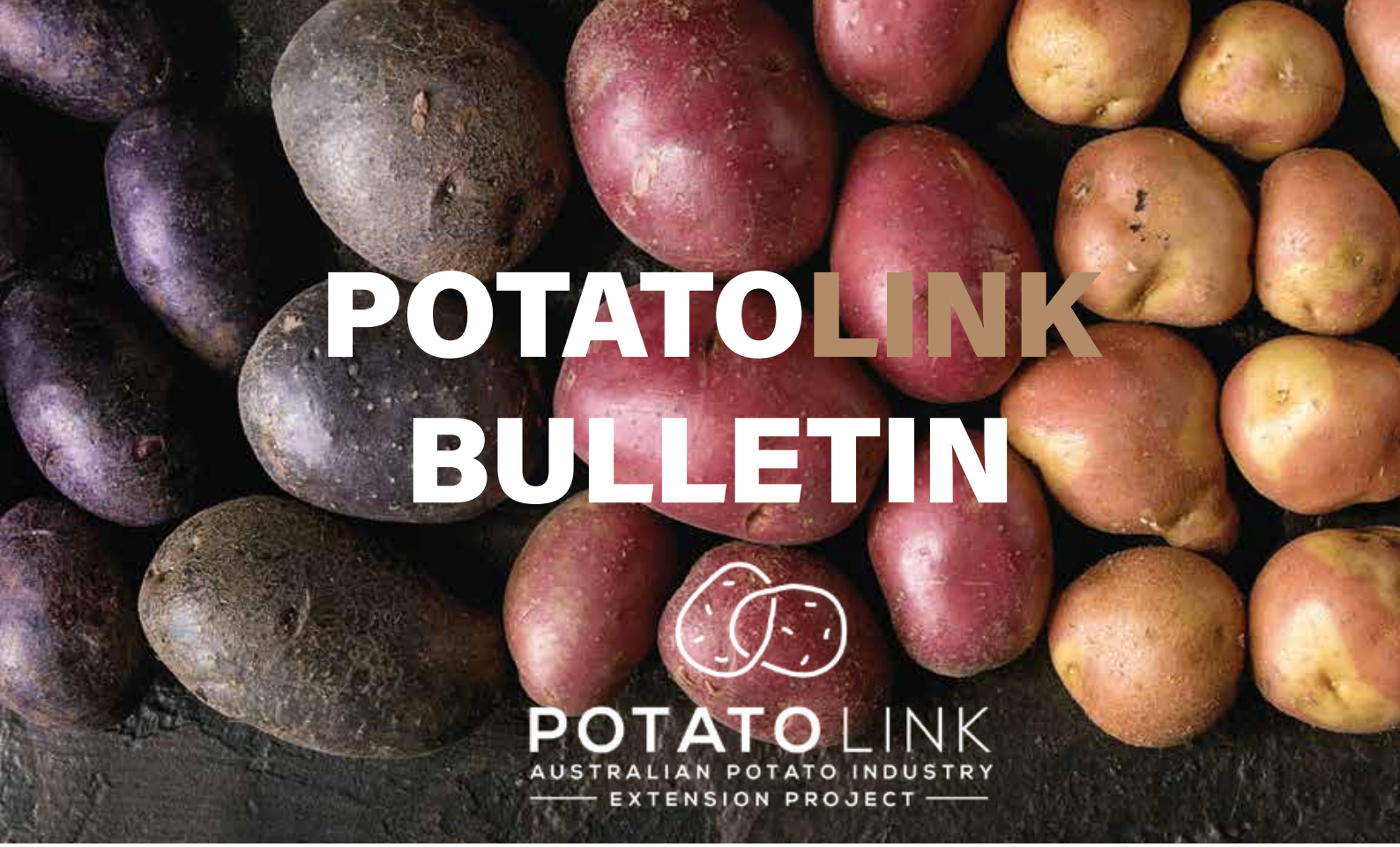

Wondering when the next in-person event will be held in your area? Looking for a fact sheet or an update on a demonstration site? Or want to join the next webinar?

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The PotatoLink Bulletin is a free e-newsletter emailed to subscribers each month and is brimming with information. The bulletin provides a platform for growers to stay up to date on upcoming events and resources delivered by PotatoLink or other industry groups and projects.

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- New resources – PotatoLink magazine, factsheets and case studies
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vegnet update

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

National Vegetable
Extension Network

Regional Visits with Growers and RDOs

Victoria, Gippsland, South Australia, South East and North Queensland is where I've been over the past few months. A great opportunity to be out there seeing growers and their Regional Development Officers on farm and in attendance at presentations and workshops.

L-R. Borotta Farm. (L-R) Cherry Emerick, Shakira Johson and Scott Hudson, Manager Elders Bowen Branch.

Native Vegetation Insectary plantings have been a popular addition to a number of farms in Victoria and on a visit to Boratto Farms I had the opportunity to see firsthand how small plantings have begun to establish themselves along a dam wall. If you have an interest in finding out more about how they can complement and work for you on your farm, contact your Regional Development Officer for more information.

Shakira Johnson and I ventured to North Queensland talking about Biosecurity and the value in having a Biosecurity Farm Plan. Biosecurity signage at the entry of your property is a positive step in being proactive in this space and the North Queensland region has this well covered. We visited the local Elders store in Bowen where Biosecurity is a priority. They are constantly out on properties and have taken the initiative of having their own Biosecurity kit in their vehicle. This works to minimise the possible spread of pests and disease.

L-R. Beet cyst nematode on screen. Cherry Emerick, Bing (Ben) Troung - Snake Beans being grown

South Australia's regional Development Officer Peta Coughlin facilitated a great event with the program covering what her role entails, the latest update in their Innovation Fund Beet Cyst Nematode project, Biosecurity through to on farm field demonstration.

These events are great for growers, agronomists and farm employees allowing them to further grow their skills and knowledge with the added opportunity to socialise and network.

While in the Lockyer Valley I caught up with Bing Truong who is working hard on his farm further developing his hydroponics and protective cropping. I can attest that the beans he is growing taste amazing!

If you're a vegetable grower in the South East Queensland region and are interested in finding out more about hydroponics and protective cropping, contact your Regional Development Officer or myself.

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Project Number: VG21000

R&D / VEGNET
CASE STUDY

Pilot program supports CaLD workers to settle into Gippsland

Case Study September 2023

National Vegetable Extension Network
VICTORIA - GIPPSLAND

Introduction

Culturally and Linguistically Diverse (CaLD) workers are essential to the vegetable industry in Gippsland, from European backpackers to workers from the Pacific Islands, Thailand and Vietnam. Many businesses employ CaLD worker in their harvest, weeding, planting, picking and packing operations. Supporting CaLD workers to integrate into our communities and feel welcome and safe in Gippsland is crucial not only for the workers, but the growers and wider community as well.

VegNET Gippsland, through Food and Fibre Gippsland, delivered the Informed and Supported Workers (ISW) Program funded by Agriculture Victoria from July 2022 to September 2023. This pilot program aimed to deliver targeted support to organisations that assist CaLD workers so they could undertake collaborative activities that strengthen Victoria's horticulture workforce.

The ISW Program provided training and skills development, employment and pastoral support, promoted COVID-safe behaviours and built cultural competency to assist CaLD workers and their employers across Gippsland.

The ISW Program aligned strongly with VegNET Gippsland's priority area to build business capacity and a sustainable workforce in the region, including increased and more accessible support for CaLD workers.

The ISW Program highlighted some gaps and challenges for CaLD workers; however, it also identified the needs of CaLD workers in Gippsland, the stakeholders working within this area and the activities that had the most benefit to the workers, growers and the community.

Tailored program activities

To better understand the needs of CaLD workers and their employers across Gippsland, comprehensive consultation was undertaken with growers, labour hire companies, industry stakeholders, accommodation providers, health care workers, religious leaders and government bodies at the start of the program.

While the ISW Program considered many elements impacting CaLD workers, from COVID-19 to health, diet and nutrition, the following four areas became the primary focus of the Program: worker road safety; communication; CaLD stakeholders; and cultural diversity.

1. Worker Road Safety

Throughout the ISW Program, it became clear that there were some serious concerns associated with the safety of CaLD workers, particularly with respect to alcohol, drink-driving, and road safety. Through discussions with community groups and employers, it was understood that issues relating to alcohol consumption can generally be linked to homesickness, emotional stress, boredom, and isolation. While road safety problems are more commonly linked to a poor understanding of State and National road rules.

Key messages

- **The Informed and Supported Workers (ISW) pilot program, funded by Agriculture Victoria and delivered by VegNET Gippsland through Food and Fibre Gippsland, aimed to help seasonal workers effectively transition into work and life in Gippsland.**
- **The program connected stakeholders working with Culturally and Linguistically Diverse (CaLD) communities, shared useful resources, held events and training sessions, and used targeted communication approaches to build the cultural competency of CaLD workers and their employers across Gippsland.**
- **While there are ongoing challenges to overcome, the program paved the way for a more informed and supported CaLD community in Gippsland and encouraged similar initiatives in other areas of Australia.**

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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

AUSVEG AGRICULTURE VICTORIA Food & Fibre Gippsland

Pilot program supports CaLD workers to settle into Gippsland

To help CALD workers better understand the safety issues associated with road safety and drink-driving in Australia, through collaboration with Pacific Labour Facility, the ISW Program was able to fund and facilitate over 30 workers to participate in a Safe Driver Training Course. The course included the use of virtual reality goggles showing the effects of drink driving, a practical driving session and a theory component.

The safe driver training came with its own challenges, with employers noting that some elements of the theory content of the course were too complex for a seasonal worker with minimal English comprehension. It was recommended by an employer that any future courses include prior consultation with employers/industry about how to structure and deliver the content to ensure the best possible outcome. It was also noted that for many of the workers their attention span only lasts about 2 hours due to language barriers, and that making the content as practical and visual as possible is best. This kind of feedback from employers is key to providing the best possible support and education to the workers.

Further to this, the local Police were very helpful and actively engaged in providing ongoing assistance with respect to alcohol and road rules through attendance and presentations at regular meetings held by two of the local labour hire companies. While this has its own challenges with respect to translation, cultural differences, and fear, it was commented by one employer that the Police "spoke very constructively with the workers about the issues of driving". It was also noted that repetitive integration can help to develop trust and understanding between the workers and the police to allow for an ongoing successful relationship and effective education program. Following the feedback from the safe driver training courses, these sessions were kept quite short, and as oral, visual, and interactive as possible.

2. Communication

A monthly e-newsletter was established early in the Program and sent to over 170 horticulture employers and stakeholders across Gippsland to help promote the needs of CaLD workers, share relevant resources for growers and workers, and provide information on the courses being offered by the ISW Program. This e-newsletter leveraged the existing VegNET contact list, and grower and industry stakeholder relationships to ensure that as many of the key Gippsland horticultural employers were informed about the ISW Program as possible.

As previously mentioned, an ongoing challenge is language differences being a key barrier to effective communication with CaLD workforces and a limiting factor for workers to feel comfortable integrating into Australian society. Many CaLD workers in Gippsland speak limited English and have minimal reading and writing skills in their own language, never mind in English. For many CaLD workers there is a heavy reliance, both socially and in the workplace, on the few people in each cohort that can speak better English to share information, communicate and translate for other workers. A member of the Community Connections group who engages closely with the workers themselves commented that the Pacific Island workers are fundamentally oral people, and that effective communication should always be oral.

To help workers improve their English skills and feel more comfortable and confident to communicate and interact with others in the broader community, AMES Australia and the ISW Program facilitated in-person oral English lessons

Nino Cipriani from AMES Australia teaching CaLD workers basic English to help improve their confidence.

CaLD workers learning English with Nino Cipriani from AMES Australia.

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Pilot program supports CaLD workers to settle into Gippsland

for over 35 seasonal horticultural workers across Gippsland. The employers who enrolled their workers to participate in these English lessons believed them to be very beneficial and reflected on the increased confidence of their workers to attempt to use English and to interact with the local community. The course also touched on digital safety with respect to scam messages that the workers may receive via text, phone call, email or online. With real examples provided, the workers were able to better understand what to look out for and how best to determine if a message is legitimate.

AMES Australia also tailored each English lesson to capture key areas of communication concern identified by the growers, such as farm safety and personal hygiene. The workers who participated in the training were also provided with links to further their English training online in their own time following the completion of the in-person training.

3. CaLD Stakeholders

The ISW Program established there was significant depth and breadth to the organisations and groups providing assistance to CaLD workers across Gippsland, and wider Victoria. While this is very positive there also seems to be a level of disconnectedness and a lack of integration across these organisations and groups.

Many groups and organisations have developed translated and video resources however it seemed that the value of these resource was minimal. It was evident that many stakeholders do not know these resources exist, never mind the workers themselves being able to have access to and benefit from them. One central location or organisation that brings everyone working within the CaLD community together to make connections, share resources and help the workers would be of great value. A unifying online presence would also help to easily identify the large number of stakeholders that work with CaLD workers, from community groups and government organisations to banks and health funds. Knowing who these stakeholders are would assist in streamlining and increasing the assistance available to workers and employers.

Furthermore, while there are many great websites with resources for the workers, such as the PALM and WorkSafe websites, along with the ISW webpage developed as part of the Program, these websites are not easily found or navigated by the workers. Many employers identified the workers as being very visual learners, with one employer commenting that visual and video resources have a valuable impact, with workers learning more from visual experiences than they do from reading or writing. Social media platforms such as YouTube and Facebook have been identified as the main websites that workers visit during their free time.

Access to online resources has been questioned as a challenge for the workers however, this seems to be an obstacle that is becoming smaller as most workers purchase mobile phones during their time in Gippsland. WhatsApp is the primary platform used by the workers to communicate with home and their employers, so this is also a catalyst to ensure workers have a mobile device. Data costs can be a further issue however, free wi-fi is often provided in the workers' accommodation buildings.

4. Cultural Diversity

Many of the ISW Program's activities focused on directly helping the workers themselves to feel more comfortable. Employers also play a big role in creating a welcoming experience for the workers. Two 3-hour seminars were delivered by AMES Australia on 'Cultural Diversity and Managing a Culturally Diverse Team' with a total of 19 growers and community health workers attending the events. When asked 'On a scale of 1 to 10, what level of new knowledge and skills did you gain from this event?' participants responded with an average score of 7. A similar average score of 7 was recorded when asked if the participants' awareness of the topic had increased following the event. Participants were also asked if they would likely change farm practices or advice following the cultural diversity sessions, with over 76% of the participants saying they would by doing things such as celebrating cultural backgrounds, getting involved with workers' culture, education, and using more pictures for work instructions.

"What does culture mean to you?" Participants at the Cultural Diversity Information Session holding up their drawings of what culture means to them

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AUSVEG AGRICULTURE VICTORIA Food & Fibre Gippsland

Pilot program supports CaLD workers to settle into Gippsland

R&D / VEGNET CASE STUDY

Improving grower productivity, profitability, preparedness and competitiveness

Through the ISW Program, particularly the information sessions, training events and newsletter, more employers and stakeholders have been made aware of the challenges CaLD workers experience when they come to work in horticulture businesses and through simple, unified steps we can help to improve the experience for both workers and employers alike.

The Safe Driver Training Courses were a success, with one employer stating that they "had very good feedback from the workers and believe that everyone took away some new knowledge and skills," while another observed that it was "really valuable to have our drivers more aware of the risks of driving tired or intoxicated."

Employers and labour hire companies working with CaLD workers would benefit from connecting with their local police and establishing a regular oral and visual program educating workers on road safety, drink-driving and alcohol. This would come at minimal cost and be beneficial for workers, employers and the wider community as a whole with respect to safety on our roads. While a more substantial cost to continue, the labour hire companies and employers who had workers that participated in the safe driver training stated that they would likely hold similar events in the future due to the success of the initial courses. The local police have also identified that road safety incidents involving CaLD workers in the local area have decreased following the driver training and education sessions.

Events such as the PALM Regional Accelerator Forum and the Gippsland Round Table highlighted and promoted the need for collaboration to ensure that everyone is working towards the same goals, rather than working individually and having split resources. With one participant commenting that "we are all here for the same thing, for the workers."

While in-person English lessons for large numbers of workers is not necessarily a cheap exercise, it was demonstrated to be very valuable for the individual workers who participated, and something employers should consider, particularly for workers they wish to have back in their businesses for several seasons. One employer in Gippsland has been utilising their local Neighbourhood House to provide workers with English lessons and have established an ongoing program due to the noticeable benefits of the program.

Through VegNET Gippsland, the rollout of the ISW program has triggered other growing regions across Australia to consider the needs of their CaLD workforce more closely.

Next steps

While the ISW Program has wrapped up, the following recommendations were identified to ensure CaLD workers can enjoy their work and life in Gippsland. They include:

- Continue ongoing support and education from the police and health care professionals. The ISW Program identified serious concerns associated with the safety of CaLD workers, particularly with respect to alcohol, drink-driving and health issues. While this has its own challenges with effective translation, cultural differences and fear, repetitive integration can allow for a successful relationship and effective education.
- Develop a shared website for the CaLD community. A central website which can be accessed by CaLD workers, growers and stakeholders such as government organisations, community groups and service providers would help to make connections, share resources and streamline activities. As translated and video resources can be costly to develop, knowing what already exists through the website will ensure that funding is invested in appropriate resources.
- Use social media platforms to better communicate with CaLD workers. Many employers recognise that CaLD workers are visual learners, with one employer commenting that "visual/video resources have a valuable impact, with workers learning more from visual experiences than they do from reading or writing". A dedicated YouTube channel and/or Facebook page for CaLD workers could share visual resources that are easy to access, use and understand. Most workers purchase a mobile phone during their time in Gippsland and often use WhatsApp to communicate.
- Don't underestimate the 'culture shock' for many CaLD workers. One grower acknowledged the vast differences they experienced when travelling to a Pacific Island nation, from road rules and vehicle safety to food, clothing and technology. Something as simple as being prepared for a Victorian winter can make a big difference to the experience of CaLD workers in Australia.

Further information and resources

Contact VegNET Gippsland Regional Development Officer Emily Scott at emily.scott@foodandfibregippsland.com.au or 0455 214 102.

- **Informed and Supported Workers (ISW) website – Food and Fibre Gippsland**

VEGNET VICTORIA NORTH, WEST AND SOUTH-EAST

Regional Update

Translating Lean Principles for Vegetable Businesses

A series of workshops held during spring in VegNET Victoria's West and Southeast regions focussed upon supporting vegetable businesses to identify opportunities for cost efficiency in their farming systems.

Grower Workshops

Werribee South and Mornington

In October 2023 vegetable grower workshops were held in Werribee South and Mornington in Victoria's west and southeast regions respectfully.

The topic of these workshops was 'Lean in Agriculture', investigating the use of Lean principles in agriculture and in particular vegetable businesses. Developed by the automotive industry, Lean principles can increase efficiencies in agribusiness.

The workshops were held as the result of an initial collaboration attempt between Agriculture Victoria, AUSVEG Vic and VegNET Victoria.

Presenting and leading discussion during the workshops was Toby Cook from Lean 6 Sigma Solutions.

Lean Principles

Identifying opportunities to reduce waste formed a key component of each of the workshops, finding the actions that occur within a business that do not add any additional value to production.

The importance of reducing waste within a business was a major theme and can be addressed in transport, inventory, production, processing, or staff time.

Methods for identifying and understanding where value and waste occurs were a core component of the Lean in Agriculture workshops.

The critical concept covered, was that of 'what gets measured, gets managed'. The overarching purpose of all the elements included in the workshops was to reduce waste and thereby reduce costs.

Grower Feedback

Marco Mason from Mason Bros in Werribee South attended the workshop held in his area in October 2023.

According to Marco the workshop was a welcome event, it was "a great revision of what we have implemented." Continuing to say, "there might be a couple of things we could do to improve."

Marco participated in the workshop and was joined by several of the Mason Bros team.

The view shared was that the workshop highlighted where a vegetable business was already implementing these principles and where there might be opportunities for further improvement.

With the production system beginning to allow less time for reflection, it was thought that a review of learnings in 2024 would be a great idea.

The workshops held captured feedback from 18 industry attendees. Feedback captured recorded a positive response to the events, with all attendees willing to recommend the workshop to others and everyone considering some change to their system.

"...a great revision of what we have implemented."

Top L-R. Marco Mason from Mason Bros in Werribee South **Above.** Toby Cook leading discussion in Werribee South.

FIND OUT MORE
Contact VegNET – Victoria (N, W and SE Regions) RDO Danielle Park on 0432 324 822 or email danielle.park@ausveg.com.au

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Project Number: VG21000

Hort Innovation VEGETABLE FUND

VEGNET FAR NORTH QUEENSLAND

Regional Update

Robotti showcased at North Queensland Field Day

Growers and industry stakeholders in North Queensland's agriculture sector converged on a vegetable farm in Bowen, North Queensland, on 13 October 2023, for an industry field day. The event, hosted by VeeJay's Kalfresh, turned the spotlight on autonomous farming technology known as 'Robotti', offering attendees a firsthand look at how this innovation is revolutionising farming practices.

Robotti is an autonomous vehicle that can essentially perform a wide range of farming tasks including seeding, cultivating, weeding. It is a multi purpose tool carrier designed to embrace a large variety of well known implements. Any implement that can be put onto a tractor could be used by Robotti with the added benefit of not needing a person operating It which is the case for conventional tractors.

With more than 40 attendees, the field day provided a unique opportunity for farmers and stakeholders to witness live demonstrations of Robotti's capabilities, engage in a Q&A session with experts, and gain hands-on experience with the technology. The event aimed to showcase the true potential of Robotti in enhancing farming methods and productivity.

One of the event's highlights was Vee Jay's Kalfresh sharing their experiences with Robotti during the winter production season. They provided valuable insights into the costs, benefits, challenges, and future opportunities associated with autonomous farming technology.

The success of this event underscores the growing interest and potential of adopting advanced technology in Australian agriculture.

The development of the Robotti project was made possible through a collaboration involving government bodies, industry partners and businesses. It received funding from the Queensland Government through the Queensland Reef Water Quality Program and Hort Innovation through the vegetable research and development levy. Bowen Gumlu Growers Association, AUSVEG, Vee Jay's Kalfresh, and Farm Concepts were all key partners in this endeavour.

The successful field day event represents a significant step forward in the adoption of autonomous technology within Australian agriculture. Robotti has great potential to revolutionise farming practices and innovation in agriculture. As technology continues to reshape the farming landscape, it's clear that future collaborations between government, industry, and businesses will play an instrumental role. The industry's eagerness to embrace advanced solutions like Robotti demonstrates the commitment to meet the challenges of tomorrow with innovation and efficiency, ensuring a sustainable and prosperous future for Australian agriculture.

FIND OUT MORE

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Hort Innovation VEGETABLE FUND

VEGNET LOCKYER VALLEY

Regional Update

VegNET's commitment to growers in southern Queensland

Leafy vegetable season is drawing to a close, onions and potatoes are in full swing, and the melons, pumpkins, beans and sweet corn crops are well underway.

The recent severe hailstorm in the Lockyer Valley has cast a shadow over the work of the past year, which was focused on cost recovery after the floods and high farm gate prices of 2022.

Prior to the hailstorm, good weather, water and labour availability had resulted in increased production of quality vegetables in the region. This increased production to some extent, as noted in discussions with growers, is also being driven by improvements in seed genetics which are helping to improve yields and allowing the growing of some vegetable lines out of season.

Growers are looking at other avenues to market their produce including exports as an opportunity to increase demand for their products.

Whilst the past few months have been VegNET event free, there is still a lot of work being done behind the scenes which is not bound by the constraints of seasons or events. Engagement with growers included those that are new to the VegNET community. The focus has very much been on establishment and maintenance of community contacts. One-on-one farm visits have highlighted the diversity of growers and their enterprises. These range from small husband and wife outfits to corporate farms. Farming types including low tech to high tech greenhouses, organic and conventional farms. One-on-one farm visits foster relationships, build trust and rapport, provide valuable feedback, bridging the gap between research, extension, and farming communities.

Grower concerns are being addressed by events such as the Gatton AgTech Showcase in November, hosted by QDAF at the Gatton Smart Farm, which highlighted labour saving technology. This event brought together many of the world's leading AgTech companies, over 800 people attended the two-day event.

The Gatton AgTech Showcase brought a number of growers to the Lockyer Valley. A grower networking evening was organised allowing growers from the various regions to digest and discuss the technologies seen at the showcase.

On 2 November the RDOs from Bowen, Bundaberg, Gippsland and Southern Queensland organised a short tour of the Lockyer and Fassifern Valleys. Visits included flood recovery and mitigation works on the Laidley Creek, hosted by Mulgowie farms and Healthy Land and Waterways using cotton as a rotation in vegetable cropping and management strategies for using saline groundwater for irrigation on Moira Farms. The group split into two separate groups to go tour Boonah of vegetable processing thanks to VegPro4; and the other group visited Metagen Laboratory for an in depth look at the advancements in soil genomics and soil biology for healthy soil.

A group of onion growers from Brazil was hosted in the Lockyer Valley on the 26 October. They were particularly interested in the short-day varieties of onions and how they are handled post-harvest. Over 50,000 ha of onions are grown in Brazil each year.

The Lockyer Valley grower group is still very much focussed on the wellbeing of the growers with events such as the Gala Dinner and Christmas party in October and November respectively. The Gala dinner held on the 28 October was a huge success and a fun time was had by all and hosted by comedian Merrick Watts. It was a welcome break from the farm and the growers let their hair down and raised a significant amount of money for Care Flight and Icon Cancer Foundation.

Above L-R. Brazilian onion growers inspecting onion drying faciltities. Visiting Growers at VegPro4. Visiting growers at Moira Farms. Visiting growers at Mulgowie Farms/ Healthy Land and Waterways flood mitigation project.

FIND OUT MORE

Contact Darren Brown, Lockyer Valley Growers on 0456 956 340 or email ido@lockyervalleygrowers.com.au

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Project Number: VG21000

Hort Innovation VEGETABLE FUND

VEGNET WIDE BAY BURNETT

Regional Update

VegNET Regional Development Officer Jessy Logan has had a busy couple of months. Some key outcomes from across the Wide Bay Burnett region include the profiling of the region to *Australian Grower* magazine, capsicum internal rot trial work with AHR and a local grower / agronomist trip to the Lockyer Valley.

VegNET RDO Jessy Logan had the pleasure of hosting a delegate of growers and agronomists down to the Lockyer Valley to attend the Gatton Smart Farm AgTech Showcase, and also to network and visit local agribusinesses. This was a coordinated VegNet activity which saw growers from Bowen, Bundaberg, Gippsland and Lockyer Valley all come together in the one location. The trips were funded through the Hort Innovation Vegetable Levy Fund and preliminary feedback is positive from all involved.

Day 1 involved attendance to the AgTech Showcase which had some interesting technologies demonstrated on the farm. There were demonstrations from Flux robotics precision sprayer, Robotti autonomous implement carrier, Einbock row guard precision guided cultivator, Stout smart cultivator with AI vision and Farmdroid autonomous seeding and weeding. There were 47 stall holders on site with information of their offerings and products and growers had the opportunity to connect with key industry people on the day.

The VegNET group finished with a networking dinner where participants from across the different growing regions came together to discuss all things farming. The second day involved tours of local agribusinesses in the region.

The first one was to Moira Farming where Mitch spoke about his experience with different cover crops depending on water supply and quality. One crop of interest that he grows between vegetable crops is cotton which can handle high salinity in water supply. Mitch discussed his resilience to challenges on farm and it was great to see how he manages his crop rotations across his various farms.

The second visit took us up to Mulgowie, where we got to speak with the team from Healthy Land and Waterways who have partnered with Mulgowie farming to implement flood mitigation measures. It was interesting to see the work to date and hear how this has made their farming system more resilient to flood events. The groups then split for the final visit, one group headed to Metagen for a tour of their facility and to learn about their new products which increase biological activity in soils. The second group headed to the Fassifern valley to tour a well known value add facility called VegPro4. The value add facility showed great potential for further collaboration with vegetable growers, as they are currently underway to expand their existing floor area and capabilities.

Deborah Hill from AUSVEG and photographer Cory Rossiter spent a week in Bundaberg to capture the essence and uniqueness of our vegetable farmers who keep our region thriving. VegNET RDO Jessy Logan was able to take the team to six agribusinesses including Marcon Family Farms, Austchilli, Butler's Market Garden, Dicky Bill, Cross Family Farms and Lindsay Rural. The AUSVEG team were exposed to the variety of produce being grown in our region and met with growers to understand their individual farming journeys. Read more about our growers from page 27

The region's VegNet project has also been supporting the internal rot in capsicum work currently being delivered by AHR and funded through Hort Innovation. Through this project further research is now being tabled to look at the ripening speed of capsicums and the benefits of this on quality. This has been of interest to several growers across the region and the VegNet project will continue pushing grower led research ideas from the ground up to ensure funding is reflecting what growers are asking for. To see the latest report on internal capsicum rot, *see page 70.*

FIND OUT MORE

Contact your Regional Development Officer: If you would like to take part in one of the Wide Bay Burnett VegNet trials, or have an issue you would like to discuss with your VegNet RDO, please contact Jessy Logan on 0407 366 797 or email vegnet@bfvg.com.au

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Above L-R. Regional profile activity Deborah Hill interviewing Clinton Marcon with Cory Rossiter filming. AgTech Demonstrations at Gatton Smart Farm field day. Capsicum rot trial work AHR Naomi Diplock and VegNET RDO Jessy Logan.

VEGNET NEW SOUTH WALES

Regional Update

Getting to know the first steps in hydroponic vegetable production

NSW Local Land Services (LLS) and VegNET NSW recently launched a 'back to basics' training session for new greenhouse cucumber growers wishing to develop skills in basic hydroponic growing techniques. The intent of the session was to explore the various areas that growers would need to consider when looking to commence hydroponic growing in a low to medium tech facility.

The training itself was conducted in a semi formal setting on the property of Coffs Harbour grower, Cheyne Clarke, and was delivered by industry trainer Tony Bundock of Genesis Horticultural Solutions.

Topics covered in the training were:

- Water quantity and quality,
- Components of a hydroponic system,
- Open and closed systems,
- Dosing systems and equipment,
- The relevance of EC and pH,
- Conducting a titration test ,
- Conducting a uniformity distribution test,
- Measuring run-off percentages and their importance,
- Media types and irrigation,
- Irrigation using time and/or radiation sum as a trigger.

The session combined theoretical concepts with real life experience as Tony and Cheyne guided the participants through the topics. Participants received supporting information to assist them back on their farms.

'Having the ability to run training on a working enterprise really helped the participants to gain a firm understanding of the various concepts being discussed' said LLS's VegNET RDO, Sylvia Jelinek. 'It was great to be able to conduct titration and distribution uniformity tests of Cheyne's active system so that the participants could see exactly how these activities are carried out. We hope to repeat similar training sessions in other areas going forward.'

The session concluded with lunch and all participants were given EC and pH testing kits to take away and use on their own farms.

Next Session

In August, LLS organised a second workshop for North Coast greenhouse growers and agronomists with trainers, Tony Bundock and Levi Nupponen from Agrology. These sessions were well attended, and participants gave positive reviews.

Tony covered Managing irrigation application rates and drain percentages:

- Irrigation principles for growing media
- Trigger options for irrigation application
- Monitoring irrigation rates and drain percentages.

Levi spoke on choosing and managing suitable substrates:

- Different characteristics of a substrate
- Growing strategy adjustments relative to substrate
- Basic on farm testing of your substrate.

The water and nutrition project within VegNET are working with a range of growers moving to a semi-closed and closed systems. LLS will be facilitating a protected cropping interest group on NSW North Coast where growers can continue to learn and network with members of the industry.

More to come

Similar workshops will also be held in Sydney for the greenhouse vegetable growers and agronomists in 2024.

The accompanying notes issued to all participants also contained templates for conducting titration and uniformity distribution testing on-farm. These notes are also available on the LLS VegNET website for anyone to download at Resources - Local Land Services - nsw.gov.au.

Above L-R. Practical observation of crops and setting up uniformity distribution tests (May) .

Levi Nupponen of Agrology teaching to a full class of growers (August).

VegNET RDO Sylvia Jelinek conducting a farm visit with grower Anjli Punia (May).

Growers discussing the use of a drain tray with Cheyne Clarke (in hi-vis shirt) (May).

FIND OUT MORE
Contact Sylvia Jelinek on 0427 086 724 or email sylvia.jelinek@lls.nsw.gov.au

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Project Number: VG21000

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VEGNET SOUTH AUSTRALIA

Regional Update

Top. Emerging Leaders Industry Immersion Tour, Parilla Premium Potatoes, packing facility, General Manager Renee Pye (centre), leading the tour. Inset. Emerging Leaders Industry Immersion Tour, Parilla Premium Potatoes, packing facility, packing process. Right. Emerging Leaders Industry Immersion Tour, Parilla Premium Potatoes. Parilla Premium Potatoes, packing facility, Wash process.

Innovation, Insights, and On-Farm Excellence

VegNET SA and AUSVEG SA brought growers together with industry stakeholders across two successful events that included a grower tour, pest and disease control updates, biosecurity and on-farm AgTech demos.

Emerging Leaders Program

The first event for the Emerging Leaders Program saw 15 growers and agronomists joining VegNET SA and AUSVEG SA for an Industry Immersion Tour to Parilla Premium Potatoes packing facility in Parilla. The tour of the state-of-the-art facility was hosted by Zerella Fresh General Manager, Renee Pye, providing the group with a unique opportunity to gain an understanding of the potato production and processing industry from a hands-on industry expert.

The Pye family established Parilla Premium Potatoes in 1990 and it now has around 50,000 hectares under cultivation in the Mallee, Southeast and Northern Adelaide plains growing 120,000 tonnes of produce each year, for the fresh and processing markets, both national and international. In 2021 they made a significant investment of $45 million in a highly automated packing facility and the adoption of optical grading and sorting technology in the facility has resulted in reduced wastage, increased operational efficiency, and improved product quality.

The tour of the facility provided a firsthand look at the potato processing journey and the technology being employed in the sorting and grading to ensure that only high-quality potatoes are packaged. The group then took a trip out to the fields to learn more about potato cultivation and growing practices used to yield the best crops. Renee's personal touch made the tour even more valuable as she shared the history of how her family built the company, the research and development on potato varieties, and the importance of the potato industry for the region and how they have worked to support this.

Top L-R. Spring Field Production Growers Day, Flux Robotics Precision Sprayer demonstration. Spring Field Production Growers Day, TriCal On-Farm Demonstration.

Spring Field Production Growers Day

VegNET SA and AUSVEG SA program team were pleased to welcome 45 SA field growers, suppliers and research community members to the Spring Field Production Growers Day for networking, industry updates and on farm Ag-Tech demonstrations.

The group enjoyed the hospitality of Sneaky's Restaurant for networking and presentations and then moved to a nearby property for an on farm Ag Tech and Production Demonstrations

The event brought together key stakeholders and the presentations included updates on pest and disease control, biosecurity update on key initiatives and targeted fumigation options in intensive horticulture.

Michael Rettke, Research Scientist, Diagnostic Tests for Soilborne Diseases, Potatoes, Onions. Vegetable at SARDI provided an update on the VegNET Innovation Fund program to support growers on the Northern Adelaide Plains affected by Beet Cyst Nematode. The project is developing a diagnostic test and will support commercial trials into management practices. An update on potato and onion diseases rounded off a well received session that provided the growers with direct access to industry expertise.

Dr Doris Blaesing, Associate at RMCG, provided information about the Soil Wealth ICP (SWICP3) demonstration trial aimed at improving crop health by reducing pests through an integrated pest management approach with the adoption of preferably native insectaries. The introduction of the Soil Wealth project to the growers aimed to demonstrate applied research and to encourage future participation in this project, and in trials more generally. The current trial is being supported by Paul Pezzaniti from Platinum Ag and Steve Coventry from Bugs for Bugs.

Steve Coventry spoke to the group about IPM for field growers and provided valuable insights on how and when it could be used and the benefits that can be gained. This was followed by Jess Bamford sharing her expertise on the selection of native plants to establish a native insectary.

The Biosecurity update provided an update on the development of a state-based monitoring program for Serpentine Leaf Miner to ensure our ongoing area-freedom claim and provide additional confidence of market access to local producers. This was followed by Ben Page from Biosecurity SA with a local round up of current biosecurity issues and service and then a national perspective from Shakira Johnson the AUSVEG National Farm Biosecurity Coordinator.

The event wrapped up with on-farm demonstrations of targeted fumigation options by Trical and precision sprayer powered by AI by Flux Robotics.

Dusan Marinkovic and Matt Stein from TriCal Australia shared their commitment to providing innovative and dependable fumigation products and services to clients and the work they have been doing to develop responses to local pest and disease issues such as beet cyst nematode.

The team from Flux Robotics, Jordy Kitsche, Louis and Kirby, demonstrated their AI-powered precision sprayer. This technology developed by Flux Robotics can help farmers find the weeds in a paddock and only spray that millimetre-accurate area, significantly reducing the impact of chemicals on agriculture.

The support for this event from both the presenters and those who attended, demonstrated a strong commitment to building a connected and active community of growers, researchers and suppliers in South Australia.

FIND OUT MORE

Contact Peta Coughlin, AUSVEG SA on 0409 029 745 or email peta.coughlin@ausveg.com.au

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VEGNET TASMANIA

Regional Update

Weather Station Network

The farming forecast network has grown from its initial six stations to more than 40 to provide localised data for growers across several regions of Tasmania previously not well covered by Bureau of Meteorology stations and given a pathway for growers into agtech.

In late October 2023 VegNET Tasmania hosted a couple of sessions focussed on the Tasmanian weather station network set up by Ag Logic (aglogic.com.au). These sessions gave growers the chance to learn from how others who are using the data, look at some of the data and how it can be used in more detail, and ask questions of Marek Matuzsek from Ag Logic who has been instrumental in pulling this network together.

The weather station network was developed from a recognition that while some parts of Tasmania were covered through the farming forecaster network (farmingforecaster.com.au), North-West Tasmania didn't meet the conditions to attract the drought funding for this network. This omission was identified by Ag Logic in conjunction with the Cradle Coast Authority (the local NRM agency) who secured funding for the initial six weather stations for the North-West of the state.

These stations were established through a leasing arrangement from Ag Logic that will allow for project longevity beyond the initial funding and 1.7 times more stations than if they had been purchased with the project funds. While currently free of charge, the network use will transition to a subscription model once the initial funding expires in June 2024.

"We'd seen too many instances where weather stations were installed for a project, with useful data collected, and once the project had finished, they'd stop transmitting and fell into disrepair," said Marek Matuzsek from Ag Logic.

"The leasing (and future subscription) model allows for this network to have an impact beyond the initial project and provide a legacy and continued data access for Tasmanian growers (in North-West Tasmania)."

These initial weather stations were bolstered through further funding opportunities that allowed for more stations to be installed the network now has more than 40 sites. The network has been so successful that some growers are connecting their privately owned weather monitoring equipment into the network.

Top. Marek Matuzsek of AgLogic runs through the transmission equipment on the Moriarty weather station. *Images courtesy of Ossie Lang.*

Above. The group had a look at the equipment in place at Spalford.

The Moriarty group reviewed data from a range of sites across the state.

Getting the most from the data

The VegNet sessions provided an overview of the weather station equipment in place and how the network works and transmits data through Wild Eye (mywildeye.com). Along with the hardware Marek was able to show the data as it appears in the Wild Eye App, including temperature, rainfall, soil temperature, and wind speed.

Marek was able to share some data use case studies with the groups and was pleased to hear from participants how they were using the data. Caitlin Radford who hosts the Moriarty station had been using the network to review the wind speed and other conditions when completing quality assurance paperwork.

"Having the data there and recorded has been invaluable in meeting our QA requirements and ensuring our spray applications are applied in the correct conditions" said Caitlin.

Spalford weather station host, Tim Walker found the soil temperature data useful in planning his sowing of potatoes this season.

"The data has meant that we can time our sowing to ensure our crop gets up and going once sown. The weather was looking promising for a while but a recent cold spell has pulled the temperature back below where we need it," said Tim.

"The soil temperature data also shows the variability that occurs throughout the day and the average data that we get from the weather station means that we get more accurate information that doesn't rely on us timing manual probe readings correctly."

Supporting adoption

Along with the discussions about using the data, the sessions were a great chance for growers resolve problems with Marek on the spot. The network has proven to be an easier entry point to ag tech and data use for growers.

"Initially the network was born from a recognition of a missed region with other projects, but it has evolved to be a soft entry for a lot of growers into ag tech, the data that can be collected and how to use that to get the best from their farming operations," said Marek.

"The system we've set up allows for additional probes and inputs to be brought into the same format, so once growers have made a start with the network, it becomes much easier to take the next steps (with AgTech)."

Thank you to Tim Walker and Caitlin Radford for hosting the events and sharing the ways they use the data. Also, thanks to the Ag Logic team and Fiona Kerslake for her support behind the scenes, and Marek Matuzsek for sharing his expertise with the groups.

FIND OUT MORE

Contact Ossie Lang, RMCG on 0430 380 414 or email ossiel@rmcg.com.au

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VEGNET NORTHERN TERRITORY

Regional Update

Top. Farm Value-add Industry tour at Rainforest Bounty. Above. Vegetable producers making jam in the FNQ Food Incubator commercial kitchen.

Jam-Packed Industry Tour to Round Out the Year

It is heating up in the Territory as vegetable growers plan to finish off their season and prepare for the Wet Season. VegNET is doing the same, as it finishes off its final activities for the year and looks to the new year for what it can deliver for its growers.

The final industry tour for the year was held 21-27 October where 20 participants headed to Cairns to participate in a Farm Value-Add industry tour delivered by FNQ Food Incubator, co-funded through the VegNET project and the Department of Industry Tourism and Trade (DITT).

VegNET brought a group of vegetable growers, government, university, and hospitality workers working in this space, while DITT brought indigenous food producers and export industry personnel on board to attend a 'jam' packed week in the value-add sector. It was important to bring all areas of the industry on the tour as producing value-add products in the Northern Territory is most successful with industry support as a whole, particularly in the areas of infrastructure and market development.

The week started off with farm tours to farms that use a portion of their produce (e.g. out of spec produce) to create a value-add products such as jam. Participants visited Skybury Farm near Mareeba, QLD. The Skybury tour was very impressive with an insight into both the farming and value-add production of the business. The participants toured the red papaya orchards and the new processing facility as well as gained an insight into Skybury's plant propagation work and sustainable farming practices. After this, participants visited Skybury's onsite restaurant where they were served a papaya inspired menu for lunch. Of interest to many was the scope of the operation and the work Skybury does to not only care for the environment but also to constantly seek new ways to value add to their crops post-harvest. As they departed the bus was filled with purchased jams, sauces, dried fruit, and vodkas.

After Skybury the participants headed to Rainforest Bounty in Malanda, QLD. Rainforest Bounty grows a variety of native fruits, including Davidson Plum, Lilly Pilly and Lemon Aspen. Rainforest Bounty employs regenerative farming practices to refine their environment and maximise harvest of the native ingredients. After getting an insight into their farming operation, the participants received a tour of Rainforest Bounty's commercial kitchens to learn about the many value-add products that Rainforest Bounty has served up over the years before sampling Lemon Aspen cordial and a range of Bush Food conserves.

The second part of the industry tour was spent in the commercial kitchen at FNQ Food Incubator to get a feel for making a commercial value-add product. This included a tour of the technology and infrastructure that assists in the efficiency of the production process and

FIND OUT MORE
Contact Mariah Maughan, Vegetable Industry Development Officer, NT Farmers Association on 0417 618 468 email ido@ntfarmers.org.au
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in delivering a high-quality product. Participants were split into two groups and made batches of mango and banana jam, with a jam contest at the end to determine which group made the best product!

The third part of the tour focussed on the business side of value-add production. There was a brilliant line up of speakers to address all aspects of a farm value-add business. There were talks on the science behind food and shelf-life testing, intellectual property and protecting your recipes and trademarks, insurance, and the risks of not being properly insured, and how to market your business effectively and why it's important. This got participants thinking about questions such as: 'does their insurance cover them? Are they following food safety laws? How can they determine their use-by date? How will they market their product and is it financially viable? Participants went home having gained a great batch of jam and greater insight into value-add production from farm to shop. There is great potential for value-add food products to be produced in the NT and it is exciting to see what's on the horizon for this area of agriculture in years to come.

With the final industry tour done for the season VegNET looks to what it will deliver in 2024, starting off with a cover crop trial on a vegetable farm in the outer Darwin region. After a short rest over the Christmas break, the project will be ready as ever to get back in to delivering extension services to growers in the Northern Territory with a great year ahead planned for 2024.

Above. Skybury Papaya. **Below L-R.** NQ Food Incubator commercial kitchen. FNQ Food Incubator production technology/machinery. Skybury value-add products

VEGNET WESTERN AUSTRALIA

Regional Update

Projects Update-Input use Efficiency

While radical change is sometimes necessary to impact business growth, the consistent pursuit of small, continuous, and incremental improvements - the 'one-percenters' across a business can create long-term, progressive change while strengthening the business's core for additional profitability and innovation.

VegNET WA delivers extension and project support in key focus areas such as reducing business costs, enhancing capacity, and improving input use efficiency. The program aims to support the growers and their business to adopt, transition or drive a change to more efficient business practices.

Notably, three new resourced projects have commenced in Western Australia aspiring to improve specific input efficiencies to improve their economy of time costs and labour:

- A north metropolitan region demonstration site for water, energy, and waste efficiency - cost inputs, looming water abatements.
- A regional southwest biofertilizer trial, labour and nitrogen use efficiency-nutrient leaching and costs input.
- South metropolitan biomineral practice change project - labour costs and capacity benefits.

Grown Smart Produce Carabooda WA Demonstration site - Input Use Efficiency 'One Percenter's'

Stemming from the participation in the VegNET vegetable innovation funded 'Heat Pumps Feasibility study and recommendations; Grown Smart produce have initiated a full metering study of their whole production system for energy and water insights to shape and inform the final system design of the water and energy efficient closed loop production system.

- Photovoltaic-powered electric heat pump to improve capacity for winter cropping.
- Recirculating hydro-fertigation system for water and nutrient distribution efficiency.
- Greenhouse cooling system for adjusting and optimising climate control.
- Bio oil root zone heating system to improve crop health.

The business has established in-house crop variety trials for resilience and has a zero waste approach to all inputs onsite and in the production system including plastics and food waste.

The business supports an innovative culture that encourages and rewards continuous improvement, recognises and appreciate employees' contributions towards these incremental changes.

The VegNET program has continued to support the growers with the use of Media Moisture monitoring equipment; with the grower attesting to immediate and profound benefits to crop health monitoring and management:

- Validate monitor and evaluate the growers' observations in crop health and water requirements and map against management requirements.
- Gaining skills in analysing the data and confidence in the data if unusual
- Quantifying the greenhouse temperatures, map the differences and respond in greenhouse management.
- The Input efficiency project will expand to include:
- Additional useful lines of data collection for the grower's examination including a pressure sensor for monitoring the system's pressure levels
- Extension resources and training for improving water efficiencies and Crop health management with a looming water abatement to reduce their water use in the North Metro region by 10% by 2028.
- Linkage with funding opportunities and specialists
- Full metering study data analysis and case study report.

The business has agreed to host other growers and industry as a demonstration site in multi-agency partnerships during the development stages of the pilot project for energy and water to share insights into how the one percenter' philosophy can accrue and collectively make a significant impact to business capacity.

Partnerships include VegetablesWA, VegNET Soil Wealth IPC, AHR, RMCG, and Irrigation Australia (IAL)

Above l-R. Installation of Acclima 315H soil moisture sensors. Enhanced whole systems management for optimised crop health and quality. Final Product - Improving Business capacity for maximised yield and product superiority.

FIND OUT MORE

Contact contact Katrina Hill on 0427 373 037 or email katrina.hill@vegetableswa.com.au.

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AUSVEG state update

VICTORIA

As our 100 years of serving Victorian vegetable growers comes to a close, AUSVEG Vic would like to take this opportunity to thank our Sponsors, Affiliate Partners and Grower Members for the support they have extended to us during this difficult year. We have seen fires, floods, escalating costs of production and a market in oversupply. Nevertheless, our resilient growers are gearing up for the Christmas rush.

We would like to welcome our two new Executive Committee members – Marco Mason, a second- generation vegetable grower from Werribee South and Paul Doria, a second-generation vegetable grower from Devon Meadows. We look forward to their contribution to our important work.

During October, a joint initiative between Agriculture Victoria's Farm Business Resilience project, AUSVEG VIC and VegNET Victoria, hosted two Lean Principals in Agriculture sessions. Presenter Toby Cook of Lean 6 Sigma Solutions lead participants through cost efficiency in farming during the two interactive sessions. Feedback was very positive, especially from the younger growers.

October also saw the introduction of our Clinician for Mental Health and Wellbeing, Brendan Hyde. In a collaboration between Vic Gov and EACH, AUSVEG Vic have been accepted as Partners in Wellbeing and have Brendan available for Victorian growers to speak to seven days a week. Our motto is, "It's easy - just pick up the phone" and ask for Brendan the AUSVEG VIC Clinician.

Phone Brendan on 1300 375 330

We are looking forward to presenting more farm business resilience sessions in the future as well as succession planning, growing leaders and actively being out and about meeting Victorian growers, whilst working on further projects to engage with grower partners and support our Sponsor and Affiliate Member base.

SAVE THE DATES

AUSVEG VIC
Annual Awards for Excellence 2024
27 April
Pullman Melbourne on the Park

Hort Connections 2024
3-5 June
Melbourne Convention Centre

HORT CONNECTIONS HC MELBOURNE 2024

AUSVEG VIC are excited to be the host state of Hort Connections 2024 and look forward to seeing a record grower turnout, supporting this premier event.

Joy Pedersen
AUSVEG VIC Executive Officer
Phone. 0413 760 776

AUSVEG State News

QUEENSLAND

Oh, what a year!

As I write this much of the state is involved in emergency bushfire response, with the aftereffects yet to be known. Add this to a year of unrelentless IR changes, another year of increased input costs, biosecurity issues and further lackluster prices for the majority of commodities and it's appropriate to say the year won't be missed by anyone.

The irony in the above environment is that when we were researching the previous one hundred years of supporting growers through the challenges they faced, we discovered that the very reason we were formed as the Committee of Direction of Fruit Marketing in 1923 is still relevant to our growers 100 years later!

A century ago, in an attempt to promote more efficient arrangements for getting fruit from grower to consumer, the Labor Government of the day introduced the legislation under which the Committee of Direction of Fruit Marketing was established as part of a wider program of agricultural reorganisation.

I challenge anyone to demonstrate that the previous 18 months haven't been one of the most active periods of political agricultural reorganisation since that time.

A century ago, the discussion of the industry's problems in the contemporary newspapers, parliamentary debates and government publications speaks of gluts in supply which then didn't provide growers with a sustainable income source. They blamed poor marketing and distribution arrangements.

One thing we did love is that the government referred to the issues as an 'underconsumption' rather than 'over-production' – let's bring this term back!

However, the statement that most resonated was this:

> *"Whatever else is done for the agriculturalist, if prices remain unpayable and marketing is disorganised little advantage will accrue to him from the new organisation. The stabilisation of prices and a paring of the margin between producer and consumer is desirable from the standpoint of both the agriculturalist and the consumer."*

Fair margins and a fair market – imagine that.

The challenges falling on growers' shoulders today have never felt heavier. One thing we know for certain is that things must change. Our sector and the Australian public who rely on your produce depend on it. We give a fork. And in 2024 we're going to make sure every Aussie out there (decision makers included) gives a fork too.

Rachel Chambers
QFVG CEO
Phone. 07 3620 3844

QFVG QUEENSLAND FRUIT & VEGETABLE GROWERS

NORTHERN TERRITORY

The 2023 Dry Season is coming to an end after what has been a challenging season for many with produce prices seeing as much as a 50% reduction in some crops. Despite its challenges, NT producers have succeeded in producing high quality produce for predominant supply to Brisbane, Sydney, and Melbourne markets.

A later than usual northern rainfall onset is expected for this coming Wet-season with the Bureau of Meteorology expecting a 60-70% chance of a later rainfall onset increasing to a greater then 70% chance for northern parts of the NT. With hot conditions currently the Northern Territory, there is hope for the delayed onset to not have a significant impact on the annual rainfall, however weather prediction services are suggesting this may be the case.

The Northern Territory government has seen a new Minister of Agribusiness and Fisheries appointed recently with Deputy Chief Minister Nicole Manison also taking on the portfolios' of Minister for Industry Tourism and Trade and Minister for Agribusiness and Fisheries. Manison stated that the Northern Territories "agriculture and aquaculture sectors are priority growth industries for the Territory Government because they create hundreds of ongoing jobs and continue to boost our economy. We are serious about getting on with the job of growing our economy to $40 billion by 2030, and this new Agribusiness and Aquaculture strategy is an integral part of that."

NT Farmers Association has recently announced Greg Troughton as their newly appointed CEO. Raised in Alice Springs and Tennant Creek, Greg has strong foundational roots in the NT, and will bring fresh leadership and strategic development skills to further advance the organisation. With a background in law, commerce and economics, and a genuine passion for stakeholder engagement and fostering business growth and innovation, Greg will be a perfect fit for the role in championing Northern Territory Horticulture on a national and international scale.

Mariah Maughan
NT Farmers Association
Phone. 0417 618 468 | 08 8983 3233

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