

SUMMER 2022/23

# potatoes

australia



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**Cover.** Georgia Thomas, Project Manager with Potato Growers Association of WA. See Page 30.

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ISSN 1834-2493



# From the Editor

## Welcome to the Summer edition of *Potatoes Australia*.

I am the new editor with AUSVEG, coming in at a time when the horticulture industry is slowly recovering from the impacts of covid, with field visits, conferences and events well and truly back in full swing.

Coming from a background in agriculture and livestock, it is interesting to see where the synergies lie between different sectors – biosecurity, cost of production, labour, but also to learn the nuances of vegetables and potatoes, that are making life interesting!

Flip over for *PotatoLink* with some interesting reads on nutrient analysis, pests and diseases research, while an understanding of beneficial bugs can make a difference to the success of a crop.

We feature three more winning growers from the awards presented at Hort Connections 2022, namely the Syngenta Grower of the Year, Hort Innovation Exporter of the Year and the Visy Impact Award. Our grower profiles give such an interesting insight into what makes them successful and some of the challenges they may have faced.

Project Manager with WA Potatoes, Georgia Thomas presented at the World Potato Congress, Dublin during 2022, her feedback on what is happening on a global level, plus an overview of her presentation gives some food for thought.

Last but not least we have look at what as been, and what is to come with industry updates such as foodservice, the Bureau of Meteorology, food security and commodities.

There is a lot going on and plenty to get your mind ticking into the New Year. Be sure to keep in touch with events during 2023 including field days and webinars that will focus on precision ag, seed management, maximizing return on investment and regenerative agriculture presented by the PotatoLink community.

Deborah Hill



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A stylized, handwritten signature of Michael Coote in black ink.

**Michael Coote**  
CEO, AUSVEG

## Message from the CEO

2022 was meant to be the year where we bounced back from the hardships and difficulties of COVID-19, but this year has been one of the toughest in recent memory for the horticulture industry.

The Australian horticulture industry has faced significant challenges this year. We are dealing with floods and continuous wet weather that have impacted crops and input costs. It has become increasingly difficult to run a sustainable business, as labour shortages have also made it hard to plant, grow and harvest crops.

The increases to the costs of production, which are impacting all sectors, have been difficult for potato growers.

This year AUSVEG received feedback from growers on their costs of production, expected plantings, and confidence in the industry's outlook over the next 12 months – what we heard back was stark:

1. Cost of production has increased by an average of 25% for businesses in the potato sector. Growers have reported to AUSVEG that:
  - Fertiliser prices have increased between 200% and 300%.
  - Chemicals and fuel by more than 40%.
  - Labour / wages by over 20%.
2. More than three quarters of businesses have indicated that their farm business margins have decreased in the last 12 months.
3. More than two-thirds of businesses are not confident about the outlook for the next 12 months, and no business surveyed indicated that they were very or extremely confident.
4. A worker shortage of at least 10,000 individual workers, which equates to many more roles as workers follow the harvest trail for seasonal work.

Growers were already operating in a challenging and unpredictable environment prior to the challenges of 2022.

It is in this spirit that AUSVEG has boosted its advocacy capabilities this year to help growers with these and other important issues.

AUSVEG has boosted its reach through its membership of the Food Supply Chain Alliance, which represents over 160,000 businesses with a revenue of over \$224 billion, as well as the NFF Horticulture Council and the Fruit & Vegetable Consortium. The Consortium was involved in the development of a KPMG report that highlights the issues regarding potato and vegetable consumption in Australia, which are in decline.

Planning for the annual horticulture event, Hort Connections is well underway. I would like to extend a thank you to our key strategic partners coming on board so early in the piece. This event represents a unique opportunity for industry to come together and I encourage you to register early to ensure that you can take advantage of the speakers, networking and trade that will be onsite in Adelaide from 5-7 June 2023.

On behalf of the AUSVEG team, I look forward to meeting with many of you at the event and wish you a successful 2023 in horticulture.





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## Message from the Chair

The past year has given us another 12 months of tough times. As we emerged from the lockdowns of the pandemic, weather events have played havoc with the industry's ability to plant and harvest.

AUSVEG acknowledges the highs and lows of our industry and continues to advocate for growers in areas such as cost of production, labour shortages and the toll difficult events can have on all of us.

It is important as an industry that we stay connected to encourage and support each other through all manner of issues. Events such as Hort Connections 2022, held in Brisbane in June, give us an opportunity to regroup, catch-up, relax and support each other through challenges and to celebrate the wins. It was pleasing to see so many growers and others in the sector come together in-person and offer support to one another. I encourage you to attend the 2023 event to be held in Adelaide next year in June.

AUSVEG's Annual General Meeting held in late November has seen two new faces join the Board, and we say farewell to two directors.

Please make welcome Andrew Moon who is a Queensland vegetable and onion grower from Moonrocks, and Tasmanian vegetable grower Mark Kable, from Harvest Moon, who have been appointed as Grower Directors.

Andrew and Mark will bring significant experience, expertise and passion to their new roles on the AUSVEG Board, and I look forward to their contributions on policies and initiatives that will lead our organisation and the Australian vegetable and potato industries into the future.

On behalf of the Board, I would like to thank Belinda Frentz and Michael Radcliff who have served on the Board for many years. Both have been steadfast and loyal advocates for the Australian vegetable and potato industries during their time on the AUSVEG Board.

I would particularly like to thank Belinda for her outstanding support and dedication as Deputy, particularly during the turbulent times of COVID-19, floods, and rising input costs that have put tremendous strains on all growers around the country.

South Australian vegetable, potato and onion grower Renee Pye will take over the role of Deputy Chair from Belinda, and I look forward to working with her to support growers on the issues that are important to them.

I wish you a safe and prosperous 2023.

A handwritten signature in black ink that reads "Bill Bulmer". The signature is fluid and cursive.

**Bill Bulmer**  
AUSVEG CHAIR



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## AUSVEG welcomes Andrew Moon and Mark Kable as new Grower Directors

AUSVEG has welcomed the appointment of Queensland vegetable and onion grower Andrew Moon, from Moonrocks, and Tasmanian vegetable grower Mark Kable, from Harvest Moon, as Grower Directors of AUSVEG following a Board Meeting and Annual General Meeting held in Sydney on 24 November 2022.

Third generation Victorian leafy vegetable grower Bill Bulmer was unanimously re-elected to the position of AUSVEG Chair, while South Australian vegetable, potato and onion grower Renee Pye was unanimously elected as Deputy Chair.

Andrew will replace Belinda Frentz, who is stepping down after serving seven years on the Board, including four as Deputy Chair, while Mark will replace Michael Radcliff, who is stepping down after three years on the Board.

Moonrocks supplies a wide range of horticulture crops, specialising in broccoli, onions and garlic from St George, Queensland. Harvest Moon Tasmania grows onions, carrots, beans, broccoli and cauliflower on a yearly basis, while its mainland branches in Victoria and Queensland source additional produce from more than 80 growers, giving the business nation-wide exposure through markets and retail networks.

"Both Andrew and Mark are actively involved in the vegetable and wider horticulture industry, with Andrew previously serving as Chair of Onions Australia and Mark the current Chair of the Tasmanian Agricultural Productivity Group," said Mr Bulmer.

"Andrew and Mark will bring significant experience, expertise and passion to their new roles on the AUSVEG Board, and I look forward to their contributions on policies and initiatives that will lead our organisation and the Australian vegetable and potato industries into the future."

"Belinda and Michael have been steadfast and loyal advocates for the Australian vegetable and potato industries during their time on the AUSVEG Board. On behalf of the AUSVEG Board, I would like to acknowledge the contributions of both Belinda and Michael during their tenures and wish Andrew and Mark well in their new roles."

"I would particularly like to thank Belinda for her outstanding support and dedication as Deputy, particularly during the turbulent times of COVID-19, floods, and rising input costs that have put tremendous strains on all growers around the country.

"Despite the challenges faced by growers and the broader community, the last 12 months have been an exciting period for AUSVEG, following our efforts to increase industry collaboration and work with the wider horticulture industry to provide effective services and representation for our growers. This was clearly demonstrated in Brisbane earlier in the year, when we partnered with the International Fresh Produce Association of Australia-New Zealand to deliver Hort Connections 2022 to nearly 3,100 local and international delegates.

"AUSVEG looks forward to continuing to effectively represent Australian vegetable and potato growers in the year ahead and is eager to continue working with the wider Australian horticulture and agriculture industry for the betterment of our growers."





## The Pye Group opens the largest potato packing facility of its kind

Australia’s leading potato supplier, the Pye Group has officially opened the largest potato packing facility of its kind in the southern hemisphere.

Operating under one roof, the \$45 million 15,000 sqm warehouse has been equipped with the finest quality world best machinery which has doubled its production capacity (from 22 tonne an hour to 45 tonne an hour), delivering the highest quality controls, and minimising waste.

Pye Group Director, Mark Pye, said the multi-million project which has taken 18 months to complete was a critical investment for its brands Parilla Premium Potatoes and Zerella Fresh as demand had soared in recent months.

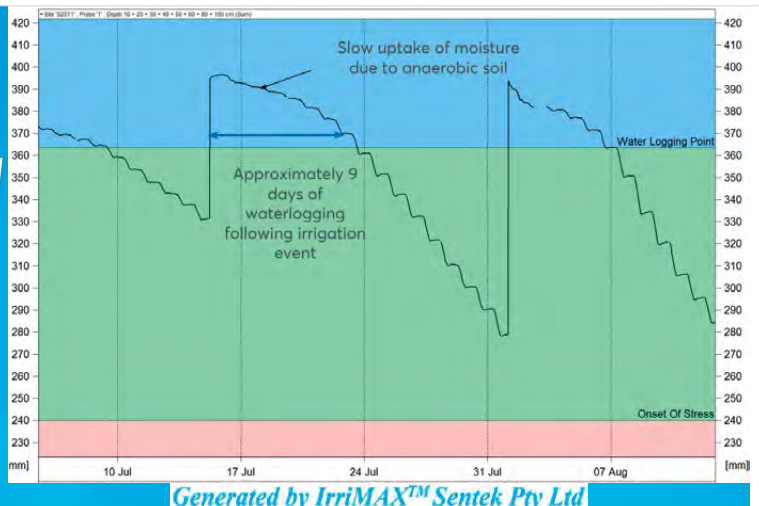
“We have always invested in the best technology, equipment and facilities to ensure we’re producing, packing and selling the best quality products in the most efficient and sustainable ways,” Mr Pye said.



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“Not only are we creating jobs and building livelihoods for more than 25 families in the Mallee region, but we’re also cutting emissions by reducing the number of B-Double trucks on the road, creating faster delivery times for our customers and producing A-grade quality, great tasting potatoes – one of the most versatile and affordable ingredients for everyday Australians.

---

**“It’s been an incredible project to oversee with machinery engineers from Europe being on site and then, throughout the pandemic, operating remotely at all hours of the night, to guide the installation process to ensure the potato packing facility was ready as quickly as possible. The efforts from our staff have been critical to the delivery of this project.”**

---

The Pye Group received a \$2million grant under a State Government Regional Growth Fund in 2020.

The production facilities and harvesting crops located at Parilla complement the existing site at Virginia giving greater touch points across the state for greater supply and access to national retailers.

The Pye Group employs more than 350 people and, in recent months, has overseen the construction of 27 Selecta homes to welcome workers and their families to the region as a place to live, work and foster new career paths.

“This state-of-the-art facility will lead our stable of brands for the foreseeable future and we’re excited at the opportunity that this new facility will bring for everyone involved.”



Above. The Pye Group have officially opened the largest potato packing facility to improve efficiencies for the whole business.



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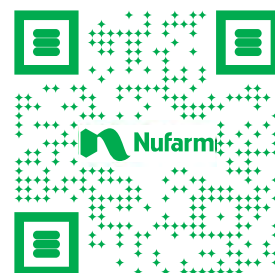


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## Registrations are now open

# HORT CONNECTIONS

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Hort Connections is the largest horticulture conference and trade show for Australia and New Zealand bringing together members from the vegetable, fruit and floral sectors.

With more than 200 exhibitors and over 3,000 attendees, it is a must-attend event.

The three-day event will be held from 5-7 June 2023 at the Adelaide Convention Centre and will bring together industry leading speakers, networking opportunities and the well-respected Hort Connections National Awards for Excellence presentations.

Hort Connections speakers and exhibitors will showcase the latest research,

technologies, and innovations to offer new perspectives on the future of Australasia's horticulture industry.

Among the many event highlights are the offsite AUSVEG Grower Networking Event, and the Corteva Agriscience Young Grower Networking Event at the Weber Grill Academy Adelaide, which will provide opportunities for established and emerging leaders to get together, network and learn from their peers and colleagues from across the country.

### EARLY BIRD All-Access Passes are again on offer

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- Welcome Reception/ Monday Trade Show
- Perfection Fresh Breakfast (Tuesday)
- Tuesday Trade Show
- Trade Show Speaker Sessions (Tuesday)
- Women in Horticulture Event/ Diversity & Inclusion Speaker Sessions (Tuesday)
- Wednesday Trade Show
- Plenary Speaker Sessions (Wednesday)
- Concurrent Speaker Sessions (Wednesday)
- Hort Connections Gala Dinner (Wednesday) and Hort Connections National Awards for Excellence.

#### Find out more

Take advantage of the Early Bird offer and register to attend, visit [hortconnections.com.au](http://hortconnections.com.au), or email [info@hortconnections.com.au](mailto:info@hortconnections.com.au).





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# The summer weather ahead from the Bureau of Meteorology

The Bureau of Meteorology has released the December to March forecast outlook, and with a third La Niña for much of the east coast, it will be another wet summer.



Climate will be influenced by La Niña until mid to late summer giving higher rainfall likelihoods in the north and east of Australia. This coupled with the Southern Annular Mode index in positive to neutral territory adds to the chance of above average rainfall for eastern Australian and below average for Tasmania.

The longer term trend shows that Australia has warmed by ~1.47°C in the period 1920-2021, leading to an increase in the frequency of extreme heat events. In recent decades, there has also been a trend towards a greater proportion of rainfall from high intensity short duration rainfall events, especially across northern Australia during its wet season.

## Long-range forecast overview

- **Rainfall:** December to February rainfall is likely (greater than 60% chance) to be above median in eastern parts of the eastern states. Below median rainfall is likely for parts of Western Australia.
- **Max temperature:** December to February maximum temperatures are likely to be warmer than median for most of Tasmania, and most of northern and western Australia. Below median temperatures are likely for south-eastern parts of Queensland, central and eastern New South Wales and most of Victoria.
- **Minimum temperature:** December to February minimum temperatures are likely to very likely (greater than 60% to greater than 80% chance) to be warmer than median for most of Australia. Below median temperatures are likely for parts of north-east New South Wales.
- **Climate Drivers:** This wet outlook over northern and eastern Australia is consistent with several climate drivers, including La Niña, a rapidly decaying negative Indian Ocean Dipole event, a positive phase of the Southern Annular Mode, and record warm waters around Australia.

## Above median rainfall for December to February likely for large parts of eastern Australia, below median likely for parts of Western Australia

- For December, above median rainfall is very likely for the tip of Cape York and is likely around the Gove Peninsula Coast of Northern Territory, eastern Queensland, the New South Wales south coast and eastern Tasmania. Below median rainfall is likely for most of north-west and central Australia.
- For December to February as a whole, above median rainfall is likely around the Queensland ranges and coast, coastal and southern New South Wales, eastern and central Victoria, parts of south-eastern South Australia and all of eastern Tasmania. Below median rainfall is likely for much of Western Australia.

## Warmer days for December to February likely for western and northern parts of Australia and Tasmania; cooler for the south-eastern mainland

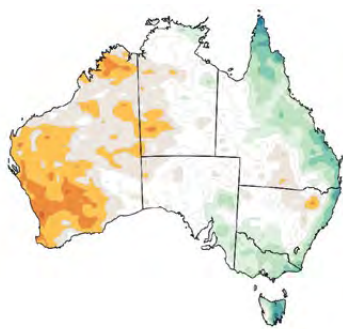
- For December, above median **maximum temperatures** are likely for most of Western Australia, the Northern Territory and into western Queensland and northern South Australia. Below median maximum temperatures are very likely for south coastal Western Australia, most Victoria, New South Wales, Queensland's southeast and Cape York and Arnhem district of the Northern Territory.

### FIND OUT MORE

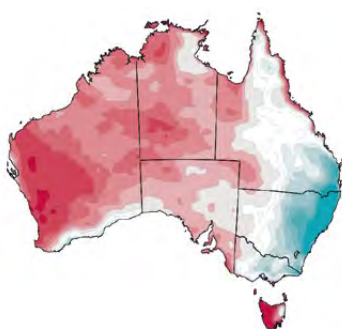
For the full outlook go to [bom.gov.au/climate/ahead/outlooks/](https://bom.gov.au/climate/ahead/outlooks/)



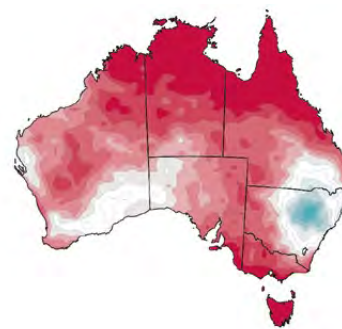
BOM OUTLOOK



Chance of exceeding the median rainfall for Dec 2022 to Feb 2023



Chance of exceeding the median maximum temperature for Dec 2022 to Feb 2023



Chance of exceeding the median minimum temperature for Dec 2022 to Feb 2023

- December to February **maximum temperatures** are likely to be above median for most of Western Australia, Northern Territory, South Australia and Tasmania. Maximum temperatures are likely to be below median for Victoria, most of New South Wales except for the far west and south-eastern Queensland.
- For December, **minimum temperatures** are likely to be above median for north-east Australia and for Tasmania. Chances increase to very likely for Far North Queensland and Arnhem district of the Northern Territory. Below median minimum temperatures are likely over southern parts of Western Australia and central and eastern parts of New South Wales.
- December to February **minimum temperatures** are likely to very likely to be warmer than median for most of Australia, except over the Southern Interior of Western Australia, western South Australia and around the Northern Tablelands and Central Slopes of New South Wales extending into southern parts of Queensland where temperatures are more likely to be below median.
- Past accuracy of the December to February chance of above median maximum temperature long-range forecasts is high to very high across most of Australia, with the exception of central parts of Northern Territory, where it is low to moderate.
- For minimum temperatures, accuracy is moderate to high for most of Australia, with moderate to low skill in pockets of the tropics.

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## BALLARAT POTATO UPDATE

# AusNet and the season ahead

The ongoing campaign to protect farmland being used for high voltage transmission lines in central and western Victoria continues with an application to the Supreme Court seeking to take the project back to the drawing board.



Piss Off AusNet ploughed into the hill at Mt Prospect. **Left:** Chris Stephens on his farm.



**The proposed route for the Western Renewables Link Project (formerly known as the Western Victoria Transmission Network Project) runs through prime farmland and significant environmental regions from north west Melbourne, past Ballarat and into central western Victoria.**

**For the Ballarat district, it impacts some 16 potato growing families in one of Victoria's prime potato growing regions.**

## The transmission network project plan and process

The Australian Energy Market Operator (AEMO) is the proponent of the Western Renewables Link. In December 2019 AEMO awarded the contract for its design, planning approval and construction to AusNet Services. The project comprises 190km of overhead high voltage transmission lines from Sydenham to Bulgana, plus a new terminal station north of Ballarat, plus infrastructure upgrades across western Victoria. Most of the new lines pass through the Moorabool, Melton and Hepburn Councils.

The project needs to pass the Victorian Environment Effects Statement (EES) planning process before it is presented to the Planning Minister to make an assessment and decision makers for consideration.

The transmission line is designed to carry wind and solar power generation with the equivalent energy to power 500,000 homes.

The preliminary EES information for agriculture and forestry identified that potatoes (seed, fresh and processed) in the Ballarat region 'supported a high value potato industry with significant investment made over many years to develop the industry, and represents the highest intensity broadscale use within the area of interest..'

A 220kV transmission line runs through the district, established some 40 years ago, but the decision has been made to not upgrade those lines, nor to utilise the land and easement that system already occupies.

AUSVEG, AUSVEG VIC and the Victorian Farmers Federation have attended local rallies and liaised with local growers and community groups in their efforts to lobby the State Government to encourage alternatives to the current proposed route that prioritises profits over preserving prime agricultural land.

## Advocacy for concerned locals

The Moorabool and Hepburn Shires have been heading up the campaign to support local residents concerns through activities such as the 'Green and Unseen' campaign, as well as consultation with government, AEMO and AusNet.

### Key concerns expressed by council include:

- Underground lines are the preferred option for residents and council;
- Current proposed route has several high fire risk zones;
- Overhead transmission towers will be 85m high:
  - Restricting aerial fire fighting capabilities
  - Restricting irrigation infrastructure and farm equipment usage.

A report commissioned by Moorabool Council found that a comparison between overhead and underground formats raised further concerns:

- Transmission towers would need to be installed every 400-500m, while underground only requires a transition station every 40km, but will require joint pits every 400-500m;



- Transmission towers are susceptible to inclement weather such as high wind, storms, lightning and heat waves which can result in power outages;
- Routine vegetation management is required for overhead lines to prevent bush fire hazards and faults – to be no higher than 3m. Damage to underground systems include tree root incursion and animals eating the surface of the cables;
- Easement requirements for overhead lines is 60-70m, while underground requires 42-48m;
- Ground disturbance is greater for underground with a trench between 1-2m for the entire length, while each tower/pylon is 3-10m for overhead lines;
- Overhead lines have a height restriction of 4.3m for machinery working underneath. A typical potato harvester is 4.5m, while irrigation booms are 7.5m.

For farmers in the region, the lack of direct consultation has been a point of frustration with groups such as the Moorabool Central Highlands Power Alliance (the Alliance) which runs the Stop AusNet’s Towers campaign, and the Kingston and District Power Alliance. The first that the region learned of the proposal was in mid-2020.

**Going to the Supreme Court**

Directly supported by a Ballarat district potato growers levy, in December 2022 an application was filed by the Alliance in the Supreme Court to seek the reapplication of the Regulatory Investment Test for Transmission (RIT-T) test. This is the cost benefit analysis test that AEMO ran to justify the project under the National Electricity Law. If successful, this court action will become a test case for all transmission projects across the National Electricity Market.



**Fifth generation potato farmer, Kain Richardson, farms in Newlyn and adjacent to the proposed terminal station.**

Photo. Luka Kauzlaric

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Soleto<sup>®</sup> is a pre-emergence herbicide for the control of annual broad-leaved weeds and annual grasses in potatoes.

Very high crop safety, no variety restrictions. Safer on Metribuzin sensitive varieties.



FEATURES	BENEFITS
<b>New Active Constituent</b>	500g/L METOBROMURON GROUP 5 Suspension Concentrate (SC) Herbicide applied as a Pre-Emergent Herbicide.
<b>Tried and trusted</b>	Trials and demonstrations in Australian conditions over the last 4 years.
<b>Very high crop safety</b>	No variety restrictions. Safer on Metribuzin sensitive varieties. Assessed for efficacy and crop safety in multiple trials in Victoria, Tasmania and South Australia prior to registration.
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<b>Persistent residual weed control</b>	Half life of 27-33 days in soil and only moderately soluble, ensuring effective weed control until after row closure.
<b>Suitable for all soil types and moistures</b>	Effective under all conditions with consistent results, including dry conditions.
<b>Tank mix flexibility</b>	Can be tank mixed with a range of pre-emergent, and knockdown herbicide. Ask your local agronomist for recommendations.
<b>Applicator Safety</b>	Non scheduled poison.





Photo: Ian Currie Photography provided by NewsCorp

In a press release, the Alliance said that it is "...seeking to quash AEMO's recent decision that its Western Renewables Link Project remains the preferred option to resolve renewable generation constraints in Western Victoria. Further, the application seeks that AEMO reapplies the process to decide what is the preferred option."

An Alliance spokesperson said the Supreme Court action had been made on three premises:

"Firstly, the cost of the project has massively blown out – it was \$473m originally, but in a document published by AEMO in November 2022, it is now about \$750m which should have triggered a re-assessment.

"Secondly, the project is premised on a connection to another transmission line out of NSW to Victoria, known as the VNI West project. We believe there has been inappropriate cost allocations for the two projects whereby neither project is accounting in their cost benefit analyses for around \$500 million of real capital infrastructure.

"And thirdly, there has been overwhelming changes in the National Electricity Market since 2019, when AEMO justified the project substantially on the basis of exporting brown coal power from Victoria to 2075 using VNI-West. We all know that coal power closures are accelerating and brown coal is not expected beyond 2032.

"It is not in AEMO's business interests to re-assess the RIT-T, nor to utilise the existing transmission lines as in Victoria they earn around two thirds of their

revenue from subcontracting and on charging AusNet transmission services - they earn more revenue for every new line that is built. We know underground is more expensive to set up, but the long term bottom line benefits far outweigh the initial savings of an overhead system."

"The EES process does not consider flow on effects. For example, building new terminal stations will attract prospective energy companies to build additional renewable energy supplies, given the proximity to connecting to the grid, further impacting on farmers.

Land value of properties where the transmission lines will traverse have also already been adversely affected, with many de-valued or sold at a loss. That de-valuation also impacts a farmer's ability to finance their operations.

The region has also seen significant property increases in part due to tree-changers, with some land reaching as much as \$55,000/Ha, meaning that it is prohibitive for farmers who are already under pressure, to expand.

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**Local farmers have already been active in expressing their concerns about the project with rallies in Melbourne, Ballarat and Daylesford, bringing their tractors into town to raise awareness of the issues.**

**The Supreme Court directions hearing is set for 22 February 2023.**

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### **Farmer and advocate**

Fifth generation potato farmer, Kain Richardson, farms in Newlyn and adjacent to the proposed terminal station. In a recent interview with ABC radio, Kain commented that while he is not opposed to renewable energy, he is concerned that the building works to instal the terminal station, would result in significant disruption to farm infrastructure such as the extensive network of irrigation that has been installed over many years.

In late 2022, AEMO announced it would consider other locations for the terminal station, essentially to suit possible VNI West routes, but the pathway for the Western Renewables Link transmission lines would remain in the current proposed location.

"While it is good news that AEMO and AusNet is finally listening after nearly three years of discussion, the fact that underground networks are not being considered means that we will still continue to advocate for better outcomes for our community," said Kain.

"The current system does not consider impacts to communities, biodiversity and tourism for our region. The visual amenity aspect and resilience problems of overhead transmission lines are being recognised overseas, with many energy suppliers replacing overhead lines with underground.

“AEMO visited the region recently to inspect the impact that the flooding had in recent times and were gobsmacked at how much earthworks would be needed to stabilise overhead towers should this level of flooding happen again.

“It really makes no sense to have this system, when the impacts on potato production are substantial in a time when supply is reduced, and demand is increasing.”

### 2023 – the potato season ahead

For the Ballarat district, the wet spring has been compounded the effects of hailstorms 12 months ago. The hail caused extensive damage to crops in the region, not only impacting potatoes for processing but also seed potato production, reducing the availability for the current season planting.

The wet and late finishing spring has resulted in a delay of nearly a month to get in the 2023 crop. When most farmers would plant in the first week of November, it was nearer December before the soil was dry enough to cultivate and plant. Harvesting at 120 days, puts it into late March – early April. The consequence is that there is a real risk that the crops may run out of summer before the frosts commence

creating issues such as sugar end when the potatoes convert starch to sugars.

“There will be a reduced yield – we will simply run out of summer,” said Chris Stephens a local potato grower. “Planting in the cooler weather gives the plants time to get up out of the ground before the heat starts. This year we went from a wet spring straight into a hot summer, so it was a battle to keep the moisture up until the plants could close the rows. The soils for many of us couldn’t be cultivated as well as we would like, resulting in clodding which means that water from irrigation doesn’t permeate through the soil as well.

“We also need to keep an eye out for late blight – this hot and humid weather means that the late blight we experienced last year is likely to present again this year. We are all hoping for cool nights, warm days and no dramatic weather events that will set the crops back.”

Chris is also Chair of the Ballarat Potato Growers Association and is deeply concerned about the impact of the transmission lines.

“We estimate that 1,000 Ha of prime potato growing land will be directly lost to the overhead lines, and a great many

more will be deemed to be non-viable because the powerlines and easements will either cut through a paddock, or the height restrictions will make it unworkable,” he said.

### Supply and Demand

The Ballarat region potato growers are primarily contracted to the French fries market based in Ballarat, of which there around 30 properties supplying as much as 3,000 tonnes a day during harvest into processor coolstores.

At the commencement of planting, growers are contracted by the processor, with the price set at the start of the planting season. Farmers are paid for potatoes that meet the specifications. The processor will take misshapen or marked potatoes, but growers are not paid for inferior product.

Current estimates indicate that Australian growers provide up to 70% of the potatoes for the French fry processor market, the 30% shortfall is imported as processed product.

With many potato production countries suffering weather events in past seasons (drought in Europe and America, wet in New Zealand), the 30% imports is not likely to be forthcoming in full. Quick Service Restaurants (QSR) will take the bulk on contract, but independent hospitality businesses will likely continue to feel the brunt of the current shortage.

As a consequence, the poor farmgate price from the processor sector (both fries and crisps), coupled with increasing farm input costs and less than ideal weather conditions, is resulting in many turning their back on the industry, or not signing contracts and pursuing other agricultural opportunities.

“There is a lot riding on the outcome of the Supreme Court hearing,” said the Alliance spokesperson “The farmers, the processors, tourism and environment (the project skirts the Wombat State Forest, the Lerderderg Gorge precinct and many water resources). No new transmission lines have been built for more than 40 years – this will absolutely be a test case for future energy infrastructure, so it is important to all of us to get it right.”

No new transmission lines have been built for more than 40 years – this will absolutely be a test case for future energy infrastructure...



Potato paddock with 220kV tower in the background.

#### For more information

Contact Western Victoria Transmission Network Project | Moorabool Shire Council.

**Stop AusNet's Towers:** JOIN THE FIGHT > STOP AUSNET'S TOWERS- [stopausnettowers.com.au](http://stopausnettowers.com.au)

AusNet WVTNP Fight | **Kingston and District Power Alliance** – Existing-Conditions-Agriculture-November-2021.pdf – [westernrenewableslink.com.au](http://westernrenewableslink.com.au)



## TRADE UPDATE

# Potato Export Overview


**COVERED IN THE DATA**

07011000	Seed potatoes, fresh or chilled
07019000	Fresh potatoes
07101000	Frozen potatoes, uncooked or cooked by steaming or boiling in water
11051001	Flour, meal and powder of potatoes
11052001	Flakes, granules and pellets of potatoes
11081300	Potato starch
20052000	Potatoes prepared or preserved otherwise than by vinegar or acetic acid, not frozen .

AUSVEG has crunched the numbers for potato commodity exports based on ABARES reports for the period July 2021 to November 2022.



## Seed Potatoes

Western Australia produces the highest volume of seed potatoes for export compared to other states.

Period	Volume (t)	Return (\$)
July – Dec 2021	4,251.30	5,068,105
Jan – Nov 2022	4,241.41	5,471,361
<b>Total July 2021 – Nov 2022</b>	<b>8,492.71</b>	<b>10,539,466</b>

### Jan – Nov 2022

State	Volume (t)	% of Total
South Australia	611.55	14.4
Foreign (re-export)	0.40	<1
Victoria	428.85	10.1
Western Australia	3,200.40	75.4
New South Wales	0.21	<1
<b>Total</b>	<b>4,241.41</b>	

### Jan – Nov 2022

Seed Potatoes Volume by destination (t)	
Thailand	1,572.02
Indonesia	876.00
Mauritius	700.00
Vietnam	689.51
Taiwan	162.40
Hong Kong	133.29
Singapore	68.50
United Arab Emirates	27.29
Norfolk Island	5.00
Qatar	3.00
Malaysia	1.80
New Caledonia	1.34
Papua New Guinea	0.42
Philippines	0.40
Fiji	0.36
Bahrain	0.08



## Jan – Nov 2022

Fresh Potatoes Volume by destination (t)	
Republic of Korea	18,545.50
Philippines	7,573.60
Singapore	2,329.11
Thailand	2,255.35
Indonesia	2,148.00
Malaysia	2,023.39
Taiwan	2,022.44
Hong Kong	1,728.26
United Arab Emirates	1,148.08
Saudi Arabia	151.88
Qatar	147.86
Brunei Darussalam	76.46
Kuwait	50.12
Bahrain	46.47
Solomon Islands	38.92
Papua New Guinea	33.34
Ukraine	28.00
Vanuatu	16.66
Nauru	12.42
Christmas Island	10.80
French Polynesia	10.51
Seychelles	7.56
Fiji	4.60
East Timor	2.78
Tuvalu, Democratic Republic of	2.00
<b>Total</b>	<b>40,414.11</b>

## Fresh Potatoes

South east Asian nations take the lion's share of fresh potatoes, principally South Korea, Philippines, Indonesia, Thailand, Singapore, Malaysia, Taiwan and Hong Kong.

Period	Volume (t)	Return (\$)
July – Dec 2021	11,343.20	11,098,081
Jan – Nov 2022	40,414.11	32,967,830
<b>Total July 2021 – Nov 2022</b>	<b>51,757.31</b>	<b>44,065,911</b>

## Jan – Nov 2022

State	Volume (t)	% of Total
South Australia	19,224.53	48%
New South Wales	15,917.25	39%
Western Australia	4,569.56	11%
Victoria	645.13	2%
Queensland	55.94	<1
Northern Territory	1.10	<1
Tasmania	0.60	<1

Potatoes Prepared or Preserved  
including thin sliced, but not in vinegar or acetic acid, not frozen

Period	Volume (kg)	Return (\$)
July – Dec 2021	211,271.80	1,868,930
Jan – Nov 2022	473,081.90	5,660,555
<b>Total July 2021 – Nov 2022</b>	<b>684,353.70</b>	<b>7,529,485</b>

## Jan – Nov 2022

State	Volume (kg)	% of Total
New South Wales	385,979.08	82%
Victoria	40,782.56	9%
Queensland	36,538.40	8%
South Australia	4,945.32	1%
Foreign (re-export)	4,479.62	1%
Northern Territory	356.91	<1%
<b>Total</b>	<b>473,081.89</b>	





## Jan – Nov 2022

Potatoes Prepared or Preserved Volume by destination (kg)	
Taiwan	103,785.61
Thailand	64,680.66
Hong Kong	48,519.24
Malaysia	47,305.42
Indonesia	33,570.64
China	31,009.40
New Zealand	28,056.56
Samoa (American)	24,620.00
Papua New Guinea	20,619.75
Fiji	12,008.40
Philippines	10,972.92
East Timor, Democratic Republic of	10,187.30
Vanuatu	8,146.20
Brunei Darussalam	7,991.15
Nauru	6,129.55
Ship & Aircraft Stores	4,195.00
French Polynesia	3,824.57
United Arab Emirates	2,105.83
Macau	1,976.00
Solomon Islands	960.00
Singapore	888.00
Tuvalu	532.00
Vietnam	400.00
Canada	252.00
Christmas Island	181.00
Cambodia	63.00
Norfolk Island	59.00
Cyprus	23.49
Cook Islands	19.20

### Value-add Potatoes Starch, Flakes and Flour

The production of value-add potato products including starch, flakes, granules and pellets; as well as flour and meal is relatively small in comparison to fresh and prepared potato exports.

New South Wales leads the way for potato starch and flakes categories, accounting for around 80% exports in both categories.

Flour and meal are evenly spread across three states – New South Wales at 29%; Victoria at 35.9% and Queensland at 26.7%. South Australia provides the balance at around 8%.

Potato starch is principally exported to New Zealand, while flakes are destined for Papua New Guinea. For potato flour the bulk at 77.4% is exported to New Zealand, Papua New Guinea, Philippines and Singapore, with New Zealand accounting for more than half.

	Volume (kg)	Return (\$)
<b>Potato Flour, Meal</b>		
July – Dec 2021	131,805.30	376,969
Jan – Nov 2022	82,035.32	290,720
<b>Total for July 2021 – Nov 2022</b>	<b>213,840.62</b>	<b>667,689</b>
<b>Potato Flakes, Granules, Pellets</b>		
July – Dec 2021	10,504.00	47,384
Jan – Nov 2022	30,873.00	142,053
<b>Total for July 2021 – Nov 2022</b>	<b>41,377.00</b>	<b>189,437</b>
<b>Potato Starch</b>		
July – Dec 2021	76,419.26	216,927
Jan – Nov 2022	48,635.25	104,335
<b>Total for July 2021 – Nov 2022</b>	<b>125,054.51</b>	<b>321,262</b>





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## Potato industry gathers to hear potato experts

The PotatoLink team brought together potato experts to share their knowledge on a range of topics to assist growers produce better potatoes, with theoretical practices backed up by practical examples from the field.

The Growing Better Potatoes Workshop was hosted by Australian Horticultural Research (AHR) and the PotatoLink project. PotatoLink is funded through the fresh and processing potato levies and contributions from the Australian government.

The workshop brought together four well respected speakers to cover a number of topics. These included seed potato storage, cutting and producing the best quality and quantity of tubers, presented by Dr Jenny Ekman (AHR) and Associate Professor Andy Robinson (North Dakota State University). Specific diseases to roots and tubers such as black dot and verticillium wilt was the subject matter for Dr Len Tesoriero (CropDoc), while Dr Chad Hutchinson (TriCal) spoke about using fumigants to promote soil health and suppress soil borne diseases.

It all begins with good quality seed potatoes which, according to Dr Ekman, are a living, breathing entities that age with time. Managing that ageing process to gain the best possible results is all about the storage environment.

A seed potato lives and breathes. When removed the ground it is warm, which means it is still respiring, burning energy, producing heat and ageing. The optimum storage temperature has been found to be around 3 to 5°C depending on variety. Managing the warm seed into a coolstore to cool it down without moisture loss, or condensation forming that can cause rot is a vital aspect of extending a seed potato's shelf life.

**"Potatoes live, breathe and age, just as we do"**



**"If we improve soil biology, we lower the pathogen carry over into the next season"**

Further, according to Andy Robinson, if you are using cut seed potatoes, giving it the right amount of time (and temperature) to heal at the wound site is an important consideration.

The size and shape of the cut seed potato will also have an impact on the yield. Smaller cuts may not produce enough tubers, while misshapen or irregular sizes, make it harder to manage the crop. Professor Robinson strongly urged delegates to check the seed cutter regularly and to keep the blades sharp and clean to reduce damage and disease risks.

**"In the first 40 days, the seed potato is drawing on its own store of energy – a bigger seed potato will give greater success – typically 2 ounces is ideal (50-60gm)"**

Dr Tesoriero has conducted wide-ranging research on many different potato diseases. In this presentation he focused on the diseases black dot, verticillium wilt and early dying. His advice for managing the presence of these diseases included use of certified seed potatoes; soil testing across the paddock (not just taking an average, and for certain diseases only); and using treatments that are registered and suit Australian conditions.

His recommendations also included the use of cover crops and biofumigants, but warned that some plants including Fat Hen, Black nightshade, heliotrope and others, can also be hosts for certain diseases. Applications of both biofumigants and fungicides need also to consider the vagaries of each potato variety as some react better to others to the active ingredients.



“as we move into sustainable and responsible production, to reach those goals we are restricted by soil borne disease”

Dr Chad Hutchison started with the premise that soil fumigation does not mean that the soil has been adversely affected, but rather can help with soil health and increased productivity.

“We need to produce an economically viable crop, while improving soil health and reducing the potential for environmental impacts from farming,” he said. Research conducted by TriCal on the soil fumigant chloropicrin showed that significant increases in yield were achievable. To support that, the researchers found that the components of soil needed for good soil health also increased substantially in the same timeframe. Conversely, soil-borne diseases decreased, meaning that the seed potato was able to draw on improved soil with reduced pressures from disease.

### About the Speakers



#### Assoc. Prof. Andy Robinson

Associate Professor at North Dakota State University and the University of Minnesota discussing maturity, seed cutting and seed spacing, herbicides and weed management.



#### Dr Len Tesoriero

Senior plant pathologist and Spud GP, covering black dot and Verticillium wilt diseases.

#### For more information

Contact Stephanie Tabone,  
Applied Horticultural Research  
Email [stephanie.tabone@ahr.com.au](mailto:stephanie.tabone@ahr.com.au)  
A full recording of the presentations is available on the [PotatoLink website](#).

The PotatoLink project is a strategic levy investment, delivered by Applied Horticultural Research, under the Hort Innovation Fresh Potato and Potato Processing Levies.



#### Dr Jenny Ekman

Postharvest specialist at Applied Horticultural Research, reviewing seed storage.



#### Dr Chad Hutchinson

Global Director of Potato Research and Market Support at TriCal Group, presenting on soil health.



POTATO – PROCESSING FUND



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## Advocacy continues to improve workforce and training



Vegetables, onions and potatoes are an important part of the Australian diet, and a significant contributor to the agriculture framework. Like many agricultural industries, the need for workers for harvesting and providing training continues to be a major focus for advocacy. AUSVEG Policy Officer Chloe Betts provides the latest update on AUSVEG’s advocacy activities.

AUSVEG has been heavily involved in the labour space, tackling the issue for long- and short-term outcomes. We have been supporting growers to access labour through Horticulture Industry Labour Agreement (HILA) and the Company Specific Labour Agreement. Consultation involving the Pacific Australia Labour Mobility (PALM) scheme, continues along with promotion and educational resources for school-aged students who are considering their career paths.

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**A labour intensive industry, the horticulture sector is short by about 10,000 workers, which equates to many more roles as workers move with the harvest trail.**

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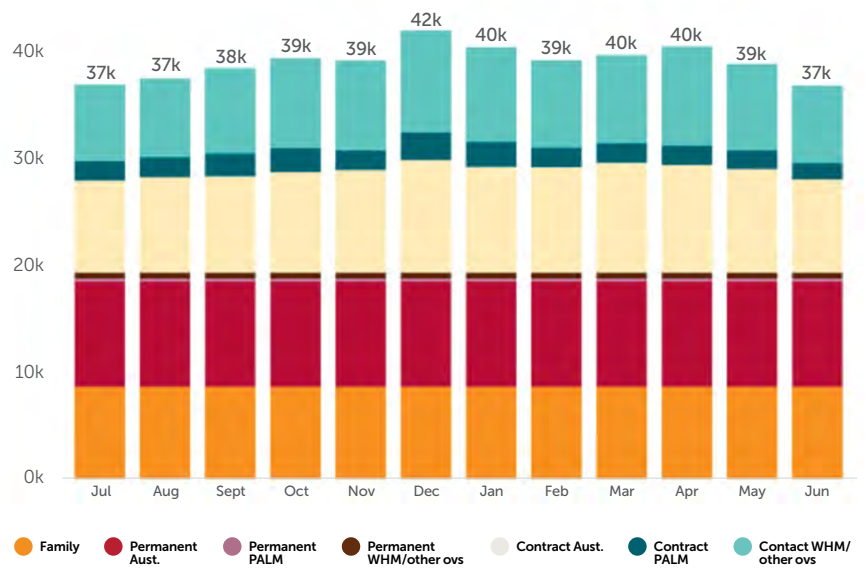
The consequences for businesses are reduced capacity to harvest, and/or less planting, as well as the longer term impact on reduced investment in areas that can improve productivity, efficiency and future profitability.

Workers under contract schemes make a significant contribution to the workforce as can be seen in *Figure 1*.





Figure 1: Breakdown of workers by category 2020/2021



According to ABARES, from January 2020 to October 2021, the number of WHMs in Australia declined by 80% from 141,000 people to around 29,000 people. ABARES estimates that around 25–30% of all working holiday makers (WHMs) were employed in horticulture before COVID-19.

The December outlook from ABARES shows that the number of visa workers is likely to increase in the near future based on Visa applications, however, those workers are yet to arrive in the country.

### Labour opportunities for growers

Growers can recruit international workers via the following visa schemes:

- PALM Scheme
- Horticulture Industry Labour Agreement (HILA)
- Working Holiday Maker Program

AUSVEG has developed a factsheet that explains each of these visas and the roles that they cover. Please note that the Australian Agriculture Visa is being integrated into the PALM scheme. AUSVEG is working closely with government to push the needs of industry and ensure that the PALM scheme aligns with the needs of growers.

### Other opportunities

#### The Company Specific Labour Agreement (CSLA)

This visa cover roles which are not already covered by an industry labour agreement. The HILA currently only covers 31 occupations in horticulture but does not include harvest roles, which are covered in this visa.

#### The Training Visa (Subclass 407)

This allows internationals to undertake training to improve their skills and gain industry experience in their field of study/work. This is a two-year visa.





**AUSVEG is currently advocating for**

- The Australian Agriculture Visa or a Harvest Visa.
- Expansion of the PALM scheme to re-engage countries and investigate new countries.
- The development of affordable accommodation for farm workers.
- Implementation of a National Labour Hire Licensing Scheme.
- Exposing primary and secondary students to agriculture through curriculum, farm excursions/ incursions.

**Upcoming**

- **The Pacific Engagement Visa**

The new Pacific Engagement Visa (PEV) will start in July 2023 and allow visa holders to come to Australia with their families. The PEV is separate from the PALM visa and is intended to create permanent migration pathways. You do not need to be a PALM worker to apply for the PEV.

**FIND OUT MORE**

To download the visa factsheet, visit [ausveg.com.au/app/uploads/2022/11/AVG2205001-Visa-Factsheet-WEB.pdf](https://ausveg.com.au/app/uploads/2022/11/AVG2205001-Visa-Factsheet-WEB.pdf)

Visit the AUSVEG advocacy website to learn more at [ausveg.com.au/ausveg-advocacy](https://ausveg.com.au/ausveg-advocacy), email Lucy Gregg [lucy.gregg@ausveg.com.au](mailto:lucy.gregg@ausveg.com.au) and Chloe Betts [chloe.betts@ausveg.com.au](mailto:chloe.betts@ausveg.com.au).

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**Up to 3,000 visas will be allocated annually by a ballot process across Pacific countries and Timor-Leste. Those selected from the ballot will be invited to apply for permanent residency once they have secured a written employment agreement in Australia and meet other migration requirements.**

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Details on the process are still being finalised, but PALM scheme participants in Australia on valid temporary visas will also be eligible to apply for the PEV ballot when applications open.

The PEV will take into consideration previous migration history of applicants. If you have breached Australian visa conditions in the past, your application may be rejected.

The visa is currently in the early stages of design and more information will be provided when it becomes available.

**Federal Budget outcomes for labour and training**

The October 2022-23 Federal Budget announced that 480,000 fee-free TAFE places would be delivered, as well as boosting the Work Bonus income for older Australians to give the option to work without impacting on their pension.

**For migration**

- Pacific Australia Labour Mobility participants on long-term placements will be able to bring partners and children to Australia when sponsored by their employers.
- To boost permanent migration from Pacific Island countries to Australia, the Government is creating a new Pacific Engagement Visa. Up to 3,000 permanent visas will be allocated annually to nationals of Pacific Island countries and Timor-Leste in addition to the existing permanent Migration Program.
- To address skills shortages more quickly, additional funding of \$42.2 million will be provided to accelerate visa processing, reduce the visa backlog, and raise awareness of opportunities for high-skilled migrants in Australia’s permanent Migration Program.
- The permanent Migration Program will be expanded by an additional 35,000 workers to 195,000 in 2022–23.



# EARLY ORDER

FOR 2023 SEASON

## Now is the time to plan for your 2023 tillage and seeding requirements.

Between the 1st of December 2022 until the 28th of February 2023 Kubota are offering big discounts on machinery ordered for your 2023 requirements during this 3 month period.

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**PP PRECISION PLANTERS**  
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**VP VEGETABLE PLANTERS**  
2.5m - 6.5m Working Widths



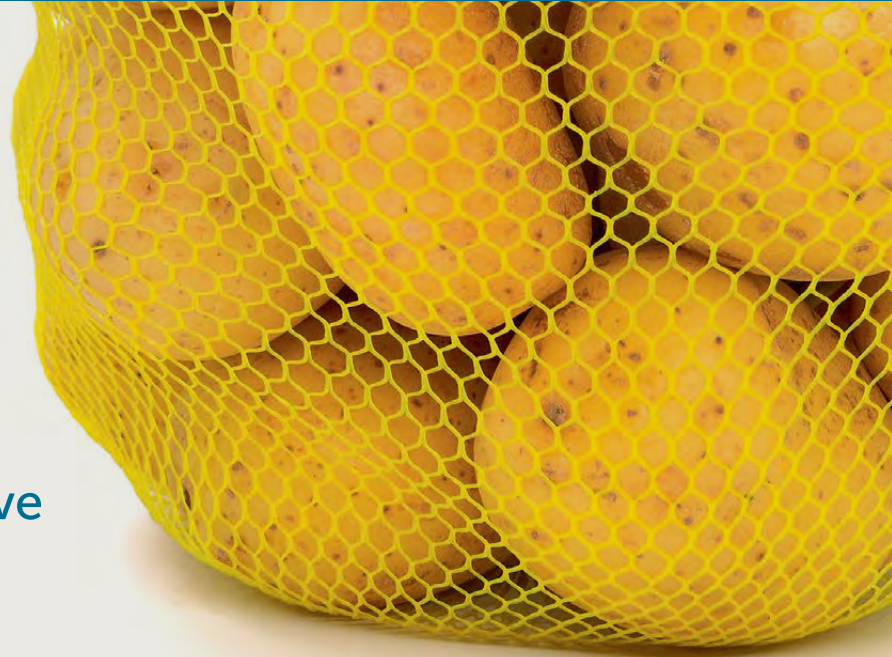
**CD COMPACT DISCS**  
2.0m - 7.0m Working Widths



**DS DISC SPREADERS**  
9m - 54m Spreading Widths



## It's not them, it's you: why potatoes don't deserve their bad reputation



PhD candidate Pratik Pokharel

Though spuds may not have all of the same benefits as other vegetables, they can still be part of a healthy diet - so long as they're prepared the right way.

With low or no-carbohydrate diets rising in popularity in recent times, the humble potato is now regularly overlooked in favour of other vegetables.

In fact, research literature has previously indicated potatoes may have a detrimental effect on health, such as possibly increasing the likelihood of developing Type 2 diabetes.

However, new Edith Cowan University (ECU) research has shown while spuds may not have all the same benefits as some other vegetables — such as lowering risk of Type 2 diabetes — health issues associated with potatoes may actually be due to how people are preparing them and what they're eating them with.

More than 54,000 people reported their dietary intake for the long-term Danish Diet, Cancer and Health study.

A recent analysis of this study led by Dr Nicola Bondonno from ECU's Nutrition and Health Innovation Research Institute, found people who consumed the most vegetables were 21 per cent less likely to develop Type 2 diabetes than those who consumed the least amount of vegetables.

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PhD candidate Pratik Pokharel carried out work on the analysis and said while potatoes didn't have the same impact on Type 2 diabetes, as some other vegetables they also didn't have any negative effect.

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"In previous studies, potatoes have been positively linked to incidence of diabetes, regardless of how they're prepared — but we found that's not true," Mr Pokharel said.

"In Denmark, people consume potatoes prepared in many different ways; in our study, we could distinguish between the different preparation methods. When we separated boiled potatoes from mashed potatoes, fries or crisps, boiled potatoes were no longer associated with a higher risk of diabetes: they had a null effect."

Mr Pokharel said underlying dietary patterns were the key.

"In our study, people who ate the most potatoes also consumed more butter, red meat and soft drink — foods known to increase your risk of Type 2 diabetes," he said.

"When you account for that, boiled potatoes are no longer associated with diabetes. It's only fries and mashed potatoes, the latter likely because it is usually made with butter, cream and the like."

### Eat your veggies

Mr Pokharel said findings from the study indicate vegetables could play a key role in reducing Type 2 diabetes, as people who ate a lot of leafy greens and cruciferous vegetables such as spinach, lettuce, broccoli and cauliflower had a significantly lower risk of developing the condition.

He said the relationship between vegetables and diabetes should be incorporated into public dietary guidelines — as should the benefits of eating potatoes.

"The finding that vegetables lower diabetes risk is crucial for public health recommendations, and we shouldn't ignore it," he said.

"Regarding potatoes, we can't say they have a benefit in terms of type 2 diabetes, but they also aren't bad if prepared in a healthy way.

"We should separate potatoes and other vegetables in regard to messaging about disease prevention but replacing refined grains such as white rice and pasta with potatoes can improve your diet quality because of fibre and other nutrients found in potatoes."

### Putting it into practice in the kitchen

Mr Pokharel said people should be advised to increase their vegetable intake — and they could include potatoes, so long as they left out some of the unhealthy extras such as butter, cream and oil.

"Potatoes have fibre and nutrients, which are good for you," he said.

"People talk about carbs being bad, but it's more about the type of carbs you're

having; compared to something like white rice, boiled potatoes are a good quality of carbohydrate.

"But just take care how you prepare them: don't eat fries, or mash with extras in it all the time.

"Just boil them and eat them like other greens or other foods — and you don't need to have it with red meat all the time."

'Vegetable, but not potato, intakes are associated with a lower risk of type 2 diabetes in the Danish Diet, Cancer and Health cohort' was published in **Diabetes Care**.

*ECU authors involved in this study were Pratik Pokharel, Dr Lauren Blekkenhorst, Dr Catherine Bondonno, Professor Jonathan Hodgson and Dr Nicola Bondonno.*

# HEALTHY FIELDS, HEALTHY YIELDS.

**STRIKE** formulations are chloropicrin based pre-plant fumigants used to effectively manage soil borne pathogens in a variety of crops.

**STRIKE** works to control disease while it promotes the growth of beneficial microorganisms such as Trichoderma and Mychorrhizae.

**STRIKE** controls:

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- ▼ Common Scab
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- ▼ Pythium
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- ▼ Nematodes



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# The world of potatoes comes together in Dublin

**The World Potato Congress 2022: *The Changing World of the Potato*** focused on new trends and challenges for the potato industry globally from trade to technology and agronomy; health and nutrition and food security.

Held in Dublin, Ireland, the nostalgic home of the potato – potatoes are originally from Peru, the three day event was an opportunity to bring the industry together through farm tours, social events and suppliers.

Plenary speakers were drawn from a broad background of subjects including potato market rebuild in Ukraine, how trade pressures and competition are shaping the market, consumer trends and misconceptions about potatoes.

Keynote speaker for the event was the Director-General of the United Nations FAO, Qu Dongyu who presented on the role the potato has in a changing world.

Much of the focus for the event was the decline globally in potato consumption in Western countries, but as a cost effective crop and food source, the potato will play an important role in addressing world hunger and food security in developing countries where consumption is increasing.

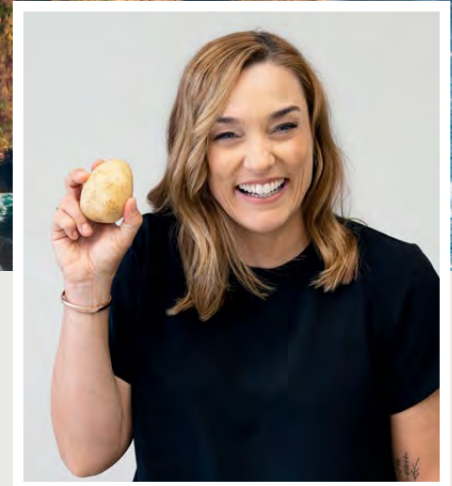
Georgia Thomas, Project Manager with Potato Growers Association of Western Australia who confesses she is 'mad about potatoes' presented on "Potatoes – The Good Carb" to show that new research dispels the myths and misconceptions of potatoes as a healthy and nutritious part of our diet.

The research shows that potatoes not only keep you fuller for longer than other carbohydrate sources but are also low-fat and contain key nutrients. Research also shows that when cooked and cooled, potatoes have even more health benefits.

According to Georgia, consumer research indicates that health perceptions continue to be a major influence on the potato purchase decision, along with packaging, convenience and cost. The health perceptions are that potatoes contain too many carbohydrates, are starchy, result in weight gain and create a glucose spike for diabetics.

**The positive health outcomes for potatoes are:**

- One medium potato (unpeeled) contains 7.7gm of fibre – equivalent to 2 slices of wholemeal bread or ½ cup chickpeas
- 250kJ of energy per 100g serve (boiled), nearly a quarter of a slice of wholemeal bread and significantly less than pasta (520kJ)
- Cold storage of cooked potatoes has been shown to have benefits for gut health, glycemic control and satiety (cooked then cooled, such as a potato salad). See our article in Spring Potatoes magazine.



- Potatoes are suitable for a range of dietary intolerances such as FODMAP, lactose, gluten and contain no amines or glutamates.

To maximise the nutritional results, Georgia advises to keep the skin on, eat a variety of different coloured potatoes (eg red and purple), steam or microwave to cook and let them go cold (you can always reheat them).

**Promoting potatoes with a healthy message**

To raise the positive health attributes of potatoes, the WA Potato Association has created a marketing campaign to support industry.

The focus is to create consumer interaction, education and engagement by creating a platform for communication for the industry through to the consumer with seasonal updates, product news, recipes and cooking techniques.

For industry members an Association-led campaign gains economies of scale for photography, advertising and other marketing assets that can be utilised by all, while reaching a greater audience through a variety of media channels. The campaign also developed a Seed for Schools program which provides schools with seed potatoes, guidebook,

**How many potatoes do we eat?**

Consumption (per person annually)	
Australia	18kg
Ireland	80kg
Globally	31kg

posters, fertiliser and other resources to encourage children to learn more about growing and eating potatoes.

Last year, the campaign achieved 5 million audience impressions and engaged with over 25,000 fans and improved education and collaboration with industry and consumers.

**Common goals for the potato industry**

The World Potato Congress provided so many insights into what the global industry is doing, said Georgia.

“A big focus for many was on global food issues and security particularly in developing countries and how



**Pictured L-R.** Michael Hoey, President IPF, Ireland, Georgia Thomas, Senior Project Manager WA Potatoes, Dr. Tom Arnold Chair, Irish 2030 Agri-Food Strategy Committee, Dublin, Lauren M Scott, Chef Strategy Officer, International Fresh Produce Association USA, Romain Cools, President / CEO WPC Inc., Belgium, Tara McCarthy Chief Executive, Bord Bia (Irish Food Board), Dublin, Cedric Porter Managing Editor, World Potato Markets, UK.

the potato can address some of the issues around nutrition and as a cost effective crop.

“It is an exciting time for potato marketers to address consumer needs around the sustainability of what they eat, the family budget, health and nutrition, potatoes tick of all those boxes and is a message that needs

to be pushed out more effectively. [powerpackedpotato.com.au](http://powerpackedpotato.com.au)

“Being able to come together to discuss the issues globally and regionally, was terrific after having to conduct most meetings virtually in recent years. It was a real privilege to be able to attend.”

**The next World Potato Congress will be held in Adelaide, in 2024.**



**#HortCon23**

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**HORT CONNECTIONS** 5-7 June 2023  
Adelaide Convention Centre  
Knowledge for growth

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Who ever said Adelaide wasn't a hotspot? We're pleased to announce that the Trade Show is already bigger than it was for Hort Connections 2022.

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**Special grower rates**

We are pleased to continue offering growers access to discounted Early Bird All-Access Passes. **Scan the QR code below to register as a grower.**



[hortconnections.com.au/registration](http://hortconnections.com.au/registration)



## Frontline Biosecurity – staying vigilant

The AUSVEG biosecurity team provides regular updates and news on pest alerts and events via the Frontline e-bulletin.

### Guava root-knot nematode

First identified in Australia in October 2022, this microscopic pest has caused issues for farmers worldwide and has now been found in the Northern Territory on sweet potato, cucumber, capsicum, butternut pumpkin, snake bean, zucchini and chilli plants at a commercial farm, two residential gardens and a community garden. According to a report on ABC in October, Chief Plant Health Officer Anne Walters said that work was under way to trace the links between the properties.

Since then, a full time project manager has been appointed by the NT Government to increase understanding of the nematode and coordinate increased surveillance across Darwin.

The pest has been detected in Malak, Rapid Creek, Anula and Leanyer in Darwin, Palmerston, Middle Point and on Croker Island.

DNA samples have been provided to the Queensland and Western Australian Governments to check historical samples to confirm this nematode is not present in other jurisdictions.

Formal engagement with growers will commence late December, which will include visiting growers, undertaking tracing, collect samples, providing advice for management and developing protocols for pest free place of production.

Guava root-knot nematode spreads through the soil attached to machinery, tools, footwear, and plant products. It causes severe knotting of a plant's root system and can cause stunted growth, wilting and the yellowing of leaves. However, it has been reported that many growers may not realise their crops are infected until the end of the season when crops are harvested, and the heavily galled root systems are observed.

Crops reported in several countries to become infected with guava root-knot nematode include (but are not limited to):

**Vegetables and herbs:** sweet potato, cucumber, watermelon, squash, pumpkin, cantaloupe, luffa, pepper, tomato, eggplant, potato, broccoli, lettuce, okra, carrot, celery, basil, parsley, common bean, sugar beet, ginger, arrowroot, white yam, salvia

**Field crops:** tobacco, soybean, cotton, cowpea, sugar cane

**Fruits and trees:** grape, plum, peach, almond, fig, guava, banana, mulberry, jujube, jackfruit, dragon fruit, coffee, papaya



**Ornamentals:** Jamaican poinsettia, snapdragon, gardenia, lantana, willow

**Weeds:** pigweed, nutsedge, morning glory, Jerusalem cherry, nightshade, velvetleaf, wild mustard

To report a suspected case of Guava Root-Knot Nematode, call the exotic plant hotline on 1800 084 881 or email images to the Plant Biosecurity team at NT Department of Industry, Tourism and Trade at [plantbioscecurity@nt.gov.au](mailto:plantbioscecurity@nt.gov.au).

### Brown marmorated stink bug risk season

The brown marmorated stink bug (BMSB) is one of Australia's **most unwanted exotic pests**. It eats over 300 plants, including fruit and vegetables. Affected crops include sweet corn, tomato, cucumber, capsicum, carrot, beans, beets, eggplant, lettuce, peas, tomatoes, apples, peaches, apricots, and figs.

The pest is often found in cargo entering Australia from the northern hemisphere. The **threat of incursion increases between September and April**, and each year **seasonal measures** are put in place at Australia's border to prevent the pest from entering the country. If BMSB establishes itself in Australia, it could infest our homes and gardens, cause economic and environmental harm, and threaten our fruit and vegetable industries.

For the 2021-22 BMSB season, measures will apply to targeted goods manufactured in or shipped from **target risk countries**. Targeted high risk goods vary from wood products to glassware so it is important to check any overseas packaging or post for hitchhiker pests.



Brown marmorated stink bug. **Below.** Nymphs and eggs. Image: Wilbur Hershberger



If you spot anything unusual, make a report to the Exotic Plant Pest Hotline on 1800 084 881 or contact your local department of agriculture.

AUSVEG has several resources available for further reading:

- BMSB -Biosecurity Alert
- BMSB - Factsheet

For further questions, contact [science@ausveg.com.au](mailto:science@ausveg.com.au).

### Varroa Mite update

As at December 2022, the New South Wales Department of Primary Industries has identified 106 infested premises under the Emergency Order (No. 31). The two most recent hives in the purple zone are at properties in Tumby Umbi on the central coast, and Mulbring in the Hunter. Both are outside the eradication (red) zones, which means the current eradication zone will be expanded to cover these infested premises.

During December 2022, a program to euthanise wild European honey bees in the red areas around Narrabri commenced. To date, around 92% (17,086) of hives have been euthanised around the Newcastle/Hunter areas.

“Wild European honey bees, which are

the same species as honey bees kept in managed hives, build their nests in tree hollows and other enclosed spaces,” said Dr Satendra Kumar, chief plant protection officer with NSW DPI.

“Removing these bees from the environment of red eradication zones is necessary to reduce any chance of the Varroa mite parasite existing undetected within wild hives.”

Dr Kumar said the baiting program has been developed to include strict guidelines to protect and ensure the safety of all people, animals, livestock and the local environment and that NSW DPI has been authorised by the Australian Pesticides and Veterinary Medicines Authority to use fipronil to remove wild European honey bees.

The bait stations are designed to exclude other animals and insects, and to prevent contamination of soil and water. They will remain in place for up to 12 months, but only in active use with insecticide for very short periods of time, to a maximum of 3 hours each session.

“During active use, bait stations will be monitored by trained staff, to minimise the risk of off-target impacts. Experience to date has shown zero feeding in stations by off target species. Bait stations are placed at least 2kms away from the edges of the red eradication emergency zones to reduce the risk of European honey bees from outside the eradication zone interacting with the bait stations.”

Generally, there is a standstill on all bee and hive movement in NSW.

The Emergency Order specifies the limited conditions under which, if any, movements may occur in each Zone. Both registered recreational and commercial beekeepers are permitted to move their hives within low-risk areas of the State, using the Hive Movement Declaration.

Registered beekeepers in red eradication emergency zones whose hives have been euthanised continue to be eligible for compensation. Commercial registered beekeepers in the purple surveillance emergency zone are also now eligible for reimbursement.

“In line with the program guidelines set by the NSW Rural Assistance Authority, only



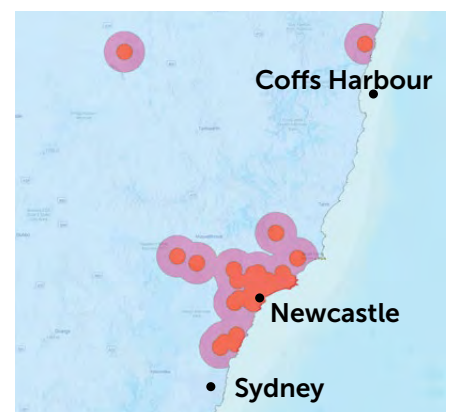
Varroa Destructor Image: Scott Bauer, USDA Agricultural Research Service, Bugwood.org

registered beekeepers will be eligible for reimbursement, so I strongly encourage any beekeepers in those zones to make sure they’re a registered beekeeper in NSW,” Dr Kumar said.

Planning and preparation of the baiting program has been conducted by NSW DPI in consultation with the Environment Protection Authority and NSW National Parks and Wildlife Service. All beekeepers within the eradication and surveillance zones must report their hives, preferably online by completing the **Beekeeper Notifications - Varroa mite online form**.

**The Varroa Emergency Response Hotline**, accessed via the Exotic Plant Pest Hotline 1800 084 881, is operational Monday to Friday 9am - 5pm. For urgent matters outside of these hours you can call the hotline number for instructions on accessing the on-call function for the Varroa Emergency Response Hotline.

For updated information please visit [dpi.nsw.gov.au/varroa](http://dpi.nsw.gov.au/varroa).



Emergency zone map: Varroa mite emergency response ([nsw.gov.au](http://nsw.gov.au))

Red = eradication zone (10km)  
Purple = surveillance zone (25km)  
Blue = general emergency zone (NSW)



## Hunger in our community is a reality

In October 2022, Foodbank released the annual *Foodbank Hunger Report*, highlighting that in the 12 months prior, more than 2 million households experienced severe food insecurity. The report shows that children under 18 are particularly vulnerable, but the vegetable industry can help.

The *Foodbank Hunger Report 2022* reports that in the past 12 months, more than 2 million Australian households (21%) experienced severe food insecurity, which means they ran out of food because of financial limitations and at worst went entire days without eating.

If this is expanded to also include households experiencing moderate symptoms of food insecurity this increases to a third of surveyed households in Australia (33%), or 3.3 million households, experiencing food insecurity at some point in the past 12 months

Households with children were even more likely to experience severe food insecurity, with 32% reporting that they were severely food insecure – 1.5 times greater than the national average (21%). Food insecurity has been on the rise during the past 12 months, with 23% of Australian households perceiving that they now struggle financially to access food more often compared with last year.

Again, those with dependent children were more likely to have felt the pressure than those without. The main reasons reported for experiencing severe food insecurity in 2022 were increased/high living expenses (64%) and “reduced/low income or government benefits” (42%), in addition to other factors such as a change of household living arrangement (24%) or natural disasters (19%).



### About the report

The annual *Foodbank Hunger Report* is an initiative of Foodbank, which is the largest food relief organisation in Australia. It currently provides support to more than one million vulnerable Australians every month by working with the food and grocery industry including farmers, wholesalers, manufacturers and retailers.

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**On any given day, over half a million households in Australia are struggling to meet their food needs. For these 520,000 households this means, for example, they and/or their children are having to skip meals, go hungry and/or reduce the size of meals because they couldn't afford to buy food.**

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Households that have experienced severe food insecurity, or very low food security, have suffered reduced or compromised quality, quantity and adequacy of food they have access to due to financial constraints and have experienced mental stress associated with such situations



Of the respondents in households suffering severe food insecurity:

- 94% “worried whether food would run out before I/we got money to buy more”
- 90% agreed that “the food that I/we bought just didn’t last, and I/we didn’t have money to get more”
- 84% “couldn’t afford to eat balanced meals”
- 97% had cut the size of meals/ skipped meals, and 60% hadn’t eaten for a whole day, because there wasn’t enough money for food, for themselves or any other adults in their household.

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**Of those who did experience reduced meal size/meal skipping, 88% had done so for 3 months or longer over the last 12 months.**

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Of individuals in households experiencing severe food insecurity:

- 96% had eaten less than they felt they should because there wasn’t enough money for food
- 88% reported having gone hungry without eating
- 74% had lost weight because there wasn’t enough money for food.
- Among households with children experiencing severe food insecurity:
- 93% stated they “relied on only a few kinds of low-cost food to feed their child/ren because they ran out of money to buy food”
- 79% said they “couldn’t feed their child/ren a balanced meal because they couldn’t afford that”
- 60% said ‘their child/ren was/were not eating enough because they just couldn’t afford enough food’.

The duration of food insecure episodes is varied. Across those experiencing food insecurity, the most recent experience lasted for less than a week for the majority (61%). For those who didn’t or couldn’t overcome the situation within the one-week milestone, however, the situation could deepen into a much longer-term experience.

### Reasons for household food insecurity in 2022

The increasing cost of living is the most common reason for food insecurity, followed by reduced or low income. In 2022, increased or high cost of living was the most common reason for food insecurity, affecting 64% of food insecure households.

The second most common reason was reduced or low income affecting 42% of food insecure households. This was then followed by limited access or ability to travel to get food (26%), changes in the household or living arrangements (24%) and natural disasters (19%). For over half (55%) of the food insecure households, their food insecurity wasn’t the result of just one reason, but they were affected by compounding factors.

### Barriers to engaging with formal food relief support services

The top two barriers to accessing formal food relief for severely food insecure Australians are perceptual rather than physical – shame or embarrassment as well as the belief that others are in greater need of assistance.

Regardless of whether an individual had previously received formal food relief, the research asked those who have been food insecure over the last 12 months about the barriers for them in seeking food relief from a formal service such as a charity or community organisation.

- ‘Too embarrassed or ashamed’ was the leading barrier (40%), indicating that self-stigmatisation is a critical issue for food relief services to address.
- Second was the belief that ‘others are in greater need of assistance’ (30%) suggesting that a greater understanding is needed of the broad eligibility criteria for food relief.
- Food insecure individuals finding it ‘hard to travel to pick up food relief’ (22%), or that they ‘don’t know about services nearby’ (22%).
- Other practical barriers were that ‘food provided doesn’t suit needs’

(16%), ‘charities not open at a time that suits’ (14%) and ‘already exceed the food relief allowed’ (10%).

All of these represent potential opportunities for food relief services to improve engagement with the food insecure communities and families, through better understanding their needs.

### Households with dependent children are particularly vulnerable to food insecurity

Half (52%) were food insecure in 2022, significantly greater than the national average of household food insecurity at 33%. Altogether, nearly 2.3 million children under the age of 18 were from households impacted by food insecurity in the past 12 months, equivalent to over 330,500 children potentially impacted on any given day.

1.3 million children in Australia lived in severely food insecure households in the past year. Of even greater concern is that a third (32%) of households with dependent children are severely food insecure. Furthermore, single parent families faced even more of a challenge, with 65% experiencing food insecurity vs 49% of two-parent families.

For food insecure households with dependent children, food insecurity is more frequent (at least several times a week for 28% of households) than for the average food insecure household (23%). It was also likely for the households with children to take a longer time than average to recover, with a third (32%) not being able to afford food for longer than a month vs 28% for the average food insecure household.

#### For more information

For more information on the Foodbank report or to learn more about providing assistance, visit [foodbank.org.au](https://www.foodbank.org.au)



# Potato Levy Update

It is Hort Innovation's job to work with industry to invest the potato levies and Australian Government contributions into initiatives to help growers be as productive and profitable as possible, through the Hort Innovation Fresh Potato and Potato Processing Funds.

## What is the potato levy?

Levy is payable on potatoes that are produced in Australia and either sold by the producer or used by the producer in the production of other goods. The R&D levy rate on unprocessed potatoes is 48 cents per tonne.

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.

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/vegetables](http://agriculture.gov.au/agriculture-land/farm-food-drought/levies/rates/vegetables).

## How are levy investment decisions made?

Investments specific to the Hort Innovation Fresh Potato Fund 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 potato Strategic Investment Plan?

The potato SIP 2022-2026 is the roadmap that helps guide Hort Innovation's oversight and management of both the fresh potato and potato processing levies and Australian Government contributions,

ensuring investment decisions are aligned with industry priorities.

The SIP lays the foundation for decision-making in levy investments and represents the balanced interest of the potato industry. The most important function of the SIP is to make sure that levy investment decisions align with industry priorities.

Previously, the Potato – Fresh Fund had a separate SIP, called the potato grower SIP, and in 2021, it was refreshed and combined with the processing potato SIP to reflect the current needs of industry. The refresh involved close consultation with growers, industry participants and the wider research community.

The current potato SIP details the industry's strategic goals centred around four outcome areas: extension and capability; industry supply, productivity and sustainability; demand creation; and business insights. Under each of those outcomes, there are industry-specific strategies and key performance indicators that provide guidance on how the potato - fresh industry will work towards achieving the outcomes.

For the previous potato grower SIP, a performance report has been developed to demonstrate how investments delivered in the Potato – Fresh Fund from 2016/17 to 2020/21 generated impact for potato growers. The report provides 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 potato grower

SIP 2017-2021, going forward an annual performance report will be provided for the potato SIP 2022-2026.

## What is the potato Annual Investment Plan?

While the potato SIP provides an oversight of investment over the next five years, the potato 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 potato 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 potato Strategic Investment Advisory Panel (SIAP).

Hort Innovation develops draft investment recommendations based on investment ideas that are aligned to the potato 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 potato SIAP consists of supply-chain stakeholders from both the fresh and processing potato 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's 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 and Potato Processing Funds are detailed in the Your investments page of this Fresh Potato and Potato Processing Fund sections 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 program, run through the investment *Australian potato industry communication and extension project (PT20000; PotatoLink)*, also provides regular information on levy-funded activity.

#### Find out more

Please visit [horticulture.com.au/growers/potato-fresh-fund/](https://horticulture.com.au/growers/potato-fresh-fund/) to read more about the Hort Innovation Fresh Potato Fund, and [horticulture.com.au/growers/potato-processing-fund/](https://horticulture.com.au/growers/potato-processing-fund/) to read more about the Hort Innovation Potato Processing Fund.

For further details or if you have any questions, please contact Hort Innovation Industry Strategic Partner Mark Spees on 0439 574 173 or email [mark.spees@horticulture.com.au](mailto:mark.spees@horticulture.com.au). Alternatively, you can phone the AUSVEG office on 03 9882 0277.

**Hort  
Innovation**  
Strategic levy investment

**POTATO –  
PROCESSING FUND**

**Hort  
Innovation**  
Strategic levy investment

**POTATO –  
FRESH FUND**



# Hort Innovation Fresh Potato Fund Update

The potato Strategic Investment Plan (SIP) 2022-2026 provides a roadmap to guide Hort Innovation's investment of potato industry levies and Australian Government contributions, ensuring investment decisions are aligned with industry priorities.

The SIP's intent is to reduce the cost of production and improve the sustainability of production practices with effective management of pests, diseases, weeds and biosecurity threats. Growth in domestic and international consumer demand is also a focus for the potato industry.

Currently, both the fresh potato and processing potato research and development (R&D) funds have capacity to invest over the life of the SIP. Careful prioritisation of investment needs is required by industry over the next five years.

The four outcome areas of this SIP cover significant themes under which programs and investments will be focused.

## Industry outcomes

Outcome statements as identified and prioritised by the potato industry have been prepared under four key outcome areas:

- Extension and capability.
- Industry supply, productivity and sustainability.
- Demand creation.
- Business insights.

### OUTCOME 1

#### Extension and capability

To manage knowledge, relationships, systems and processes required to communicate effectively with internal and external stakeholders.

##### Achieving the outcome will involve:

- 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.

### OUTCOME 2

#### Industry supply, productivity and sustainability

To accelerate the application of production practices that optimise returns and reduce risk to growers.

##### Achieving the outcome will involve:

- 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.

**OUTCOME 3**

**Demand creation**

To maintain and strengthen consumer demand for fresh potatoes as the foundation for sustainable expansion of production and consumption in domestic and international markets.

**Achieving the outcome will involve:**

- 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.

**OUTCOME 4**

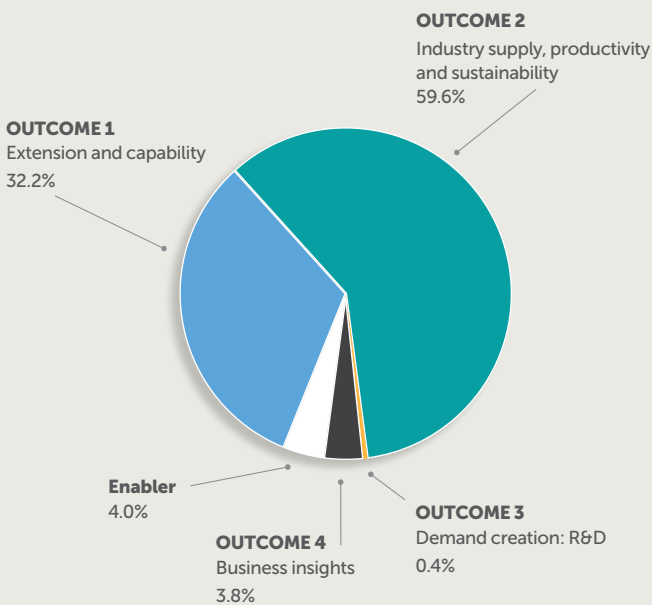
**Business insights**

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.

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.

These investments underpin and are complementary to delivery of the other outcome areas.

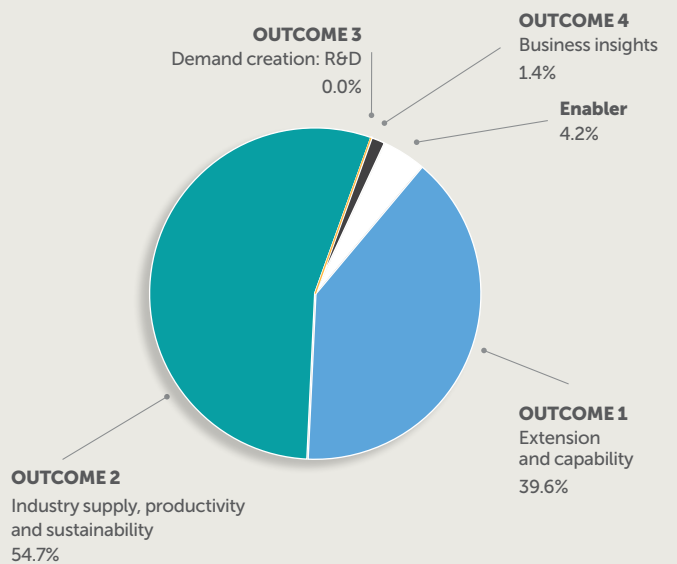
**\$636,597 has been invested by the Fresh Potato Fund** in the Strategic Investment Plan – July 2021–June 2022



**Investment expenditure analysis**

Investments specific to the Hort Innovation Fresh Potato and Potato Processing Funds are guided by the potato Strategic Investment Plan (SIP). The SIP features four priority outcome areas that have been identified and agreed upon by the industry, and Hort Innovation works to invest in R&D initiatives that are aligned to these.

**\$508,514 has been invested by the Potato Processing Fund** in the Strategic Investment Plan – July 2021–June 2022



**Find out more**

Please visit [horticulture.com.au](http://horticulture.com.au) to read the full Hort Innovation Potato 2022-2026 Strategic Investment Plan.

For further details or if you have any questions, please contact Hort Innovation Industry Strategic Partner Mark Spees on 0439 574 173 or email [mark.spees@horticulture.com.au](mailto:mark.spees@horticulture.com.au). Alternatively, you can phone the AUSVEG office on 03 9882 0277.





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SUMMER 2022

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# SPECIALISED VEGETABLE MACHINERY AND GROWING EXPERTISE FROM **THE GROUND UP**



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**POTATO LINK**  
AUSTRALIAN POTATO INDUSTRY  
EXTENSION PROJECT

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Cover: [pxfuel.com](http://pxfuel.com)



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**POTATO –  
FRESH FUND**

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**POTATO –  
PROCESSING FUND**







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**Citizen science supporting Tomato Potato Psyllid surveillance**

With the help of hundreds of volunteer gardeners from across Australia, a Hort Innovation project to survey TPP has come to an end. More than 1,800 traps were assessed in each state with no TPP detected outside of WA.



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**Eyes on the World**

Researchers have developed a biosensor that can "sniff out" bacterial rots before symptoms are visible.

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**PotatoLink - Looking ahead to 2023**

Following an active and successful 2022, we have been busy organising a comprehensive schedule for 2023.

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Several projects have wrapped up in the last few months - read about them here.



# POWDERY SCAB PROJECT UPDATE



If you grow potatoes in Tasmania, you are probably familiar with powdery scab. While sometimes regarded as a southern disease, this devastating pathogen has been detected from Queensland to South Australia, and even parts of Western Australia. Annual losses are estimated to top \$13.4 million annually. However, incidence varies hugely by cultivar and area, raising the question – **WHY?**

Jenny Ekman reports.

Professor Calum Wilson from the Tasmanian Institute of Agriculture (TIA) is a world leader when it comes to managing *Spongospora subterranea*, the cause of powdery scab. He is currently conducting a three-year Hort Innovation project “Mechanisms and manipulation of resistance to powdery scab in potato roots”.

Professor Wilson provided an update on the project at the recent R&D Forum in Ballarat.

While the most obvious symptoms of powdery scab are lesions on tubers, the pathogen also causes formation of galls on roots, shoots and stolons (Figure 1).



**Figure 1.** Galls can form on roots, stolons or shoots. Source: C. Wilson.

However, it is the effects on the roots which have the greatest influence on yield. Symptoms of root infection are not always visible, with the result powdery scab can be an underestimated disease. However, recognition of the importance of this pathogen has been increasing worldwide.

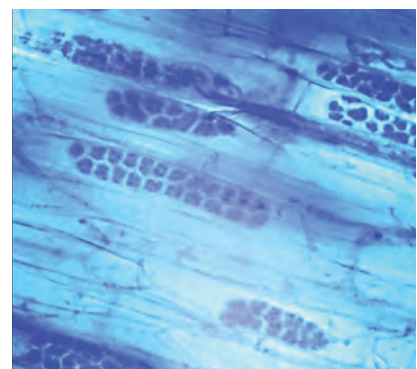
It is also possible that intensification of production, use of susceptible varieties and more frequent irrigation have increased incidence of disease<sup>1</sup>.

## HOW DOES INFECTION OCCUR?

Infection mainly occurs by zoosporangia binding to and then infecting the root hairs (Figure 2). This early, critical stage can reduce root function by 20% or more, even though no symptoms are outwardly visible. Root infection is often unrelated to the physical symptoms of galls and lesions on tubers and roots. However, it is the most important factor reducing plant growth (Figure 3, Figure 4).

Professor Wilson has therefore focussed primarily on the root hair infection phase, rather than the symptoms on tubers. The aims of the project are to:

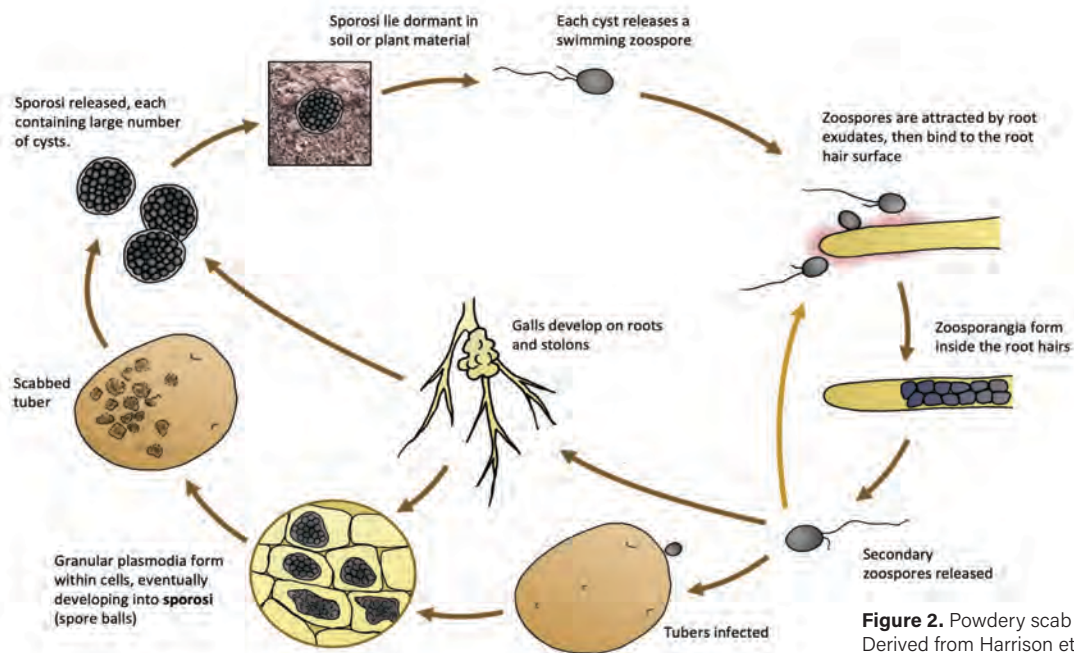
- Reduce losses
- Reduce input requirements, including water and fertiliser



**Figure 3.** Zoosporangia forming in root cells. Source: C. Wilson.



**Figure 4.** Healthy potato seedlings (top), compared to seedlings infected with powdery scab (bottom). Although no scab or root galls have formed, there are clear effects on both root and shoot growth of the infected plants. Source: C. Wilson.



**Figure 2.** Powdery scab lifecycle. Derived from Harrison et al., 1997 and Falloon et. al., 2015.

- Improve quality and storage life of tubers
- Develop new disease management and resistance screening tools

To achieve this, the project has progressed in a series of activities.

The first was to develop a new way to search for resistant varieties. Traditional screening relies on growing different potato varieties in a glasshouse over many months, then examining root galls and lesions formed on tubers. This is not only time and resource intensive, but may not provide an accurate indication of infection.

Professor Wilson’s new method examines the numbers of zoospores able to attach to the potato root hairs. This technique can provide reliable results in as little as 48 hours, potentially allowing hundreds of cultivars to be screened for resistance.

“We wanted to measure how much infection occurs in those roots,” said Professor Wilson, “you get varieties where there are almost no symptoms

**Table 1.** Variety resistance to powdery scab, based on the root attachment assay.

Highly susceptible	Moderately susceptible	Moderately resistant	Good resistance
Nicola	Gold Rush	Russet Burbank	Russet Nugget
Liseta	Yukon Gold	Desiree	Granola
Kranz	Tasman	Dawmore	Tolaas
Shepody	Spunta	Sebago	Tolangi Delight
Shine	Pontiac	Brake Light	
Red Ruby	Frontier Russet	Ruby Lou	
Patrones	Lustre	Fontenot	
Delaware	Wilwash	Purple Congo	
Nooksack	Leven	Cranberry Red	
Coliban	Bintje	Nampa	
Southern Cross	Pentland Dell	Spey	
Kennebec	Mainstay	Banana	
Diment	Cariboo	Pink Eye	
Kipfler	Atlantic	Dutch Cream	
Up-to-Date	Chiefton		
	Sequoia		
	Bismark		
	Yellow King		



on the tubers, but very high levels of infection in the roots – and vice versa (Nicola is an example of this). Our screen directly examines that initial stage of root infection.”

The results from the root assays can then be used to select potato varieties that resist infection by the *Spongospora* zoospores.

## INDUCING RESISTANCE TO ROOT INFECTION

Professor Wilson's team also looked at a novel technique that allows selection of resistant variants of existing cultivars. ‘Somaclonal variants’ are produced by exposing shoot tips to a stress, then growing the young plantlet in tissue culture. The plantlets often look and behave almost identically to the parent plant, but can have tiny genetic changes.

“Using our new assay we can screen for those variants that have altered susceptibility to root infection” explained Professor Wilson.

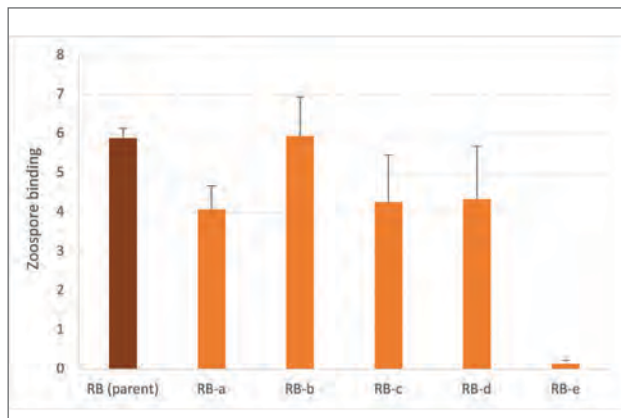
The TIA laboratory produced a large number of somaclonal variants, exposed them to the *Spongospora* pathogen, and examined infection of the root hairs by zoospores. As shown in Figure 5, while most are similar to the parental line, some variants proved highly resistant to zoospore binding.

The next stage was to conduct greenhouse trials with lines that appeared to have resistance. Plants were grown to maturity and tubers examined for signs of disease.

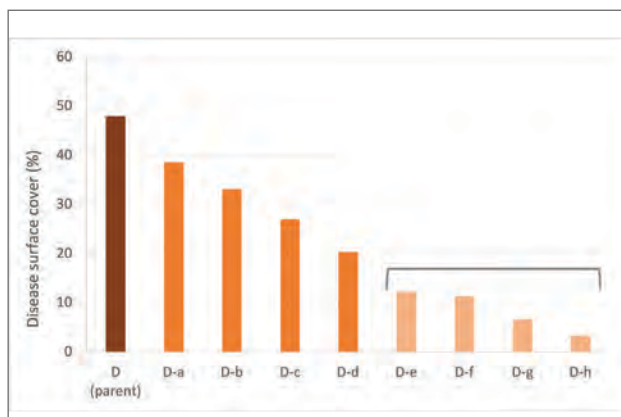
While there was considerable variability, several of the variants that strongly resisted binding by zoospores also had less physical evidence of powdery scab (Figure 6). Of course, these variants still need to be field tested to examine yield and other agronomic characteristics, but such results are highly promising.

## PREVENTING INFECTION

The third phase of the project is finding ways to prevent infection in



**Figure 5.** Somaclonal variants, here labelled a to e, were produced from parental line RB. While zoospore binding to most variants was similar to their parent, RB-e was highly resistant.



**Figure 6.** Somaclonal variants (here labelled a to h) that resisted zoospore infection were grown in the glasshouse, then tubers examined for scab. Variants D-e to D-h were significantly different to parental line D.

the first place. “We are interested in just how the pathogen attaches to the roots and how we can basically stop it happening,” Professor Wilson commented, “one possibility is to find a receptor, something that the pathogen recognises and allows it to bind.”

The team compared resistant and sensitive varieties. Sure enough, they came up with a candidate – a ‘glycosylated protein receptor’. When they used enzymes to remove glycosylated proteins from a root hair, zoospores no longer attacked it. “We now have a candidate for where the pathogen binds – if we can knock this out, we could have an immune variety,” explained Professor Wilson.

Another avenue is to look at the natural root exudates potato plants produce. These can either attract or repel the swimming zoospores.

“What we found was that the resistant varieties had less of the attractants, and more of the inhibitors, so this

Powdery scab symptoms on a tuber



again could be a really useful screen for resistance.”

An Australian Research Council (ARC) grant has enabled the TIA team to examine whether a bacterial inoculant could interfere with this process. The bacteria consume the attractant root exudates, reducing potential infection.

A large number of bacteria have been screened for this ability.

“We got one!” announced Professor Wilson, “and not only did the bacteria digest away the key attractant exudates, it also grew bigger potatoes.”

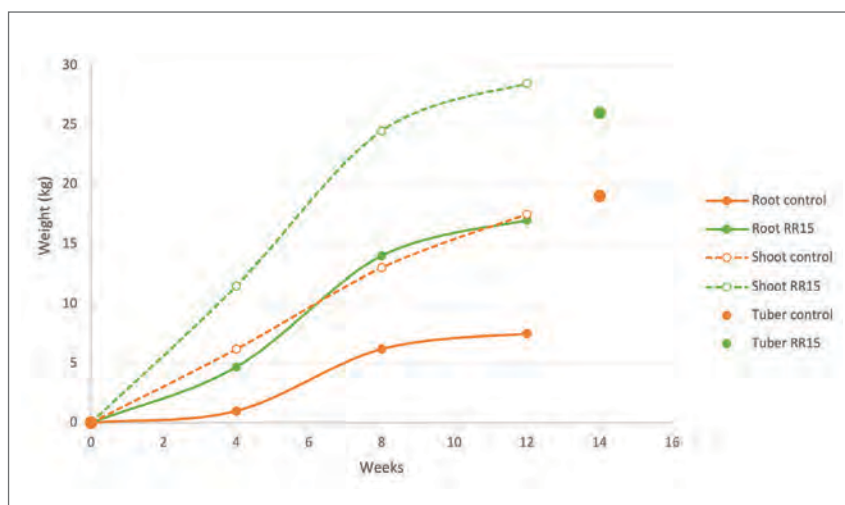
It both boosted productivity **and** reduced disease.” While the bacteria was not a cure for powdery scab, it meant that susceptible varieties produced a better crop in the presence of the pathogen (Figure 7). If the disease was not present, adding inoculant still produced a bigger crop.

### NEXT STEPS

Professor Wilson feels the best option is to target the root receptors. “Potentially, we can use genetic approaches to knock those out, and get an immune variety.”

Other good options involve improving root health using beneficial bacteria as a seed dressing, helping the plant tolerate infection. It will also be important to examine interactions between interventions for powdery scab and incidence of other root diseases.

One thing is clear. Powdery scab is both a fascinating and challenging organism. However, with these new management tools, plus a better understanding of how it infects the potato plant, we are now developing a range of innovative options to manage this devastating disease.



**Figure 7.** Effect of a bacterial inoculant (RR15) on root growth, shoot growth and tuber weight of potatoes exposed to the powdery scab pathogen. Images at right show the difference between the control (left) and inoculated (right) plants after 12 weeks.



Some of the TIA team

*PT17003 - Mechanisms and manipulation of resistance to powdery scab in potato roots has been funded by Hort Innovation, using the potato – fresh and potato – processing 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*

This research was also partially funded by the Australian Government through the Australian Research Council grant DP180103337

### REFERENCES

Merz, U. 2008. Powdery scab of potato – Occurrence, life cycle and epidemiology. *Am. J. Pot. Res.* 85:241-246.

Harrison, J.G., Searle R.J., Williams, N.A. 1997. Powdery scab disease of potato - a review. *Plant Path.* 46:1-25

Falloon, R.E. et al. 2015. Root infection of potato by *Spongospora subterranea*: knowledge review and evidence for decreased plant productivity. *Plant Path.* 65:422-434.





# BUG VS BUG

## WORKING WITH NATURAL ENEMIES



On a fine summer's day, plants fairly buzz with insect life. The vast majority of insects are harmless, some are beneficial, and a very few are damaging to potato crops. Encouraging beneficial insects into the crop can save time and money, avoid negative side effects and prevent development of resistance. By Ryan Hall

### KEY POINTS

- Predators, parasites and parasitoids can all be beneficial
- Beneficial insects occur naturally in Australia; they don't need to be purchased, just provided with food and habitat
- Maintaining a diverse insect population is key to IPM success
- Avoid broad-spectrum insecticides that kill beneficial insects

Most growers will be familiar with the term Integrated Pest Management (IPM). IPM is neither chemical focussed nor organic, but instead chooses the most appropriate management method based on pests and diseases found within the crop.

Strategies can include cultural controls, such as ensuring hills are intact to protect developing tubers from potato tuber moth, and controlling weeds that act as alternative hosts for pests and diseases. They can also be biological, using beneficial insects or pathogens that target pest species. IPM does not rule out chemicals, it just utilises them in a focussed way, supporting other strategies.

The aim of IPM is to bring these controls together to work in a collaborative way.

Beneficial organisms can generally be categorised as:

- Predators
- Parasites, and
- Parasitoids

Some species of predators and parasitoids are sold commercially. However, buying these organisms is not usually necessary. Instead, if you provide a suitable environment, with food and shelter, they will arrive.

**Predators** eat other organisms. For example, lacewing larvae are



**Figure 1.** Predators include brown lacewing (left, source: P. Horne) and white collared ladybird (right, source J. Ekman) larvae, both of which prey on aphids.

voracious hunters of aphids. Many species of ladybirds are also efficient predators, especially as both the adult and larvae are carnivorous. While adult ladybirds are easily recognised, their larvae look (and act) a little like tiny crocodiles (Figure 1).

**Parasites** live in or on their host. Some parasites kill their host, others spread disease or impair proper function. For example, we have heard

a lot in recent months about varroa mites, which parasitise honey bees, with devastating impact.

However, there are also beneficial parasites. Examples include entomopathogenic (insect-killing) fungi and nematodes. From the spectacular *Cordyceps* fungus to species of *Metarhizium* (green mould), these fungi grow within the insect, eventually killing it (Figure 2).

There are also several species of entomopathogenic nematodes (*Steinernema* spp., *Heterorhabditis* spp.) which attack soil borne insects. They multiply inside the insect, eventually bursting out and spreading in search of new hosts.

**Parasitoids** lay eggs in or on their hosts. Like the creature in Alien, the larvae live off their host, eating non-vital organs and bodily fluids as they develop.



**Figure 2.** Entomopathogenic fungi include *Cordyceps* spp., (left, source: J. Ekman) and *Metarhizium* spp. (right, source: CSIRO)

Generally, parasitoids are host-specific, which means they only target a limited range of prey.

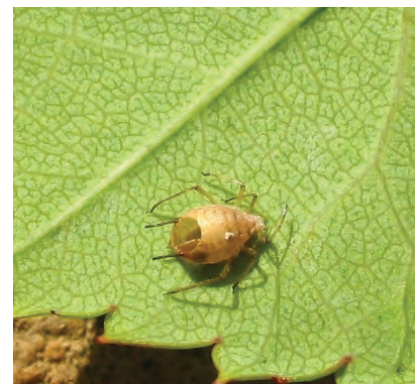
Adult parasitoids are often very small and their larvae are hidden within the bodies of their hosts. This means that they can be overlooked by growers and advisors. Despite this, they can have very significant impacts on pests.

The smallest insect recorded is a parasitoid wasp; the male *Dicopomorpha echmepterygis* wasp is a mere 0.127 mm long (University of Nebraska-Lincoln). Thankfully, most potato pest-focused parasitoids are not this small. Many are around 1 mm long or larger, just big enough to view under a hand lens.

Adult parasitoids are may be tiny, but they are highly mobile. For example, *Trichogramma* wasps are only 0.5mm long but can travel at least 30m during their 2 week lifespan (equivalent to a tall human walking 120km). Moth



**Figure 3.** Moth eggs parasitised by *Trichogramma* wasps. Source: P. Horne



**Figure 4.** and an aphid parasitised by *Aphidius colemani*. Source: N. Dimmock, Uni. Northampton, Bugwood.org



**Figure 5.** A female *Orgilus lepidus* wasp, a parasitoid that attacks potato moth. Source: P. Horne



**Figure 6.** Potato moth caterpillar parasitised by *Copidosoma* (left) and a non-parasitised PTM pupa (right). Source: P. Horne



eggs parasitised by *Trichogramma* turn black just before the wasps emerge (Figure 3). Other useful species include *Orgilus lepidus* and *Copidosoma* spp., which parasitise potato tuber moth (Figure 4 and 5).

This highlights the difficulty of identifying the insects in action. With lacewings or lady beetles, you can watch them work. It is much harder with parasitoids, with only the mummified remains of host insects left behind.

### WHICH BENEFICIAL INSECTS ARE IMPORTANT FOR POTATO GROWERS?

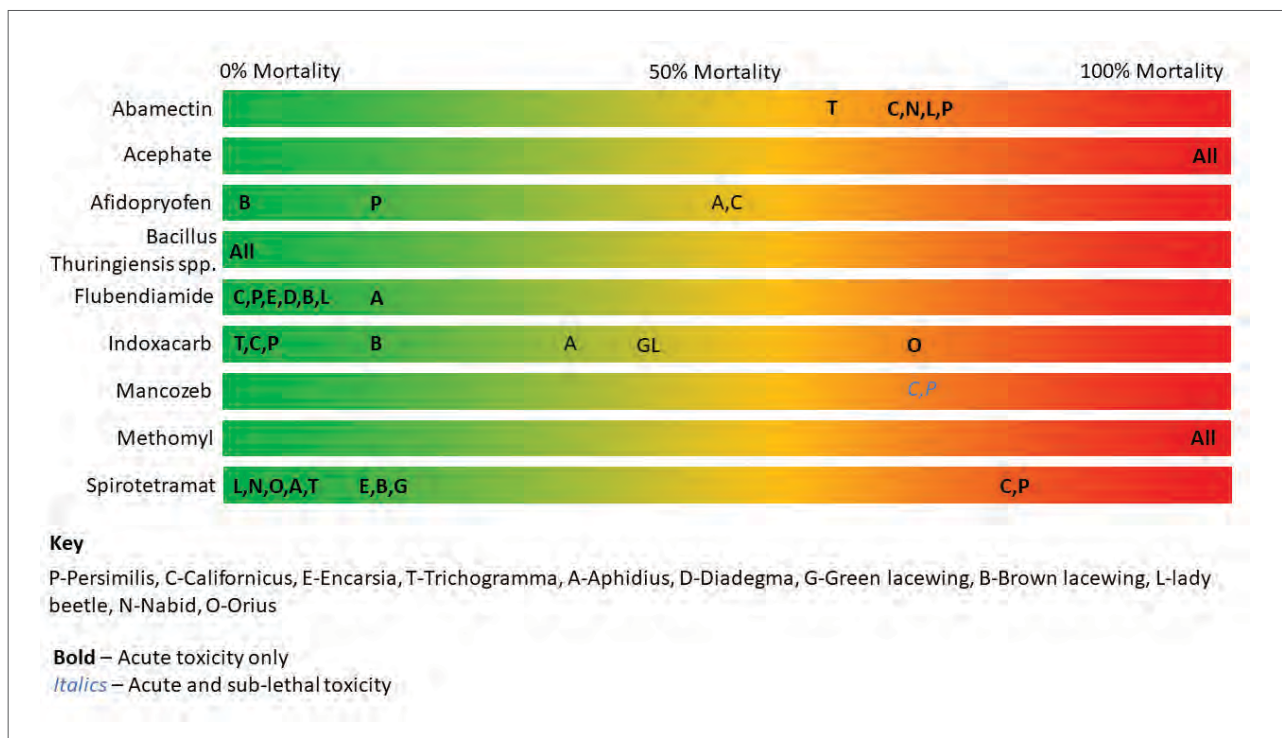
There are many beneficial species that occur naturally in Australia to help control potato crop pests, including:

- *Trichogramma* spp. – targets moth eggs (Figure 3)
- *Aphidius* spp. – targets aphids (Figure 4)
- *Encarsia* spp. – targets whitefly
- Tachinid flies (Tachinidae) – target caterpillars

- *Orgilus lepidus* – targets potato tuber moth (PTM) caterpillars (Figure 5)
- *Apanteles subandinus* – targets potato tuber moth (PTM)
- *Copidosoma* spp – targets potato tuber moth (PTM) eggs and caterpillars (Figure 6)

Maintaining a biodiverse insect population will encourage other native parasitoids and predators in your crop.

The key factor for successful IPM is to avoid insecticides that kill beneficial insects. Instead, choose selective insecticides, using only once pest populations exceed damage thresholds (Figure 7).



**Figure 7.** Table of common chemicals and their impacts on various beneficial species including predators and parasitoids

### MORE INFORMATION

Horne, P. 2022. An extension program for the onion and potato industries. MT16009. Hort Innovation Final Report.

Horne, P. and Page, J., 2020. Pests and beneficials species of potato crops

Insect Pests of Potato., 2022. Global Perspectives on Biology and Management 2nd edition

- Horne, P. and Page, J., 2022. Australia and New Zealand. In Insect Pests of Potato Chapter 22 (pp. 401-405). Academic Press.
- Horne, P. and Page, J., 2022. Integrated Pest Management (IPM) in potatoes. In Insect Pests of Potato Chapter 27 (pp. 483-490). Academic Press.

VG16067 Impact of pesticides on beneficial arthropods of importance in Australian vegetable production. Root and Tuber – A guide to pesticide effects on beneficials, 2020, <https://ausveg.com.au/app/uploads/2020/07/Root-and-Tuber-guide.pdf>

University of Nebraska-Lincoln - <https://entomology.unl.edu>

\*Information current as of 2019. Check with the AVPMA website to ensure any chemicals are still registered before use. If in doubt, consult your agronomist.

## CONTROLLING SERPENTINE LEAF MINER

**Exotic leaf miners have well and truly arrived in Australia, with the first infestation of a potato crop reported this winter in the Lockyer Valley. Focus has now shifted from elimination to finding ways to manage these new pests.**

Leaf miners are not fussy eaters. *Liriomyza huidobrensis* (serpentine leaf miner, SLM), *L. sativae* (vegetable leaf miner) and *L. trifolii* (American serpentine leaf miner, ASLM, Figure 1) can attack approximately 200 different host species across 15 families, including potatoes.

Adult leaf miners poke a hole in the leaf and lay their eggs under the surface. This means insecticides need to be systemic (moving through the plant), or at least translaminar (penetrates the outer layers of the leaf), to have any impact against their target. However, over reliance on a limited range of insecticides has already increased resistance by SLM in many countries.

Once SLM eggs hatch, larvae burrow under the leaf surface. As they feed, they leave behind characteristic squiggly white 'mines' through the inside of the leaves. Pupae (Figure 2) re-emerge and, in most cases, drop into the soil, where they can safely over-winter.



Figure 1. American serpentine leaf miner. Source: DAFF



Figure 2. Serpentine leaf miner pupae. Source: DAFF

## PARASITOIDS AS A METHOD OF BIOLOGICAL CONTROL

With much of the life cycle occurring within the leaf, a parasitoid wasp that can attack the SLM larvae as they feed provides a neat solution.

There are more than 50 species of parasitoid wasp species that target leaf miners. Many are already present in Australia and provide an effective non-chemical control option.

Four are particularly good at targeting SLM:

- *Opius* spp. (Figure 3)
- *Diglyphus isaea* (Figure 4)
- *Hemiptarsenus varicornis*
- *Zagrammosoma latilineatum*

The tiny parasitoid wasps of the leaf miner prevent further development of the host after initial paralysis. Typically, a wasp attacks SLM larvae and then lays its eggs on or in the larvae. The SLM larvae are often initially paralysed, then die once the wasp larvae hatch and starts to feed. The wasp larvae pupate beside their dead host before emerging from the leaf mine.

Some adult wasp species are also predators, killing and feeding on leaf miner larvae. Not only do these larvae nourish the wasps, they act as a nutrient boost for improved egg development.

A well-managed IPM plan using parasitoids can result in mortality rates of SLM as high as 80 percent<sup>1</sup>.

Ongoing project MT20005 (Management strategy for serpentine leafminer, *Liriomyza huidobrensis*) is further refining this control strategy.



Figure 3. Braconid wasps (*Opius* sp.) Source: Bugwood.org



Figure 4. Eulophid wasp (*Diglyphus isaea*). Source: Joseph Berger, Bugwood.org



## ATTRACTING PARASITOIDS TO A CROP

### Flowering strips

A Hort Innovation study from 2020, led by Charles Sturt University and The Graham Centre for Agricultural Innovation, examined ways to provide suitable habitat for beneficial insects. The focus of the study was to test whether flowering strips could attract beneficials, including wasps.

The project demonstrated that fast-growing, nectar-producing species can increase activity of beneficial insects, providing cost-effective pest control. The team proposed the following steps<sup>2</sup> :

1. To improve beneficial activity in the crop, establish strips of flowering (nectar-producing) plants approximately 30 metres apart.
2. Plant flowering strips that are single-species or mixed-species depending on seed availability and cost.
3. Cornflower (*Centaurea cyanus*, Figure 5) was the best choice for enhancing parasitoid wasps. Cornflower strips also attract some generalist predator species and provide shelter for beneficials even pre-flowering.

### Patience

Presenting at the recent R&D forum in Ballarat, Zarmeen Hassan from AUSVEG emphasised the need for patience. Experience has shown that parasitoid wasp populations increase naturally over time. So, while there may be a spike in leaf miner in year 1, avoiding use of insecticides will allow wasps to establish and eventually provide effective control.



**Figure 5.** Cornflower (*Centaurea cyanus*). Source: Lucy Kral on Unsplash

## REFERENCES AND OTHER SOURCES

<sup>1</sup> [https://www.dpi.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0009/1274661/Primefact-Management-of-SLM.pdf](https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0009/1274661/Primefact-Management-of-SLM.pdf)

<sup>2</sup> <https://www.horticulture.com.au/globalassets/hort-innovation/resource-assets/vg16062-boosting-beneficials-in-your-vegetable-crop.pdf>

Liu, T., Kang, L., Lei, Z., Hernandez, R. (2011). Hymenopteran Parasitoids and Their Role in Biological Control of Vegetable Liriomyza Leafminers. In: Liu, T., Kang, L. (eds) Recent Advances in Entomological Research. Springer, Berlin, Heidelberg. [https://doi.org/10.1007/978-3-642-17815-3\\_22](https://doi.org/10.1007/978-3-642-17815-3_22)

Ridland, P. M., Umina, P. A., Pirtle, E. I., and Hoffmann, A. A. (2020) Potential for biological control of the vegetable leafminer, *Liriomyza sativae* (Diptera: Agromyzidae), in Australia with parasitoid wasps. *Austral Entomology*, 59: 16– 36. <https://doi.org/10.1111/aen.12444>.



**Figure 6.** Hedgerow planted next to a potato field in Dublin, Ireland

# PETIOLE TESTING FOR NUTRIENT ANALYSIS

Petiole sampling and analysis is an effective and simple way to determine the nutrient status of a crop, including diagnosing any deficiencies or toxicities in potato plants. Like any analyses, getting the sampling right is the first step, writes Paulette Baumgartl.

Petioles are the tiny stems that connect potato plant leaflets. They not only provide support, but function like straws, drawing nutrients up from the soil and distributing them to the growing leaves.

Data from petiole analysis offers a window into the nutrient status of a crop. This may be quite different to the nutrient profile revealed through soil testing. Petiole analysis does not replace, but rather complements, soil testing, as together they indicate how available soil nutrients are to the developing plants.

While soil testing provides a good indicator of fertiliser needs before the crop is planted, testing the plant tissue acts as a 'barometer', indicating the success or otherwise of a fertiliser

regime. As it measures accumulated nutrients in the plant tissues, it can also indicate where there are nutritional disorders. Nutrition can then be adjusted during the growing season. For example, petiole testing could reveal a need for additional K during tuber bulking. However, most often it provides a guideline for future crops.

Rob Cirocco from Phosyn Analytical agrees that petiole testing is worthwhile for many nutrients, including N, S, P, K, Ca, Mg, Cu, Zn, Mn, Fe, B, Na, Cl, NO<sub>3</sub>-N (nitrate nitrogen).

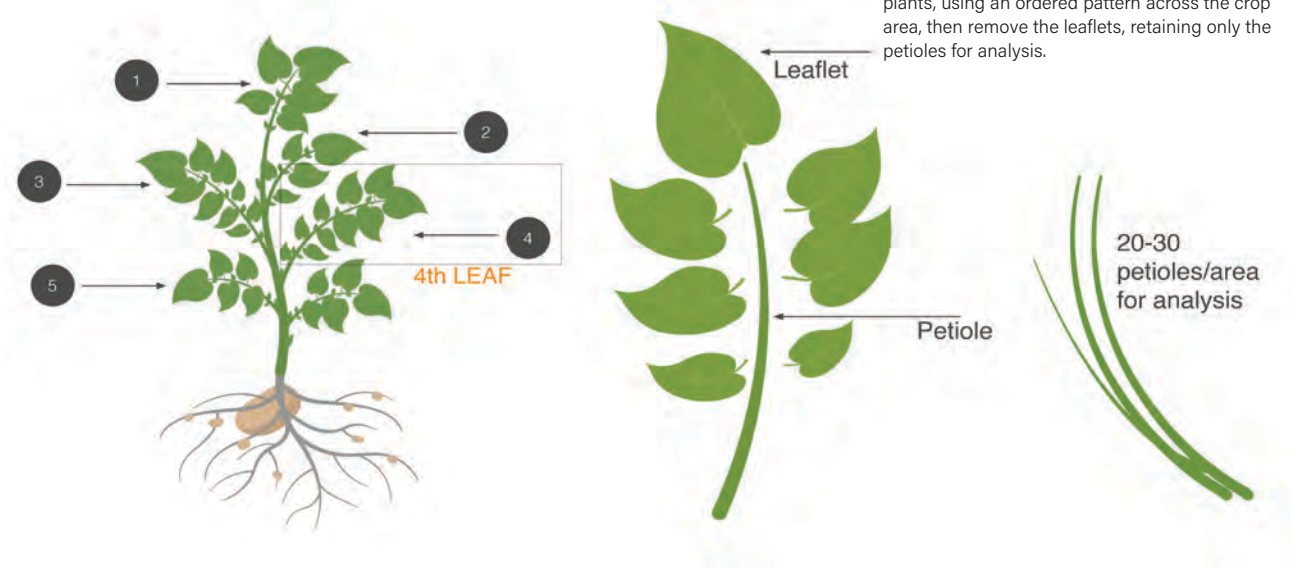
"A regular petiole testing regimen can assess the adequacy of fertiliser programs, diagnose deficiency or toxicity symptoms, and reduce the

potential for environmental pollution through excess inputs," Rob said.

As with all testing, the value of the information gained from petiole analysis will be directly related to the effort and attention put into the sampling. It is also important to note that a single test will not provide all answers, with three or four rounds of sampling, a few weeks apart, recommended.

Fortunately, with a few simple steps, it is easy to collect and handle tissue samples ready for analysis in a laboratory.

Analytical laboratories can provide specific instructions on how to sample, handle, store, label, and send the samples.



**Figure 1.** The usual procedure is to collect the youngest mature potato leaf from each of 20 to 30 plants, using an ordered pattern across the crop area, then remove the leaflets, retaining only the petioles for analysis.



## WHEN TO SAMPLE

Petiole sampling is best commenced at the S2 growth stage, usually defined as the point where the length of the longest tuber is 10mm. Collect the first petiole sample at the S2 stage and repeat the sampling every two to three weeks as necessary for up to four samples. Take note of the crop stage at sampling.

## HOW TO SAMPLE

Commercial plant test kits are available. They include clear instructions on how to collect and manage samples to ensure reliable results from the analysis.

In general, collect the youngest mature potato leaf from each of 20 to 30 plants in an ordered pattern across the crop area to be tested.

Leaf samples may be taken in a zig-zag or a grid pattern; it is important that the whole crop area is sampled

comprehensively. As a rule of thumb, collect one sample every 200 square metres, yielding 20 collected samples for every 0.4 hectares.

The youngest mature leaf is the fourth or fifth from the top of the plant. The leaves should be detached from the main stem of the potato plant, with the petioles intact (Figure 1).

Immediately after collection, detach each leaflet where it joins the main stem of the potato plant. Place the 20 to 30 petioles in a labelled sample bag. Note that this is usually paper, not plastic, to avoid increased moisture – again, analytical labs will provide instructions, including whether it is necessary to dry samples before posting.

While analytical laboratories recommend collecting samples from the entire crop, patch sampling can also be carried out to diagnose a potential nutrient disorder in one part of the crop. In this case it is important

to take samples of both healthy and unhealthy plants for comparison.

Some laboratories will also request that sample notes include the length of the largest tuber.

## HANDLING SAMPLES

Petiole samples should be kept cool and sent to your chosen laboratory service for analysis as soon as possible after collection. They should not be left in the sun or in a hot car.

If there is a delay between time of collecting and submitting samples, keep them in a fridge at 4°C in the meantime.

Rob emphasises the importance of sending those samples quickly.

“To maximise the integrity of a sample requiring analysis, always send it to the lab using the fastest possible service. In many instances, Australia Post’s Express Post service is suitable.”

## IMPORTANT DOS AND DON'TS OF PETIOLE SAMPLING

### Dos

- ✓ Collect tissue samples before 10am.
- ✓ Use clean plastic disposable gloves to sample as sweaty or dirty hands can contaminate the sample.
- ✓ Pull the whole leaf from the plant, then strip the leaflets from the petiole stem.
- ✓ Make a note of growth stage of the plant, including tuber size and if possible, weeks from emergence – specific details should be supplied with a sample.
- ✓ Collect samples in a paper bag, as opposed to a plastic bag, to avoid the sample sweating.
- ✓ Send to the lab as quickly as possible.

### Don'ts

- ✗ Avoid sampling 3-5 days after crop has been sprayed with pesticides or foliar nutrients.
- ✗ Avoid soiled, damaged, dead, or dying plant tissue.
- ✗ Do not sample plants stressed by environmental conditions, for example, drought, flood, extreme cold or heat wave conditions.
- ✗ Do not sample plants affected by disease, insects, or other organisms.
- ✗ Avoid atypical areas of the paddock, such as poorly drained areas.

# SCOPING STUDY FOR SOIL BORNE PATHOGENS

A new study funded through Hort Innovation will review the feasibility of a national plan ensuring Australian farmers are on the front foot when it comes to risks from exotic pathogens. **By Paulette Baumgartl**

As an island, Australia has always enjoyed an advantage when it comes to managing biosecurity. Examples are the new, aggressive "A1" strains and sexual "A2" strains of late blight, found in almost every potato growing country of the world but still absent from Australia.

However, globalisation of trade by both air and sea, and the movement of large numbers of people, have increased risk. Added to this is the impact of climate change, which could extend the habitat range of some pathogens.

Nevertheless, Australia remains free of many important plant pathogens. Maintaining this good fortune is critical for continued and profitable market access.

Dr Sophia Callaghan from NSW Department of Primary Industries

provided an overview of this new study (*MT21016, Feasibility/scoping study: Surveillance and diagnostic framework for detecting soil-borne pathogens in vegetable industries*) as part of the 2022 R&D forum, emphasising the importance of quick detection.

"If we cannot prevent the arrival of exotic pathogens, then early detection is our best defence," Dr Callaghan said.

"Early detection, before a crop shows any symptoms, is our greatest chance of containing and eradicating new pests."

The challenge here is that more often than not, pathogens are only detected once a plant starts showing signs of disease. Pathogens may be there long before symptoms manifest. They may be present in soil or in otherwise

## GROWER ENGAGEMENT

**There is more to this project than sifting through the literature!**

The project team is eager to initiate as many conversations as possible with stakeholders, including growers, agronomists, and industry.

They want to know:

- Do you perform any surveillance/crop monitoring on your farm?
- Do you test soil for chemical, physical or biological properties?
- What are your thoughts on a national surveillance scheme for exotic pathogens?

If you have any thoughts, or would like more information on the project, please contact:

[Sophia.callaghan@dpi.nsw.gov.au](mailto:Sophia.callaghan@dpi.nsw.gov.au)

[Toni.chapman@dpi.nsw.gov.au](mailto:Toni.chapman@dpi.nsw.gov.au)



asymptomatic plants (known as sub-clinical).

Through systematic soil sampling, Dr Callaghan believes it might be possible to avoid disease spread.

A nation-wide soil testing program is an ambitious undertaking and there are many considerations.

This 12-month project will explore the feasibility of a national surveillance and diagnostic framework for detecting exotic soil-borne pathogens – including fungi, oomycetes, bacteria, viruses, and nematodes – in the potato, melon, onion, and vegetable industries.

Activity 1 of the study is to determine the best methods for soil sampling and diagnostics for early detection. As part of this activity, the team plans to

update and extend the lists of exotic pathogen threats, including a review of international literature on new and emerging pathogens.

A critical review of current soil tests used to detect pathogens, from traditional to molecular, and novel technologies is also a priority.

“Australia is a huge country, so understanding how this approach could work at scale will be a major factor in determining its feasibility,” Dr Callaghan said.

“Investigating how this could work in practice, as part of a nationally consistent framework for soil surveillance and diagnostics, is our focus for Activity 2.”

“Any surveillance program needs to be practical at scale, while also

being comprehensive enough to be meaningful,” Dr Callaghan added.

The team will look to national and international industries for examples of successful surveillance programs, as well as opportunities to leverage existing infrastructure.

Dr Callaghan emphasised the need for the program to make sense economically, which means making the most of any systems already in place and ensuring any program passes a cost benefit analysis.

Finally, the project team will summarise any gaps in Australia's knowledge capability and identify priorities for R&D investment.

Watch for future updates on the project through the PotatoLink bulletins and this magazine.



**Left.** Root knot nematode (*Meloidogyne enterolobii*) has an extensive host range, including potatoes. Source: Wikipedia



**Below left:** Oomycetes are a group of several hundred organisms that include some of the most devastating plant pathogens. Source: <https://www.apsnet.org>

**Below right.** Potato infected with late blight pathogen. Source: Dolf de Boer



*MT21016 - Feasibility/scoping study: Surveillance and diagnostic framework for detecting soil-borne pathogens in vegetable industries has been funded by Hort Innovation, using the Melon, Onion, Potato - Fresh, Potato - Processing, Sweetpotato and Vegetable Funds with contributions from the Australian Government. Hort Innovation is the grower owned, not-for-profit research and development corporation for Australian horticulture.*

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# PINK ROT - PROJECT UPDATE



Pink rot, mainly caused by *Phytophthora erythroseptica*, is a true potato specialist. At first glance this should make it easier to manage. However, the pathogen's long-lived oospores, which can survive in soil for up to 7 years, reduce the effectiveness of crop rotations.

Dr Jenny Ekman reports.

## THE IMPORTANCE OF PINK ROT

Pink rot loves a wet year. The disease is likely to thrive under the current La Niña conditions, being most active in wet soils between 15 and 25°C.

There are also reports pink rot may be developing tolerance to common fungicides (e.g. metalaxyl). Moreover, the key processing variety Russet Burbank has a long maturation time, making it particularly susceptible to this disease.

These factors may explain why pink rot has risen in importance, especially over the last 3-5 years, and particularly in northeast Tasmania. In this area losses can be up to 30%, despite regular fungicide application. Even if disease rates are low, rotten tubers must be detected and eliminated before storage and processing, adding cost.

For some growers, pink rot is now their most challenging disease. Heavily infected paddocks may yield only 25 t/ha; with 45-56 t/ha required just to break-even, this effectively takes entire paddocks out of potato production.

Unfortunately, symptoms often only appear as the crop approaches maturity. Rotting at the crown area can cause infected plants to wilt and collapse. The tubers develop blackened areas, rubbery feel and a distinctive, highly unpleasant smell.

When cut open, the rotten area oxidises, producing the key diagnostic pinkish colour (Figure 1).

## MANAGING PINK ROT

Dr Robert Tegg from the University of Tasmania, together with Professor Calum Wilson from TIA, SARDI researcher Michael Rettke, and soil scientist Dr Bill Cotching, have been trying to find ways to manage this devastating disease.

In 2009, American research at the University of Utah (Benson *et al.*, 2009a and 2009b) suggested that a pH of 7.0 or higher, together with high levels of available calcium, could significantly inhibit infection of root and stolon tissue by *P. erythroseptica*. However, this research was conducted using a hydroponic system. It also did not follow infection through to mature plants and tubers. This made it unclear whether similar effects would

be observed under field conditions.

The Hort Innovation project "Investigating soil pH and nutrition as possible factors influencing pink rot of potatoes – a pilot study" was initiated to investigate this research.

Key project aims were to:

1. Examine the impact of soil pH and calcium formulations in field (and pots) on pink rot development
2. Investigate the impact of landform and soil structure
3. Identify knowledge gaps and opportunities from reviewing literature and discussions with industry

The project was timely, as there had been little Australian research on pink rot disease control since SARDI research back in the 1990s.

Figure 1. Pink rot in tubers. Source: R. Tegg





## ROT RECONNAISSANCE

The project started with a series of field surveys. Paddocks with a known history of pink rot were surveyed around Sisters Beach, Sassafras, Scottsdale and the Midlands in Tasmania.

Assessments included:

- Pathogen detection using PREDICTA Pt
- Soil chemistry, with a focus on calcium and pH, but also other nutrients
- Soil structure and depth, including variation across paddocks
- Incidence of disease

Analysis of 19 field sites over two years found pH ranging between 5.2 to 6.6 at planting. This sits within the range of pH 4.8 to 6.5 which is normally recommended for potato production. pH tended to decrease slightly during cropping, falling by 0.1 to 0.6 points by harvest.

In season 1, soil calcium treatments such as nanocal (liquid calcium supplement) and calciprill (ultra-fine calcium carbonate) were tested for effects on disease incidence.

“Calcium treatments tended to maintain or slightly raise pH of the soil,” commented Dr Tegg. “However, they didn’t really reduce pink rot disease. Despite this, there were minor yield increases in some cases and, in Season 1, application of nanocal tended to reduce the incidence of hollow heart.”

Tasmanian soils used to grow potatoes are primarily ferrosols. These are highly buffered, making it extremely difficult to alter pH. An enormous volume of lime, or other alkalisers, would therefore be needed to increase pH to above 7.0.

“I think we can say that raising pH or adding calcium are definitely not silver bullets for pink rot,” concluded Dr Tegg

“but there may be other benefits from regular applications of calcium to the soil”

## PINK ROT AND SOIL QUALITY

While this result may have been disappointing, the research team identified a number of other soil factors that do influence occurrence of pink rot. This involved using Dr Bill Cotching's expertise in scoring soil quality, assessing its interconnected chemical, physical and biological properties.

According to Dr Cotching, soils that score 4 or less – as shown on the scorecard in Figure 2 – are less suitable for horticultural production than soils with a score of 9 or 10, which have high organic matter and good structure.

Dr Cotching also examined topsoil depth, soil profile changes and topography.

The data confirmed that pink rot can flourish in damp areas of the paddock. In the example shown in Figure 3, 400 tubers from 20 plots on the sloping or low areas of the paddock were assessed for incidence of pink rot. Five plots from the low area had high incidences of disease, whereas the team found only one diseased tuber in one plot on the sloping area.

“This effect of topography is what we expect from pink rot,” commented Dr Tegg. “Another site that we sampled had a very boggy area that we assumed would not be planted to potatoes. However, when we returned 4 weeks later, it had been planted. The result was early dieback, significant pink rot, and essentially downgrading of that paddock with much of the crop thrown out.”

While topography is important, topsoil depth and quality may be an even better guide to the likelihood of pink rot in some circumstances. This may

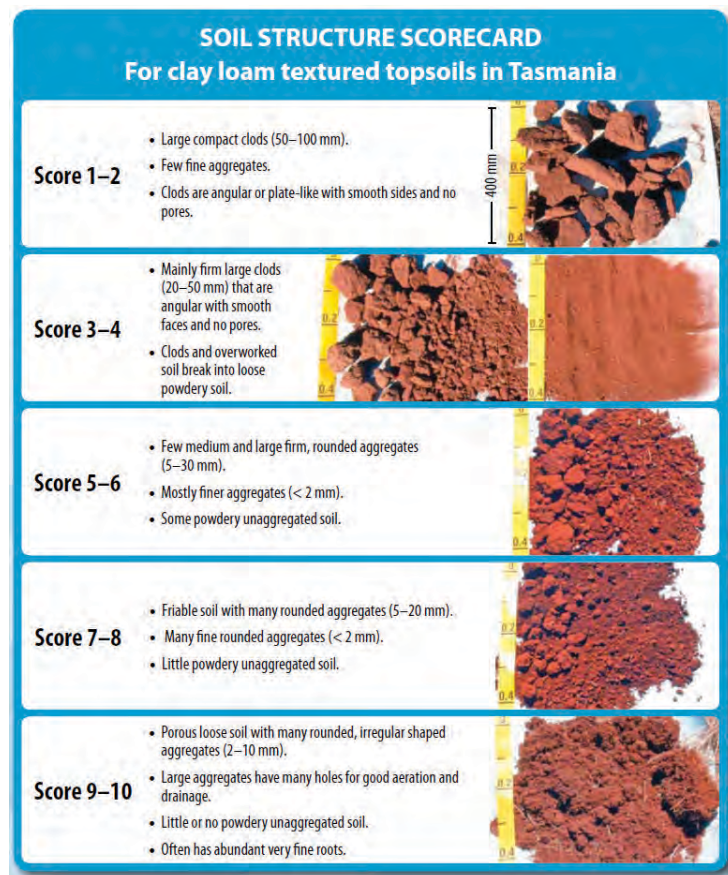


Figure 2. Dr Bill Cotching's soil quality scorecard (Source: soilquality.org.au/factsheets/soil-structure)





**Figure 3.** Low areas of the paddock (shown pre-planting at left, and at crop maturity at right) were more likely to stay damp, increasing development of pink rot. Source: R. Tegg.

mean that a flat area with good quality soil is likely to be less susceptible to pink rot than a well-drained, but eroded slope.

For example, the flat area of one paddock sampled at Sisters Creek had 40cm deep topsoil and a soil structure score of 8. In contrast, the headland area was eroded and compacted, the topsoil being only 25cm deep with a soil structure score of 3-4. The lower soil quality score correlated with increased pink rot, early dieback occurring on the headland area (Figure 4).

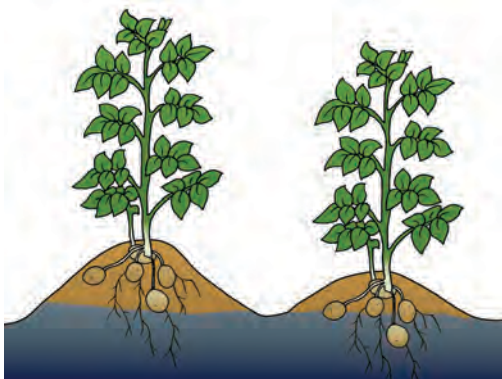
The team even drilled down to the level of individual rows. Where twin rows are inconsistent height, the

smaller mounds have less soil depth and will tend to stay wet for longer in between irrigation events (Figure 5). "Unfortunately, in the smaller mounds, we saw a greater likelihood of pink rot. That was one finding from the work that was obvious across many different paddocks that we surveyed," stated Dr Tegg.

Intersects between rows, where they run at 90° to each other, are another area with increased risk. This can occur due to blockage of water running down one set of rows, causing pooling at the intersection (Figure 6).



**Figure 4.** The high quality soil in the flat area of this paddock (top) produced an excellent crop, whereas plants growing on the degraded area near the headland (bottom) died prematurely due to significant pink rot. Source: R. Tegg.



**Figure 5.** Where pairs of rows are uneven heights, the smaller mounds may have increased risk of pink rot.



**Figure 6** (below). There is a greater risk from pink rot where rows intersect at right angles, such as where headland rows cross downward rows. Source: R. Tegg.



## USING PREDICTA PT FOR PATHOGEN DETECTION

As well as measurements of soil attributes, regular samples were taken for qPCR detection of the pink rot organism with the PREDICTA Pt service.

PREDICTA Pt provides a reliable indication of risk for a range of pathogens (e.g. powdery scab, black dot) and nematodes.

Unfortunately, pink rot is harder to detect in the soil, and results are not always a good guide to the likelihood of infection.

The pathogen was rarely detected before planting. However, as the soil warmed and irrigation was applied, pink rot was found more frequently. This suggests that pink rot populations in soil fluctuate widely during the growing season, so both sampling strategy and timing are critical for detection.

The other finding is that intensive sampling is needed to be sure of detecting the pink rot pathogen. Current Predicta Pt sampling protocol advises analysing 4 separate samples, each compiled from 30 subsamples taken in a "W" pattern, for a paddock larger than 10ha. However, new modelling by SARDI suggests that at least 10 separate, composite samples are needed to be 90% confident of detecting pink rot within a paddock.

The requirement for a large number of samples, combined with the low probability of detection prior to planting, may make testing uneconomical and impractical in some situations.

## QUESTIONS FOR FUTURE RESEARCH

While the research has revealed much, questions remain:

- When is the best time to take soil samples for pink rot detection and risk assessment?
- Is there a way of enriching the soil sample to increase chances of detection?
- While other crops e.g. carrots, cereals, perennial ryegrass are potential hosts for pink rot, do they support the pathogen's full lifecycle?
- To what extent do volunteers during crop rotations contribute to risk of pink rot in temperate areas?
- How does pink rot interact with other pathogens?
  - Potatoes can be infected by powdery scab, *Rhizoctonia* and *Sclerotinia* as well as pink rot – does infection by one of these organisms make the plant more susceptible to the others?
  - What are the potential interactions with bacteria and/or nematodes?
- Can EM38 mapping identify areas which are more likely to be susceptible to pink rot?
  - These may then be left fallow or planted with an alternative crop such as corn.
- What new or alternative chemistry may become available for management of pink rot?

## KEY POINTS

- Calcium amendments and pH modification are very unlikely to offer a practical way to manage pink rot
- Soil characterisation and site analysis can be an effective way to assess risk
- Pink rot is difficult to control, and will require multiple management strategies
- Factors associated with increased risk of pink rot include:
  - Damp conditions in low lying areas
  - Over-irrigation or unseasonal rain, especially late in the season
  - Shallow topsoil and/or poor soil structure
  - Soil compaction, such as in the headlands
  - Short mounds, especially where the neighbouring mound is taller
  - Intersections between rows which prevent water from draining
  - Damage to plants by the irrigator, tractor or windy conditions

*PT19000 - Investigating soil pH and nutrition as possible factors influencing Pink Rot in potatoes – a pilot study has been funded by Hort Innovation, using the Potato - Fresh and Potato - Processing research and development levies and contributions from the Australian Government. Hort Innovation is the grower owned, not-for-profit research and development corporation for Australian horticulture.*

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# CITIZEN SCIENCE SUPPORTING TPP SURVEILLANCE



With the help of hundreds of volunteer gardeners from across Australia, a Hort Innovation project to survey TPP is coming to an end. More than 1800 traps were assessed in each state with no TPP detected outside of WA. By Paulette Baumgartl.

Tomato potato psyllid (TPP) has been established in New Zealand for over 15 years, where it is a major pest. In 2015 a quarantine survey discovered it in Australia's most easterly outpost, Norfolk Island, with the tiny insect detected in Western Australia only two years later (February 2017). This discovery triggered a major emergency response, including a survey of the entire country for the presence of this pest.

TPP carries the bacterium *Candidatus Liberibacter solanacearum* (CLso), a disease of solanaceous plants which can be particularly destructive to the potato industry. The disease is characterised by curled leaves, yellow brown splotches, and a slight purple tinge to the growing tips. Plants shrivel, die early, and yield small tubers which, when fried, are stripy and unpalatable (hence the nickname zebra chip).

## SURVEYING AUSTRALIA FOR THE PRESENCE OF TPP

TPP was initially detected in a seemingly innocent back yard vegetable patch in Perth. Primary industry agencies around Australia collaborated with the West Australian Department of Primary Industries and Regional Development (DPIRD) to help monitor and manage this pest.

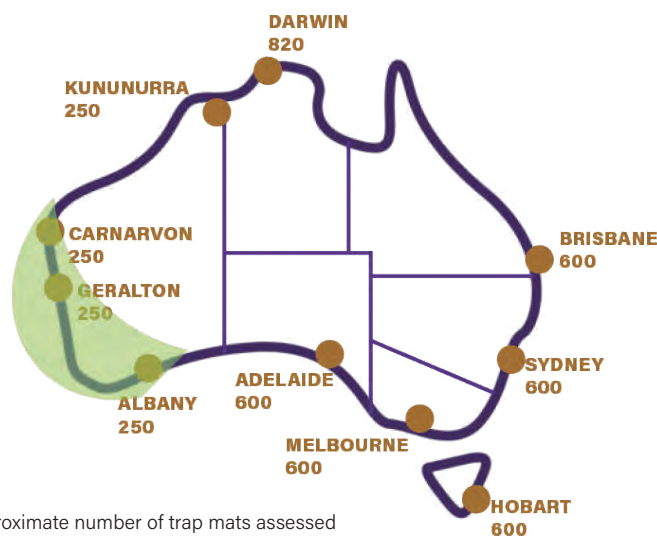
In 2019 Hort Innovation initiated a 3 year National surveillance project for both the psyllid and the CLso bacterium it could potentially vector (MT18008).

Tasked with the early detection of TPP, and testing for the presence of CLso in trapped TPP specimens, the project leaders put out a call for volunteers.

Due to the likelihood of the pest first occurring in urban areas, activities focussed on capital cities and their peri urban fringes of the capital cities, except in WA, where regional centres were targeted. Local agencies used social media to advertise the project and attract participants.

### KEY POINTS

- No reported cases of infection by the *Candidatus Liberibacter solanacearum* (CLso) bacterium occurred in Australia
- Nearly 14,500 traps were set across Australia over the course of three years
- Thousands of volunteers participated in the program, across Australian capital cities and regional WA
- Almost 6,000 TPP specimens were tested for the presence of CLso in WA



**Figure 1.** Approximate number of trap mats assessed per year in each major city. N.B. surveillance in Albany, Geraldton and Carnarvon only occurred during season 1. Current range of TPP shown in green



The program, known as 'Adopt a trap' ran all across the country except in the ACT.

Each participant received a trapping kit, which included all materials, instructions, ID stickers, a tomato (host) plant, and return details.

Participants from most states were also asked to monitor their activities via the MyPestGuide app.

With privacy measures in place, the app gave project leaders some oversight, allowing them to verify location and that the volunteers were following correct trapping procedures. This ensured the project retained scientific rigor.

In most states, trapping for the 3 year project concluded in Autumn 2022. However the program will continue in the Northern Territory until the end of this year (2022). More than 1,800 traps have been returned and assessed per state (Figure 1), with no TPP found outside the Western Australian southwest and Gascoyne regions.

Returned traps are assessed under a microscope with all psyllids examined, identified and counted. Any TPP

found are circled, and a sample (10-20 individuals per trap) are extracted for analysis of the presence of CLso molecular markers.

The Kimberley in northern WA remains free of TPP, with no specimens found in Kununurra. However, surveillance did detect TPP in Carnarvon, Geraldton and Albany.

Since the first identification of TPP in Perth in 2017, thousands of individual TPP have been analysed for CLso every spring and summer. The bacterium has never been detected. It is concluded that TPP arrived in Australia without bringing the bacterium with it, so mainland Australia is currently CLso free.

### HOW TO TEST FOR TPP IN MY CROP

Addressing the R&D forum in Ballarat, Victorian project co-ordinator and diagnostic entomologist Cait Selleck from Agriculture Victoria summarised some of the project findings and what to look out for if you are concerned about TPP on your own farm.

"Visual inspections can be difficult due to the very small size of the insects,

however, generally, adults, eggs and nymphs can often be found together on the underside of a leaf," Cait said (Figure 2).

"Another indicator is a pretty dusting of what looks like icing sugar, but is actually psyllid excrement, often referred to as honey dew" (Figure 3).

Cait is one of many entomologists from around Australia who spend hours looking down a microscope hoping not to find a TPP specimen.

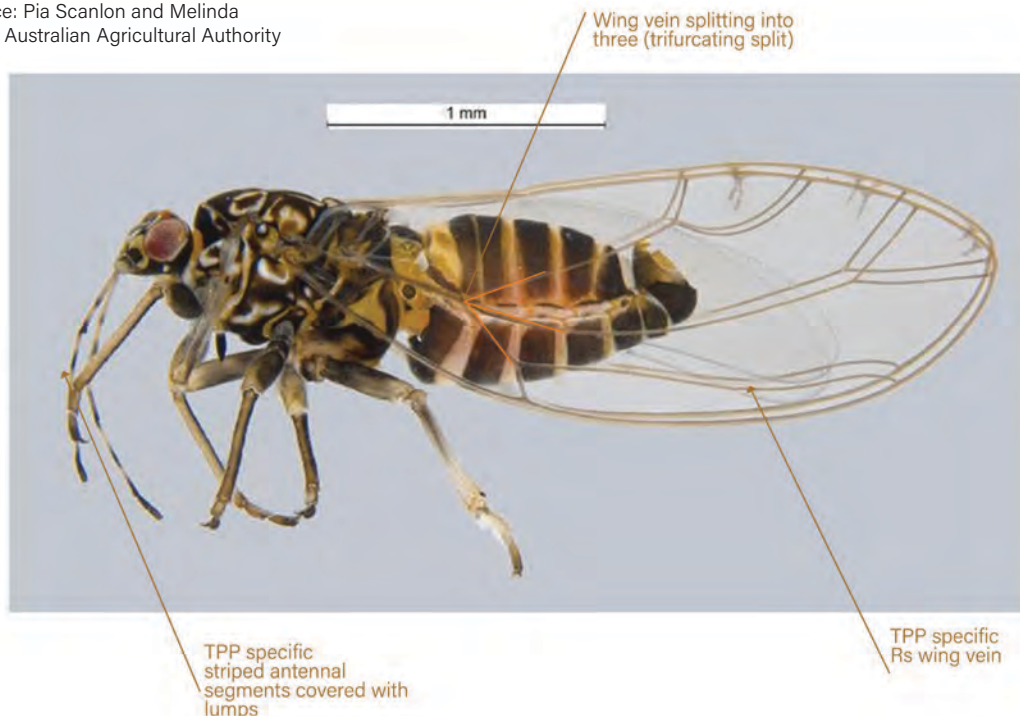
"It is a highly manual process; real people spend hours examining the traps to inspect every psyllid," Cait explained.

"TPP itself has some clear identifying features, making it easy to spot under a microscope, including characteristic veins on its wings (Figure 4 and 5)."

Cait adds that the best way to determine whether TPP is present is with a sticky trap, readily available at a garden or hardware store. It is highly recommended to use the trap with a cage to reduce the risk of vertebrate by-trap.

"It is important to remove the trap after one week" suggests Cait, "this is

**Figure 5.** Characteristic features of TPP.  
Source: Source: Pia Scanlon and Melinda Moir, Western Australian Agricultural Authority



enough time to detect whether TPP is present in the crop. In any case, any longer and the trapped insects start to degrade, making correct identification difficult."

The trap should be mounted on a stake or with a bulldog clip to a fence or similar.

As TPP prefer an ambient temperature of 26 degrees, the best time to set out traps is during the growing season for northern Australia (May to August), summer in Tasmania, and spring and autumn everywhere else.

Traps are best placed in a transparent plastic covering, before posting to the relevant agency.

Check the websites for each state to check their protocols before sampling and sending.

You can learn more about TPP and zebra chip through the PotatoLink webinar on this topic presented by Dr Melinda Moir (DPIRD) and John Jackson (Potatoes New Zealand).

View at [potatolink.com.au/webinars](http://potatolink.com.au/webinars).



**Right, from top to bottom:**

**Figure 2.** Community of TPP eggs, nymphs and adults. Source: Pia Scanlon, Western Australian Agricultural Authority

**Figure 3.** 'Honey dew', characteristic icing sugar appearance of TPP nymph excrement. Source: Pia Scanlon, Western Australian Agricultural Authority

**Figure 4:** Adult TPP. Source: Pia Scanlon & Melinda Moir, Western Australian Agricultural Authority

*MT18008 - National tomato potato psyllid and zebra chip has been funded by Hort Innovation, using the nursery, potato-fresh, potato-processing and vegetable funds and contributions from the Australian Government Hort Innovation is the grower owned, not-for-profit research and development corporation for Australian horticulture.*





# EYES ON THE WORLD

## RECENT ADVANCES IN POTATO RESEARCH AND INNOVATION

Whole-cell bacterial biosensor for volatile detection from *Pectobacterium*-infected potatoes enables early identification of potato tuber soft rot disease

Veltman, B., Harpaz, D., Melamed, S., Tietel, Z., Tsrur, L. and Eltzov, E., 2022. *Talanta*, <https://doi.org/10.1016/j.talanta.2022.123545>

### WHAT IS IT ABOUT?

Just as one bad apple can spoil a barrel, so one bad spud can spoil a bin. And even though catching rotten tubers early can make all the difference, how can you grade out tubers with no external symptoms?

New research is developing sensing technologies that can detect the volatile organic compounds (VOCs) produced by soft rot bacteria. VOC sensors and detectors, notably the electronic-nose (E-nose), have existed for some time, but have often struggled in practice.

This recent study from Israel took a different approach, developing a biosensor based on the responses of bacteria (various strains of *E. coli*) to the presence of VOCs. A biosensor is a device that can detect a chemical substance (including VOCs) using an enzyme, antibody, or in this case a whole cell bacterium, that binds with the target substance.

### WHAT WAS CONCLUDED?

Israeli researchers initially examined whether there were specific VOCs produced by potatoes infected with *Pectobacterium* bacteria. They successfully identified five such compounds using gas chromatography-mass spectrometry (Figure 1).

They then exposed various strains of genetically engineered *E. coli* bacteria to these compounds to see whether they responded. The most responsive bacterial strain was one called TV1061. This fluoresced strongly when exposed to three of the five identified VOCs.

The bacteria were embedded in calcium alginate, enabling them to be made into small tablets. Banks of these tablets could then be placed into jars containing healthy and infected potatoes.

The bacteria were incubated with whole infected/uninfected potatoes for two hours, then their fluorescence was measured using a plate reader. Comparing the fluorescence of

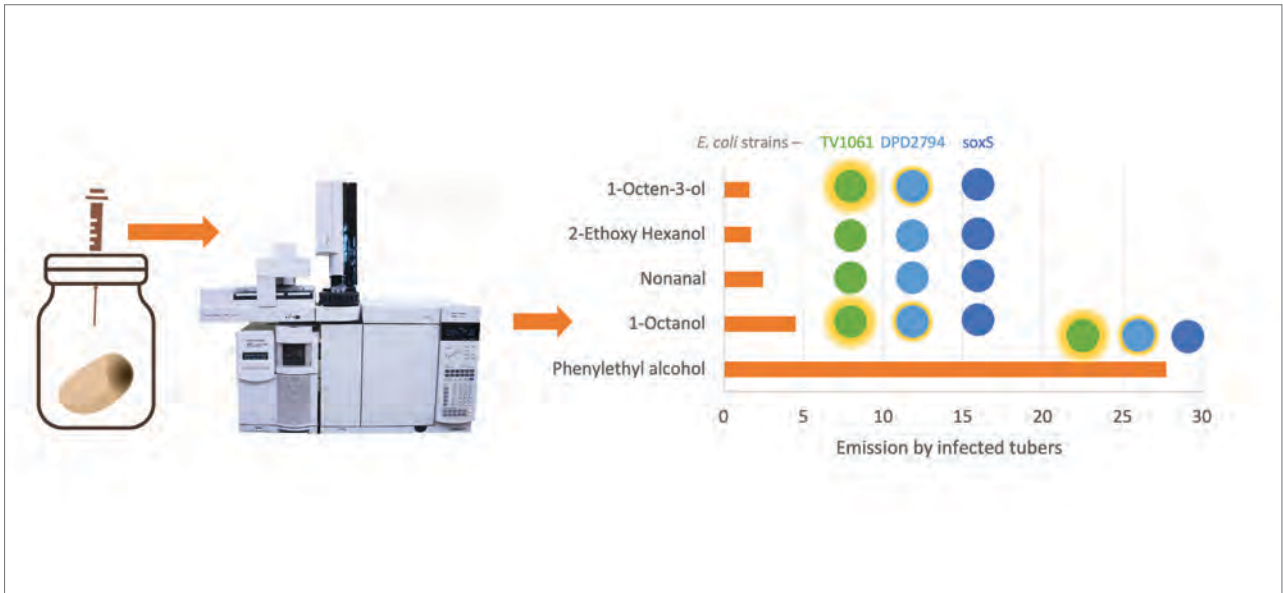


bacteria exposed to healthy vs infected potatoes provided a reliable indication of the amount of rot present (Figure 2).

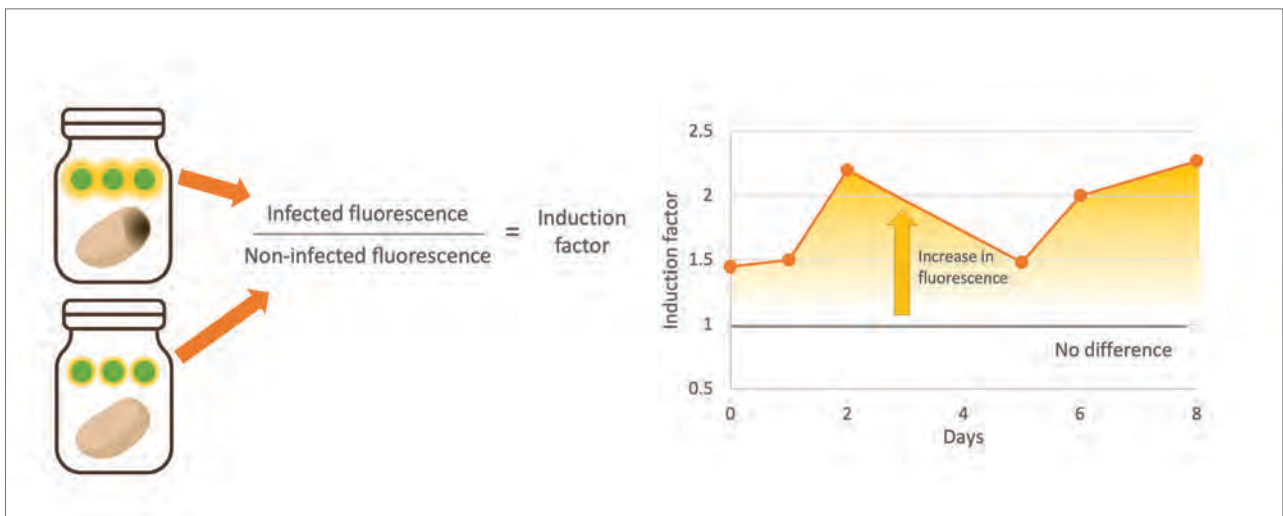
The bacterial panel responses were tested over a period of up to eight days. The response increased markedly by day two, with consistently high readings after day six.

This is an important step toward developing simple and effective tests that will allow for more efficient crop management. The use of tests like this that can “smell” disease before you can see it can help to keep infected tubers away from clean tubers, reducing postharvest losses.

It could also be used to verify that potatoes are soft-rot-free before export or planting. With some further development, it is possible these tests could be available at all stages of the supply chain.



**Figure 1.** The researchers first identified five volatile organic compounds specifically produced by potatoes infected with *Pectobacterium* species. They then exposed a number of genetically engineered strains of *E. coli* to these compounds and measured whether they fluoresced in response. One of the strains (TV1061) fluoresced strongly when exposed to three of the five identified compounds (1-Octen-3-ol, 1-Octanol and phenylethyl alcohol).



**Figure 2.** The bacteria were set into calcium alginate, allowing them to be formed into tablets. Banks of tablets were exposed to infected/uninfected potato tubers for two hours daily over eight days. Comparing the difference in fluorescence (induction factor) indicated the amount of disease present. While a response to infection was noted immediately, the fluorescence increased after two days as the disease progressed.





# POTATOLINK BULLETIN



**POTATOLINK**  
AUSTRALIAN POTATO INDUSTRY  
— EXTENSION PROJECT —

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?

For all this and more, subscribe to our monthly newsletter.

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.

## EACH ISSUE INCLUDES

- Upcoming events – webinars, regional in person events, online training and conferences
- New resources – PotatoLink magazine, factsheets and case studies
- Updates from our demonstration sites
- Event reviews for all those who missed out
- General info, project updates and more

## SCAN THE QR CODE TO SUBSCRIBE



Back issues can be downloaded from our website ([potatolink.com.au/bulletins](http://potatolink.com.au/bulletins)).

Already enjoying our bulletin but have some feedback? We're always happy to hear your thoughts.

Email [info@potatolink.com.au](mailto:info@potatolink.com.au)

# POTATOLINK PLANS FOR 2023

Following an active and successful 2022, where we could enjoy the benefits of in-person events after many COVID disruptions, we have been busy organising a comprehensive schedule for 2023.

Responding to feedback from the broader PotatoLink community, including participants at in-person events and webinars, project regional representatives and the Project Advisory Group, we are pleased to announce our themes for 2023, including:

- Precision Agriculture
- Management of seed
- Maximising return of inputs- irrigation, nutrition
- Regenerative agriculture
- Weather & disease management

Our regional representatives are fine tuning their plans for the in-person events in their regions and will focus on topics in alignment with the needs of the regions and the themes above.



## A NEW FACE IN THE POTATOLINK TEAM

After his successful service as PotatoLink's Tasmanian representative, Frank Mulcahy is retiring from the post. On behalf of the potato growers of Tasmania and the PotatoLink team, we want to express our gratitude for his support and contributions to the project and wish him every success in the future.

We are therefore excited to announce that Tim Walker from Walker Ag Consultancy will be stepping into the role. Welcome to the team Tim!

Tim is passionate about agronomy, with over 20 years' experience in the field, who also manages the family farm growing potatoes, poppies, pyrethrum, grain and rearing livestock.

As a consultant, Tim works closely with land managers on tasks from pre-paddock selection through to harvest. To complement his role as a trusted advisor, he often tries new practices and products out on his own farm to support his recommendations.

Tim was awarded the Rising Star mantle at the 2012 AUSVEG National Convention and the Regional Winner in the 2020 Syngenta Australia Growth Awards Productivity category.

**Read more about Tim at  
[walkerag.com.au](http://walkerag.com.au)**

Tim Walker joins the PotatoLink team as our representative in Tasmania.

## DEMONSTRATION SITES

Weather permitting, the demonstration sites will look at

- Seed management- storage and physiological age
- The impact of 'skips' during planting
- The benefits of potassium sulfate topdressed early
- Biologicals
- Integrated pest management
- Soil moisture monitoring

## NEW INSIGHTS

Several international pathology, agronomy, and seed management experts are due to visit Australia in early 2023.

This is potentially a great opportunity to hear their insights on topics that are relevant to Australian growers.

Such events also form part of the lead up to the International World Potato Congress, to be held in Adelaide in 2024.

## KEEP UP TO DATE

The best way to stay up to date with PotatoLink activities and resources is via our monthly bulletins (see page 28 for more information and subscription link), or our website [potatolink.com.au](http://potatolink.com.au)

We look forward to seeing you at an event in your area soon!



# NEWS - IN BRIEF

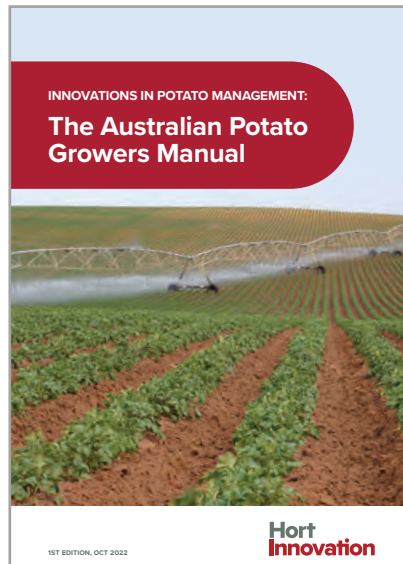
## AUSTRALIAN POTATO GROWERS' MANUAL

The much-anticipated growers' manual has been published and is now available to download.

Written and reviewed by experienced plant and soil scientists and industry specialists, the comprehensive guide contains the latest information on best practice potato production in Australia.

Chapters include requirements for potato growth, seed quality, growing a successful crop, harvesting, storage and emerging technologies.

As a digital publication, the manual serves as an online portal, linking to other sources of information for a deep dive into topics which may be of specific interest.



Download your copy at [potatolink.com.au](http://potatolink.com.au)

## HORT INNOVATION PROJECT WRAP



**Project PT17002, Program approach for pest and disease potato industry investments, led by Dr Kristen Stirling and Dr Doris Blaesing, has concluded.**

Their final report, including outputs and recommendations, is available online via the Hort Innovation website.

The project had three key objectives, namely, to keep industry informed of pest and disease research outcomes; ensure that the pest and disease R&D program is coordinated and collaborative; and that investment in potato pest and disease R&D program is effective and efficient.

Outputs included two R&D forums (2019 and 2021), regular articles published in Potatoes Australia magazine, webinars, facts sheets, review of international R&D, presentations, and the facilitation of ongoing meetings between research partners.

This project highlighted a lack of strategic pest, disease and weed management R&D for the potato industry, with many projects appearing to be mostly reactive, i.e., dealing with problems rather than with risks and prevention using a coordinated integrated crop protection approach.

Drs Stirling and Blaesing had the

following recommendations on how R&D should be delivered in the future. These included:

- Understanding the case for investment
- Understanding the pest and disease opportunities and threats to the Australian potato industry and
- Research and development
- Developing a strategic and coordinated plan for delivery of future pest and disease R&D including identification of the Approach, Delivery, Objectives and Priorities.

Download the final report at <http://bitly.ws/wLXJ>

## HORT INNOVATION PROJECT WRAP



**Project PU 19001  
Potato Workshop  
and Market Access  
Plan was led by Dr  
David McKinna. The  
project sought to**

**reach consensus between industry, Hort Innovation, and government, about the market access priorities for potatoes and the next steps for export markets.**

Some consensus has been achieved,

however Dr McKinna suggests that ongoing collaboration will be required, which will demand cultural change within the industry.

To achieve this, Dr McKinna has recommended the establishment of an informal potato industry export committee. This would be similar to the summerfruit industry's Summerfruit Export Development Alliance (SEDA).

He has also proposed that a short potato industry export forum should be held every 12 months. This would

allow centralisation of all market access/improvement applications and ensure they are 'in the national interest'

The potato industry would also benefit from having a three year, rolling export strategy that is updated annually.

The report revealed a clear need to coach industry for export growth and improve the industry understanding of the drivers of fresh potato consumption.

**Download the final report at  
<http://bitly.ws/wLZa>**



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



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

# Potatoes Australia Ltd is proud to host the 12th WORLD POTATO CONGRESS (WPC 2024)

Adelaide, Australia, 23 - 26 June 2024

The next World Potato Congress will be hosted by Potatoes Australia in June 2024.

The congress gathers potato professionals from all over the world to meet and share ideas and knowledge.

## GET INVOLVED



Potatoes Australia is calling for Expressions of Interest from those who would like to be involved. Scan the QR code for more information or contact Liz Mann (EO Potatoes Australia, [liz@potatoesaustralia.com.au](mailto:liz@potatoesaustralia.com.au))

POTATOES AUSTRALIA

The Voice Of The Potato Industry Value Chain



**WPC 2024**





Photo by Marc Hinderager