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australia
| Winter - 2021



HORT CONNECTIONS 2021 | EVENT WRAP-UP AND AWARDS FOR EXCELLENCE WINNERS
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PotatoLink

Flip over the magazine to read *PotatoLink*.

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AUSVEG



Editorial

You may have noticed that *Potatoes Australia* looks a little different this edition, with two covers and a distinct-looking research section at the back of the publication. That's because we have partnered with Applied Horticultural Research (AHR) to help disseminate levy-funded research to growers.

PotatoLink contains the information on levy-funded research that is produced through the industry communications and extension program.

We will continue to partner with AHR to ensure important information on research commissioned by Hort Innovation is communicated with important industry information, including biosecurity, pests and diseases, grower profiles, international research and other areas important to running your business.

If you were lucky enough not to be caught in Victoria, you may have been able to attend Hort Connections in Brisbane earlier in June.

After a tumultuous 18 months, it was pleasing that so many people could be in the same place at the same time to catch up with colleagues and peers – and meet new people in-person.

Hort Connections 2021 had its significant challenges in getting off the ground, but the support from industry, exhibitors and delegates led the way for it to be a much-needed celebration and stress-relief for the horticulture industry.

If you were unable to make it, we have shared some photos and an overview of some of the speaker sessions for you in this edition, as well as an overview of the winners for the Awards for Excellence.

While all award winners were truly deserving, two special mentions go to Xavier Toohey and Dr Jenny Ekman.

Xavier Toohey is a potato grower in Ballarat, Victoria, and was announced the winner of the Corteva Agriscience Young Grower of the Year award.

Xavier was featured in the June/July 2016 edition of *Potatoes Australia*, and since then has gone from strength to strength, building his business and improving his growing practices. He also willingly shares information with his friends and neighbours to help improve the growing practices of the broader region and industry.

When we profiled Xavier in 2016, we asked him where he saw himself

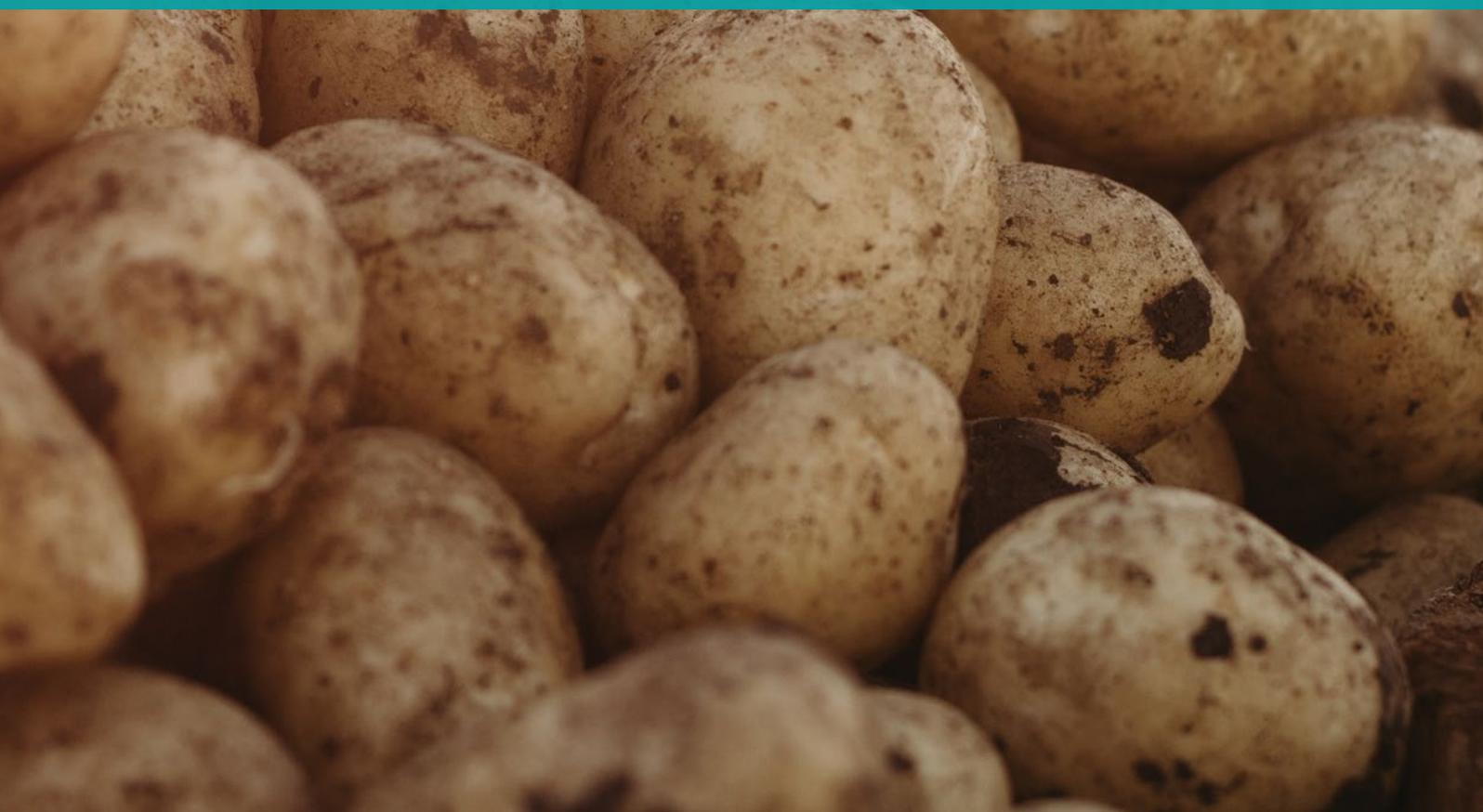
in five years' time. He said he would be expanding his business and staying in the potato industry. If you ask him now, he would say the same thing – staying in the industry and growing his business.

You can read more about Xavier and his accomplishments on page 12.

Dr Jenny Ekman from AHR was recognised with the Bayer Researcher of the Year award and is a key member of the *PotatoLink* team.

Dr Ekman is a well-known and highly regarded researcher in the horticulture sector, and an astute communicator who can deliver complex research outcomes to growers and the supply chain that are compelling and easy to understand.

You can read *PotatoLink* by going to the back of this magazine and reading from back-to-front.





Michael Coote

CEO
AUSVEG

Message from the CEO

It is a great privilege to address you as the incoming AUSVEG CEO. While I have already worked in this industry for many years, I am looking forward to the task of advocating strongly for our growers across all levels of industry and government on critical issues.

I have worked with many of our hard-working potato growers through my previous role as National Manager – Export Development, where I led AUSVEG’s international trade agenda, export development activities and trade team to build capabilities in exporting businesses, helped advocate for better international market access for our industry and assisted AUSVEG in advancing the causes of our potato and vegetable growers.

What makes the Australian potato industry special is its growers. In my role, I will get the opportunity to interact with growers from all around the country, listen to their concerns and find solutions to address these concerns.

As the peak industry body for the potato industry, AUSVEG preforms an important function for growers. AUSVEG is run *by growers for growers*, and has close ties with regional- and state-based grower groups, government ministers, advisors and department officials at all levels. Half of our grower directors are potato growers, which ensures that national policies on important industry issues are strongly influenced by the feedback and experiences of our country’s potato growers.

I have seen and heard first-hand the significant blockers and great hardship faced by growers throughout the supply chain. They must have a strong voice to ensure their concerns are heard and taken seriously by all levels of industry and government.

I have also seen first-hand the hard work that the AUSVEG Board and staff do day-in, day-out for our potato and vegetable growers. In my new role, I will harness the passion and dedication of our staff to deliver the most meaningful outcomes for potato growers.

I look forward to working with our broad network of growers, supply chain partners and contacts throughout government to advance the causes of potato growers for many years to come.

I would like to thank our outgoing CEO James Whiteside. James and I had a close working relationship, and I look forward to building on his good work over many years to help our potato and vegetable growers.

I am also happy to present the new partnership between AUSVEG and Applied Horticultural Research (AHR) that ensures research project outcomes from Hort Innovation funded projects are communicated to growers in this publication.

AHR is the service provider of the Hort Innovation-funded potato extension and communications program, and we are happy to help broaden the reach of its communications through this magazine.

If you are reading this in hard copy, you can flip it over and read *PotatoLink*, which details the outcomes of Hort Innovation funded research. If you are reading this online, you can read from back-to-front to see this content.

We are happy to be working with AHR and Hort Innovation to help increase the promotion of levy-funded research and development, and encourage anyone to reach out if they want to learn more about their levy-funded research investment program.

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Hort Connections 2021 – Celebrating the International Year of Fruits and Vegetables

Despite the ongoing disruption from COVID-19 and the snap lockdown preventing Victorians from travelling to the event, over 2,200 delegates from all sectors of the horticulture industry descended on the Brisbane Convention and Exhibition Centre from 7-9 June to 'Celebrate the International Year of Fruits and Vegetables'. There were hundreds more who tuned in and streamed the speaker sessions.

Hort Connections encompasses the vegetable, fruit, nut, cut floral and nursery sectors. This year, more than 60 event sponsors and industry organisations partnered to provide added value to delegates and allow them to access the expertise and services of a range of industry members in-person and online.

The three-day event was the premier opportunity for supply chain members, growers and industry stakeholders in the fresh produce and floral industry to see the latest in technology and innovation, hear from industry experts, meet leading local and global agribusinesses and network at the most highly anticipated social events on the industry's calendar.

Major sponsors of Hort Connections 2021 included Hort Innovation (Principal Convention Partner), Syngenta, Coles and the Queensland Department of Agriculture.

Trade Show

The snap lockdown in Victoria did little to dent the impact of the Hort Connections 2021 Trade Show, which was a major highlight of the conference and presented an unparalleled opportunity to network with the leading supply chain partners in Australian horticulture.

It featured around 190 industry partners from across every sector of the industry and provided delegates with the chance to look at the latest trends, technologies and

services to give their businesses an edge in both productivity and profitability.

The trade show was sponsored by Australia's Fresh Produce Markets. During the event, many growers and industry members were able to forge new partnerships with a range of leading agribusinesses and reconnect with friends, colleagues and supply chain partners to celebrate the achievements of the horticulture industry through what was the most difficult year for many businesses and communities.

The Hort Connections 2021 Trade Show also featured a dedicated networking hour, with the Trade Show Happy Hour sponsored by Nufarm taking place at the close of Tuesday 8 June, which allowed delegates to mingle with exhibitors around the entire trade show.

Industry events

A number of industry events that catered to growers and supply chain participants were held in conjunction with Hort Connections 2021:

- Lockyer Valley Growers Expo.
- Avo Connections.
- Potato Industry Networking Event.
- Queensland Horticulture Export Congress.

Networking opportunities

Throughout the conference, networking events were held to connect growers with agribusinesses, researchers and representatives from all areas of the supply chain, transport and retail sectors, including the Hort Connections Gala Dinner, multiple off-site and on-site events held by Hort Connections sponsors and a variety of other events that coincided with the conference.

Gala Dinner

The capstone event of Hort Connections 2021 was the Gala Dinner, where industry members from across the supply chain

gathered to celebrate the achievements of the best and brightest in the Australian horticulture industry. Queensland vegetable growers Andrew and David Moon won the Syngenta Grower of the Year, while Fresh Markets Australia won the 2021 PMA-Produce Plus Marketer of the Year Award for its 'A Better Choice!' – Shop & Win campaign.

Annual Vegetable Industry Seminar, which covered:

- Making horticulture more attractive for prospective workers and students.
- Advanced crop protection.
- Export and trade.
- Fruit and vegetable marketing.
- Increasing children's consumption of vegetables.

Supply Chain and Consumer speaker sessions, which covered a number of topics, such as:

- Overview of the consumer market for fruits and vegetables, and state of the industry.
- Market access.
- Fresh produce safety.
- Data management.
- Business innovation.

Plenary Sessions featuring leading thought-leaders and industry figures:

- Agriculture Minister David Littleproud.
- AgTech leader Jack Milbank.
- Author Alice Zaslavsky.
- Food Frontier CEO Thomas King.
- Athlete and Peak Performance Coach Adele Spurgin.
- Consumer Trends Specialist Lewis Muscat.



Jennifa D'Souza and Tayla Field from One Harvest.



Hort Connections emcee Toby Travnner.



Federal Agriculture Minister David Littleproud and AUSVEG Deputy Chair Belinda Adams. Hort Connections photography by Andrew Beveridge.



Potato grower Kerri-Ann Lamb.



Gala Dinner sponsored by One Harvest.



Hort Connections Trade Show.



Plenary speaker Jack Milbank from AgPro Technology.



Gala Dinner pre drinks.



HORT CONNECTIONS

7-9 June 2021
Brisbane Convention Centre

Celebrating the international year
of fruits and vegetables



Andrew and David Moon

Syngenta Grower of the Year

L-R: Paul Luxton, Syngenta Australia –
New Zealand Managing Director, and Andrew Moon



Xavier Toohey

Corteva Agriscience Young Grower of the Year

Xavier Toohey, image courtesy of Corteva Agriscience



Catherine Velisha

Boomaroo Nurseries Women in Horticulture Award

Catherine Velisha



Steve Moffatt

Hort Innovation Exporter of the Year

L-R Julie Bird, Hort Innovation Chair, Steven Moffatt,
and Mitchell Moffatt

National Awards for Excellence Award Winners

The Hort Connections 2021 National Awards for Excellence Gala Dinner, sponsored by OneHarvest, celebrated the outstanding achievements and contributions made to the Australian horticulture industry by growers, marketers, researchers and supply chain members.



Dr Jenny Ekman

Bayer Researcher of the Year

L-R Scott Ward, Bayer National Sales Manager, Horticulture, and Dr Jenny Ekman



East Gippsland Vegetable Innovation Days

Visy Industry Impact Award

L-R Bonnie Dawson, Daniel Hammond, Noel Jansz, Stuart Grigg and Andrew Bulmer. Absent: Jody O'Brien, Kate Grigg, image courtesy of Bonnie Dawson



Andrew Smith

E. E. Muir & Sons Community Stewardship Award

L-R Troy Muller, E. E. Muir & Sons Regional Manager – South-East Queensland and Andrew Smith



Mark and Darren Todaro

Butler Market Gardens Environmental Award

L-R Belinda Adams, AUSVEG Deputy Chair (on behalf of Butler Market Gardens), Tim Withers, AUSVEG VIC Executive Officer (accepting the award on behalf of Todaro Farms) →

National Awards for Excellence Award Winners (continued)



Fresh Markets Australia – 'A Better Choice!' Shop&Win campaign

PMA A-NZ and Produce Plus Magazine MOYA
Marketer of the Year Award

L-R: Verena Cunningham, General Manager SeekaFresh
& Strategy, and Hamish Montague, FMA Deputy Chair



The Yield

PMA A-NZ Tech Innovation Award 2021

L-R: Ian Cass, UPL Australian Marketing &
Business Development Manager, and Ros Harvey,
The Yield Founder and Managing Director



Peter Tighe

FMA Meritorious Service Award

L-R: Peter Tighe, and Hamish Montague, FMA Deputy Chair



Claudia Etherington

FMA Col Johnson Young Achiever's Award

Trish Skinner (accepting the award
on behalf of Claudia Etherington)

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Xavier Toohey, image courtesy of Corteva Agriscience.

Victorian potato grower Xavier Toohey named Corteva Agriscience Young Grower of the Year

Victorian potato grower Xavier Toohey has been presented with the Corteva Agriscience Young Grower of the Year award at the Hort Connections 2021 National Awards for Excellence Gala Dinner in Brisbane on Wednesday 9 June.

The Corteva Agriscience Young Grower of the Year award is presented to a fresh produce grower and future leader in horticulture who champions the success of the industry and shows a commitment to innovation to help inspire the next generation of growers. The award winner demonstrates a high level of commitment to the industry and helps to enrich their community.

Corteva Agriscience is the only major agriscience company completely dedicated to agriculture. By combining the strengths of DuPont Pioneer, DuPont Crop Protection and Dow AgroSciences, Corteva harnesses agriculture's brightest minds and expertise gained over two centuries of scientific achievement.

Xavier Toohey was also the winner of the 2021 Visy AUSVEG VIC Young Grower of the Year earlier in the year.

"Xavier is a deeply passionate potato grower who has demonstrated significant skill and acumen to grow his business to increase the scale of his potato production, which has added flow-on benefits to the local community," said outgoing AUSVEG CEO James Whiteside.

"He is an active member of his local community and readily imparts his knowledge to other local growers to help them improve their growing practices and grow their own businesses."

"Xavier has adopted technologies and processes on his farm to reduce his energy and water consumption, and has a strong focus on improving soil health, reducing the risk of pests and using cropping techniques that have produced yields of up to 10-20 per cent above district averages."

"I congratulate Xavier on his award and his commitment to improving his business and his local industry. The Australian horticulture industry needs more young people involved, and it is important that we recognise the achievements of young growers such as Xavier to ensure we foster our next generation of leaders."

Corteva Agriscience Marketing Manager for Horticulture & Insecticides, Nick Koch, said it was a thrill to announce Xavier Toohey as the 2021 Young Grower of the Year.

"Xavier's tenacity and enthusiasm for producing potatoes are incredible. He's just the sort of passionate grower our industry needs," Mr Koch said.

"At a time when other people were leaving the potato industry, Xavier committed to it and invested in it. He now has two farms, and it's a real credit to him."

Mr Koch said what made Xavier's achievements more impressive is the fact he has developed his business rapidly with limited external support.

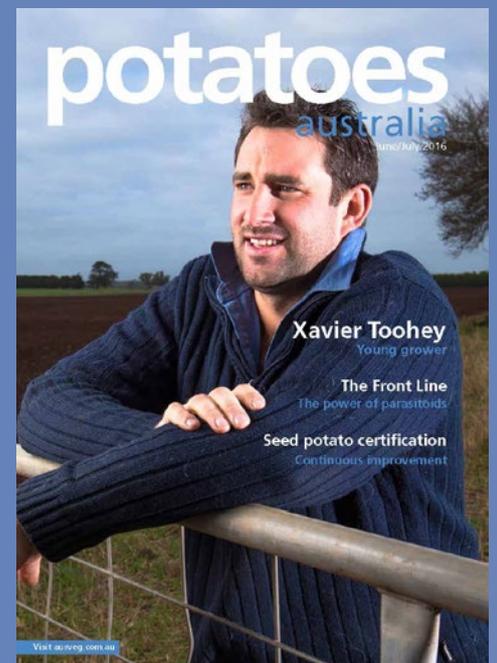
"Not only has he built a successful and sustainable business in a short space of time, but he's done it off his own steam," he said.

"A lot of young people have help to get them started in farming, but Xavier did it on his own through sheer hard work and determination. He is also stepping up and taking leadership at an industry level, which is fantastic."

"The Young Grower of the Year Award is about our industry recognising exceptional young growers like Xavier."

Other nominees for the Corteva Agriscience Young Grower of the Year Award

- Anthony De Ieso (SA)
- Caitlin Radford (TAS)
- Christina Kelman (NSW)
- Jake Ryan (WA)
- Jake Shadbolt (VIC)
- Jason Dobra (WA)
- Kane Busch (VIC)
- Marlon Motlop (SA)
- Matthew Griggs (TAS)
- Mitchell East (WA)
- Renee Pye (SA)
- Samuel Spirli (VIC)
- Vanstone Produce (QLD)



Xavier Toohey on the cover of June/July 2016 Potatoes Australia.



Thomas King addressing delegates virtually at Hort Connections 2021.

Emerging opportunities in alternative proteins

Food Frontier CEO Thomas King addresses delegates

If the world's consumption of meat and animal products continued at its current rate, we would need two planets of resources to meet the projected demand. Australians eat more meat than the rest of the world, consuming almost three times the global average according to OECD data. The data tells us we cannot sustain relying solely on traditional methods of protein production. So how do we create sustainable, and healthier, protein sources into the future? Jil Hogan reports.

What are people eating?

Research in 2019 by Colmar Brunton found one in three Australians identified as a 'meat reducer' – someone eating less meat – or a 'flexitarian', someone who enjoys multiple meat meals each week but has a strong emphasis on plant-based eating as well.

Only around 10 per cent of respondents identified in the mostly meat-free demographics of vegetarian or vegan.

"That number has remained pretty stable for the last few years. It's actually the meat reducers and flexitarians that seem to have grown, which also makes sense in terms of the new plant-based products we've seen hit the market shelves," Thomas said.

"[There are] a large number of consumers who are seeking to reduce their meat consumption, but still want the convenience and familiarity of the sorts of meals they're used to eating or serving up for the kids."

Meat-free alternative products readily available in stores include traditional options such as tofu, tempeh or falafel, through to food mimics, where fruits, vegetables, or fungi are turned into a meat-like product.

"In the last five or so years, we've seen the emergence of what we call new generation, plant-based meat brands that are offering consumers an option that mimics more of the experience of cooking and eating the meat that they've come to know and love," Thomas said.

"The main consumer demographic that they're targeting are those meat reducers and flexitarians – people who

aren't reducing their meat consumption because they don't enjoy the taste. They're reducing their meat consumption for those health, environmental or other factors, but still want familiarity and convenience."

Most of these new generation plant-based meat brands use soy, wheat, or pea protein, while some brands are starting to explore protein from potato, rice, quinoa, chia, and lupins.

Emerging industry

Food Frontier's 2020 State of the Industry report by Deloitte Access Economics found Australia's industry for plant-based meats doubled in revenue and jobs over the last financial year, with Australians spending \$185 million within the category.

The number of plant-based meat products at major Australian supermarkets also doubled within this period, and even some of the biggest meat producers in the world are either releasing their own plant-based product lines or acquiring existing plant-based companies.

So how can Australian producers benefit from this emerging industry, which is projected to reach \$3 billion by 2030?

"By diversifying our protein offerings, the Australian agrifood sector can set itself up to be more competitive in a changing global food market and a changing protein landscape," Thomas said.

"Our region is home to more than half the world's population, which is driving the really bad protein and meat consumption trajectory. And that's demand for protein across the board – obviously meat and

traditional protein, but also alternative proteins."

"For example, the demand for plant-based meat products in China and Thailand is forecast to increase by 200 per cent over the next five years. And over the next five years across the entire Asia Pacific region, it's expected there'll be a 25 per cent increase, reaching US\$1.7 billion. Australia and New Zealand are in a prime position to capitalise on our strengths to lead in this market alongside the traditional protein markets."

Future opportunities

Thomas said there are big opportunities to leverage protein-rich crops such as fava beans, lentils, lupins, and chickpeas that are grown widely in Australia, but predominantly exported as a commodity. Other ingredients including fats like sunflower and canola oils, plus vegetables and plant-derived ingredients used for colour, texture and nutrition are also needed for production.

"Last financial year we saw a 70 per cent increase in the domestic production of plant-based meats, and many of those leading local companies have indicated strongly their desire to use more Australian ingredients in their products," he said.

"By value-adding and processing it locally by extracting protein needed for these sorts of growing food categories, we can actually generate additional value within the Australian agriculture sector."



SecondBite distributes rescued food to charities around Australia.



Robert Cerchiaro from Red Gem Growers and Packers. Photo courtesy of Miranda Costello Photography.

Donating potatoes to help end waste and hunger

SecondBite is one of the largest food rescue organisations in Australia, working with growers, manufacturers and retailers to rescue edible food from going to landfill. This food is then provided free of charge to charities that run food programs helping to feed hungry Aussies. Monica Logan from SecondBite reports.

One of the growers that SecondBite partners with is Red Gem Growers and Packers General Manager, Robert Cerchiaro, from Nar Nar Goon in Victoria. Red Gem has been growing and supplying potatoes to the retail and wholesale trade for more than 60 years. In the 1960s, Robert's father Guido started picking potatoes in Gembrook before growing his own.

Today, Red Gem grows 15 potato varieties on 1,000 acres of farmland in Victoria, New South Wales, South Australia and far-north Queensland. All Red Gem potatoes are sorted and packed in Nar Nar Goon.

Imperfect looking potatoes can have a high social value

Red Gem has been donating potatoes to SecondBite for several years. It's part of their approach to innovation, sustainability and reducing food waste.

At Red Gem, the potatoes go through several grading and inspection processes

including an x-ray machine that checks them for holes, cuts and bruises. Australia has one of the highest standards for how potatoes look, which means that potatoes that don't meet market aesthetic criteria are usually discarded. But Robert hates to see good food go to waste.

"There's so much work that goes into growing the potatoes, it's a shame to throw them out just because they aren't the perfect shape. Especially when they are still good to eat, and people are hungry," he says.

"These potatoes may not look as pretty, but they taste just as good."

A straightforward donation process

SecondBite minimises pick costs as much as possible to make it easier for growers to donate produce. At Red Gem, the potatoes that don't meet the market specifications are re-graded to sort out the good, edible potatoes from the waste. Robert arranges a pick-up easily with SecondBite by sending a text or email.

"It's great to see potatoes that don't meet the market specifications going to good use. These potatoes are only a peeler away from making a beautiful mash or roast to feed someone in need," Robert says.

There are also other benefits that Robert and Guido see in donating their potatoes.

"Space is premium, especially in the cool store. When SecondBite collects the potatoes, it frees up our space and saves us time," Robert explains.

Donated potatoes help to feed Aussies facing hardship

The potatoes donated by Red Gem get a wonderful second life. SecondBite provides rescued food free-of-charge to over 1,300 charities that run food programs helping to feed Aussies experiencing hardship. These charities turn the food into food relief packages, comforting meals and much more. During the 2020 financial year, the organisation redistributed free food equivalent to 45.4 million meals.

For charities partners like Our Big Kitchen in New South Wales, potatoes are a valued, versatile staple that are transformed into casseroles, curries and soups. The delicious, nutritious and culturally appropriate meals are then packed and provided to many other charities.

One in five Australians are affected by food insecurity and don't have access to the safe, nutritious food they need. The recent droughts, bushfires and COVID-19 pandemic have meant the need for more donated fresh produce is greater than before.

Find out more

For information about donating food to SecondBite, please visit secondbite.org or call 1800 263 283.



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Have you read the Potato Growers' Biosecurity Manual?

Plant Health Australia (PHA) in partnership with AUSVEG have developed the Potato Growers' Biosecurity Manual. This resource provides a foundation for you to identify the different pathways through which biosecurity risks can threaten your farm. Here, we provide a snapshot of farm practices and procedures that can be implemented to reduce these risks.

Biosecurity is a necessity

The potato industry is by far Australia's biggest (by volume) vegetable commodity grown, with over 1.4 million tonnes of potatoes grown for human consumption and processing in 2019-2020. Potatoes are also the most valuable crop grown in Australia as measured by value of production, with a value of around \$716 million in 2019-2020.

There are **TWO** major biosecurity risk groups to Australia's productive potato industry:

1. Exotic pests and diseases:

These are not in Australia yet (e.g. Colorado potato beetle, Zebra chip (CLso)).

2. Regionalised pests and diseases:

That are present in Australia but are restricted to regions and/or can be kept off your farm through biosecurity practices (e.g. Tomato-potato psyllid, serpentine leafminer, bacterial wilt).

Pests and diseases that are new to your farm can reduce farm efficiency, crop yield and quality. When implemented effectively, on-farm biosecurity practices can provide insurance against this reduction in farm productivity as they reduce the risks associated with transporting new pests and diseases onto your farm.

If new pests and diseases spread to your farm due to a lack of farm biosecurity, your market access and freedom to sell your produce may become limited.

For example, following the detection of cucumber green mottle mosaic virus (CGMMV) in QLD in December 2019, New Zealand suspended the pathway for all fresh cucurbits from QLD. Over a year later, QLD curcubit trade to NZ was allowed to resume, but under strict new trade conditions that specify growers

must be certified as a 'Pest Free Place of Production'. Part of this new PFP management system dictates that growers must implement a farm biosecurity plan.

A similar situation may occur for the potato industry if a new exotic pest or pathogen arrives in the future. It is best to have a plan in place, so that one doesn't need to be hastily developed in the event of a new incursion.

What transmission pathway holds the greatest risk for pest and disease introduction to your farm?

The movement of people, vehicles and equipment poses the biggest risk to farm biosecurity as this is the most common pathway for pests, diseases and weeds to travel on and around your property. By implementing biosecurity practices appropriate to your farm, you can greatly reduce the chances of introducing new pests and diseases to your property.

Start improving your biosecurity with the following achievable farm practices and procedures:

- Put up a farm biosecurity gate sign (All vegetable and potato levy payers are eligible to receive two free farm biosecurity signs. Contact AUSVEG to find out more, or print your own online – ausveg.com.au/biosecurity-agricultural/biosecurity/factsheets-templates-webinars/#gate_signs).
- Use a visitor register and inform all visitors of your farm biosecurity requirements.
- Control visitor access to production areas on your property (e.g. have one main farm access point and have a designated parking area for off-farm vehicles).
- Ensure equipment and machinery coming onto your property has been cleaned prior to entering production areas.





- Use dedicated on-farm vehicles for transport around the property, where possible – reduce the chances of transporting pest and diseases onto and around your property.
- Have footbaths (with disinfectant, see image) and a boot cleaning station. All visitors to farm production areas should clean their boots on arrival and departure.

Other possible transmission pathways

There are four other major transmission pathways for pests and diseases to enter your property, and each pathway has its own associated risks to farm efficiency. To reduce the impact of these risks on your property, there are farm procedures and practices that are highly recommended and easy to implement. Find out about some of these practices below:

1. Farm inputs

- Purchase planting material from reputable sources.
- Use certified fertiliser.

2. Production practices

- Monitor crops and fallow areas for pests and diseases.
- Record the results of monitoring activities.
- Learn about exotic pests – so you know them when you see them.
- Property cleanliness (e.g. fences).

3. Farm outputs

- Good farm hygiene (e.g. waste disposal, compost piles away from production areas).
- Post-harvest risks (e.g. Appropriate storage facilities to limit physiological aging and susceptibility to post-harvest disease).

4. Feral animals and weeds

- Wild and feral animal access.
- Volunteer plants and weeds.
- Property and land damage (e.g. maintain fence lines).

Now that you know the transmission pathways, what's next?

1. Assess your own farm biosecurity practices against the biosecurity checklist (available in the Potato Growers' Biosecurity Manual (pg. 26) or online at ausveg.com.au/app/uploads/2018/06/Potato-Growers-Biosecurity-Manual.pdf).
2. Seek advice from consultants and agronomists and look into preparing your own Farm Biosecurity Plan.



Key takeaways

- A biosecurity plan is essential to your business.
- Implementing on-farm biosecurity practices can reduce the instances of plant pests, diseases and weeds, both protecting your business and leading to increased production efficiency.
- A biosecurity plan can protect your market access (e.g. proof of freedom).
- The riskiest transmission pathway for plant pests and disease is the movement of people, vehicles and equipment.
- Under circumstances where an exotic plant pest enters Australia, a biosecurity plan can offer you insurance against the pest.
- The responsibility of plant pest and disease biosecurity is shared between government, industry and community.

Find out more

Any unusual plant pest should be reported immediately to the relevant state or territory agriculture agency through the Exotic Plant Pest Hotline (1800 084 881). For further information, please contact AUSVEG on 03 9882 0277 or email science@ausveg.com.au.

The Farm Biosecurity Program is funded by the Plant Health Levy.

Improving efficiency in potatoes grown on Australia's red soils



Potatoes have high nitrogen (N) and phosphorus (P) demand. High N inputs increase the risk of leaching and denitrification losses exacerbated by heavy rain events and poor irrigation scheduling. Aside from correct N fertiliser placement and timing, growers can retain soil N by holding it in the ammonium form. This can be done by treating ammonium and urea-based fertilisers with a nitrification inhibitor (NI). A potential benefit of 'ammonium nutrition' is improved P use efficiency on highly buffered red soils where potatoes receive high P rates.

NIs such as Entec® and eNpower® have been commercially available in Australia for over a decade and have gained widespread acceptance in crops like sugar in the wet tropics.

To better understand how NIs can be used by potato growers, Incitec Pivot Fertilisers commissioned independent field studies on highly productive red soils near Atherton (Queensland) and Devonport (Tasmania).

NIs work by suppressing bacteria that convert ammonium-N into nitrate-N. While plants use both forms of N, nitrate can be lost by leaching and denitrification. Ammonium-N attaches to clay and organic matter and is resistant to such losses. Ammonium is a more energy efficient N source for plants as nitrate-N must be converted back to ammonium-N in the plant for amino acid production.

This paper builds on a study conducted at Atherton in 2011 that showed statistically significant yield increases of >4 t/ha to Entec treated fertilisers in Sebago potatoes grown on a red soil. The latest study was conducted by The Tasmanian Institute of Agriculture at its Forthside Vegetable Research Facility in north-west Tasmania. The trial was set out with a randomised complete block designed with three replicates, and Russet Burbank potatoes were planted on 1 November 2019. The soil is classified as a red Ferrosol with pH (CaCl₂) 5.8, organic carbon 4.7%, Bray P 16.7 mg/kg and PBI averaging 1,100. The trial was split into an N rate trial +/- Entec / Enpower and a P rate trial +/- Enpower.

Figure 1. Gross potato yield (t/ha) in response to progressive reductions in nitrogen application rates.

Basal N (kg/ha)	Sidedress N (kg/ha)	No. of side dresses	Total N (kg/ha)	Yield (t/ha)			Average yield response to DMPP (t/ha)
				Standard practice	+ Entec	+ eNpower	
135	175	4	310	84.46	87.58	88.54	3.60
	73	3	208	77.99	86.10	81.96	6.04
	0	0	135	70.52	73.84	73.88	3.34
81	175	4	256	82.66	73.83	79.31	-6.09
	73	3	154	75.35	73.13	71.82	-2.88
	0	0	81	65.53	66.77	66.37	1.04
0	0	0	0	57.28	58.19	54.02	-1.18

Nitrogen trial

N treatments included basal applications of 0, 81 and 135 kgN/ha combined with side dress applications of 0, 73 (3 applications) and 195 (4 applications) kgN/ha. The P trial had a basal N application of 310 kg/ha based on district practice and P rates of 0, 80, 159 & 265 kg/ha.

Inhibitor treatments with the higher basal N rate (135 kg/ha) showed yield increases of 3.3-6 t/ha, whereas lower yields were reported with the lower basal N rate (81 kg/ha).

This suggests that the benefits from the inhibitor application are only realised above a minimum nitrogen input, whether they are applied at pre-plant or as side dressings. When basal application and side-dressing treatments were ignored for each inhibitor, the slopes of each regression estimated similar gross yield increases of 0.09 t/ha per unit of nitrogen where no inhibitor was applied; 0.08 t/ha where Entec was applied; and 0.1 t/ha where Enpower was applied (F1,19, p = <0.0001).

The phosphorus trial

The P trial had a basal N application of 310 kg/ha based on district practice and

P rates of 0, 80, 159 & 265 kg/ha. Responses in the P trial were somewhat confusing, with plant available P being higher at the two lower P rates (0 and 80 kg/ha), equal at 159 kgP/ha and lower at 265 where Enpower was applied.

Curiously, the gross yield data suggests no penalty from reducing P rate from 265 kgP/ha for conventional P fertiliser to 159 kgP/ha where Enpower was used. It is suggested that further work is needed with a greater range of P rates to better understand this relationship.

The bottom line

Where high basal rates of N and P are used to grow potatoes on red soils in high rainfall and/or irrigated environments, there is evidence to support the use of NIs such as Entec and Enpower. The use of such technology may facilitate a reduction in side dress number as well as N rate, labour and cost, with minimal production downside. The impact on P response is less clear; however, it is apparent that NIs improve available soil P on red soils at lower P rates – implying improved P efficiency.

Find out more

Please visit ipfhorticulture.com.au.

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African Black Beetle: A wolf in sheep's clothing

While the African Black Beetle (ABB) is not the most significant pest to the Australian potato industry, it can still cause extensive damage to potato crops. Gordon Jones, a fresh potato grower from Victoria, had issues with ABB around four years ago. From his experience, the pest is very damaging when population levels are high, with the largest effect being a reduction in saleable yield as affected potatoes are unmarketable. While he had issues with ABB for around two years, Gordon was able to successfully control the pest by using biofumigant crops like Indian mustard.

The Front Line discusses current pest biology and monitoring options for this seemingly innocuous potato tuber pest.

Where are they found?

African Black Beetles are native to Africa. They were first detected in Australia in Wyong, New South Wales in the 1920s and are now found across NSW, Queensland, Victoria, South Australia and Western Australia.

The pest has not yet been detected in the Northern Territory or Tasmania.

What are their hosts?

This pest has a large plant host range including potatoes, grapevines, olives, pineapple, eucalypts, sugarcane, maize, pasture, turf, and many vegetable crops.

How do I know if I have seen it?

Eggs are cream to white, oval and about 1.8 millimetres long. Larvae are cream to white with a brown head, black jaws and three pairs of legs on the thorax (see image). They are a soft bodied curl grub, up to 25 mm long.

Newly emerged adults are brown and soft. Within hours adults harden and darken to a jet-black scarab beetle with serrated front legs up to 15 mm long (see image).

Feeding damage

Both larvae and adults can cause damage to plants. Potato tubers are most at risk from the soil-dwelling larvae and their underground feeding habits.

Larvae can damage potato tubers when the crop and larvae maturity levels are aligned (see image). This damage is generally caused between December and January. Long term challenges of ABB infestations include delayed autumn sowing and significant economic losses as increased seed and soil insecticide treatments may be required, and affected potatoes are unmarketable, reducing saleable yield.

Adults preferentially feed on young plants, on above or below ground stems. This feeding habit can lead to permanent damage of plant growing points, resulting in plant death. Older plants are more resistant to adult beetle feeding damage but can become weakened.

How is the pest spread?

Spread of this pest can be attributed to their flight activity and hitchhiking capacity on plant and soil material. Flight activity of adults can be regularly observed from summer to autumn, with the emergence of new adult generations. These swarms are often associated with summer thunderstorms.

Beetle flights are sporadic and difficult to predict, hence monitoring is key to



African Black Beetle larvae at four different life cycle stages. Image courtesy of the South Australian Research and Development Institute.

reducing the potential damage of these beetles to potato crops. During flights, beetles are attracted to areas with heavy mulching.

Life cycle

Adults overwinter near the soil surface and in spring they feed, mate and lay eggs. A new generation of adults emerge late summer to autumn. Temperatures 15°C and above are optimal for the pest's development and survival.

Monitoring

In-crop infestations of ABB regularly occur when crops are planted into infested soil. Before planting, monitor paddocks for larvae and adults. Use spade sampling across a paddock and up to depths of 15 centimetres to determine the population load in an area.

Monitor adults from summer to autumn using light traps. By observing the beetle flight activity at night, the potential levels of pest crop invasion can be indicated. From autumn to early winter, monitor crops for the presence of adult beetles.

Economic thresholds

Densities of three to five adult beetles per square metre is considered a threat to susceptible crops and control is warranted

at these levels. Beetle densities of 10 or more per square metre can result in significant crop damage.

State movement controls or impacted markets

This is not a notifiable exotic pest and there are no movement controls

or impacted markets. However, implementation of best practice on-farm biosecurity can limit the spread of this pest onto your property.



Damage to a potato tuber by an African Black Beetle (*Heteronychus arator*) larva. Image courtesy of the Western Australian Department of Primary Industries and Regional Development.

Find out more R&D

Any unusual plant pest should be reported immediately to the relevant state or territory agriculture agency through the Exotic Plant Pest Hotline (1800 084 881). For further information, please contact AUSVEG on 03 9882 0277 or email science@ausveg.com.au.

The Farm Biosecurity Program is funded by the Plant Health Levy.



AUSVEG National Public Affairs
Manager Tyson Cattle.

AUSVEG Advocacy update

Over the next 12 months, AUSVEG will carry on with working with government and industry stakeholders to advocate on the issues affecting potato growers and their operations. In this column, AUSVEG National Public Affairs Manager Tyson Cattle provides a detailed overview of the four priorities for labour.

Four-point plan for workforce

The horticulture industry, via the National Farmers' Federation Horticulture Council, are united in its calls for government intervention in the sector.

The horticulture industry is dealing with significant workforce shortages in the sector with the decline in working holiday makers, which offers a significant opportunity to address a range of concerns within the industry.

As a united horticulture industry, we are calling on the Federal Government to act on these four priority areas as a matter of urgency.

4 Improved enforcement and compliance activities

To help level the playing field within the sector by stamping out non-compliance by properly resourcing the Fair Work Ombudsman and Australian Border Force to actively pursue mistreatment in the sector.

It is our strong belief that with these four key issues, which are not new, must be addressed by the Federal Government for the development of the Horticulture sector.

It is important to note, these four points will not address immediate issues, and industry still requires increased quarantine capacity and increased numbers of Seasonal workers into the country to deal with labour shortages.

These four points are immediate areas which the federal government can implement which will help the horticulture industry become a \$20 billion sector by 2030.

Long awaited good news on the Ag Visa

AUSVEG has welcomed the announcement that the Federal Government will make a new agriculture work visa available to all 10 countries across South-East Asia.

The new visa would provide a wider pool of workers available to Australian agriculture from the UK and the ten ASEAN countries and will help to meet ongoing seasonal workforce gaps that continue through the pandemic.

According to the announcement from Agriculture Minister David Littleproud, the new seasonal agricultural worker visa would mirror the existing Seasonal Worker

Programme and will add to the pool of workers available to work on Australian farms.

"The horticulture industry has been calling for a dedicated and productive workforce for many years and this morning's announcement is great news for the sector," AUSVEG National Manager – Public Affairs Tyson Cattle said.

"Growers require access to a productive, reliable and competent workforce and while Working Holiday Makers will always have a role to play within our industry, giving growers and workers a pathway to primarily work on-farm should be seen as a major step forward for the development of the horticulture sector."

"The ASEAN countries are some of our closest trading partners, so extending the Agriculture Visa to these countries makes economic sense and demonstrates our commitment in helping our regional neighbours."

"What we need now is timely action to get this visa class up and running, so that we can start bringing in workers as soon as possible when borders open up and international workers are able to enter the country."

"While we await more details around the visa arrangements for this visa class, we understand the new visa will build on the successful Seasonal Worker Programme and Pacific Labour Scheme visas that have proved invaluable to the agriculture sector over the past 12 months."

1 Agriculture Harvest Visa

To allow growers with harvest periods of less than nine months access to an efficient and productive workforce, and to remove the reliance on the working holiday maker program and the 88-days.

2 Horticulture Industry Labour Agreement Skill Level 5 additions

To allow growers with a continual harvest period to be able to access a productive and efficient workforce for up to four years.

3 National Labour Hire Licencing Scheme

A single national scheme that labour hire contractors must abide by and that is simple for growers to recognise must be a priority.

Find out more

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



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L-R: Andrew and Craig Mildren.



Continuing over six decades of family farming tradition

In this edition, Pat Salter sits down with Craig and Andrew Mildren from Reck Farms in Queensland’s Lockyer Valley region. Pat is the Operations Manager, and he speaks to the pair and their team about a range of topics, including Reck Farms’ latest innovations, overcoming challenges and ways to attract young people into the potato industry.

Over 60 years ago, Mulgowie locals Des and Val Reck established Reck Farms in Queensland’s Lockyer Valley region. The couple purchased their first farm in Lower Tenthill in 1962, and today Reck Farms spans across two council regions. There are 16 properties in total and the specialty crops are processing and fresh market potatoes, along with beetroot, broccoli and 10 other horticultural commodities.

Second-generation grower Craig Mildren and his wife Leanne are part-owners in Reck Farms, which remains a family-run business. Craig’s specialty is the potato aspects of the business where he is involved with the planting regime through to the final product. Craig enjoys growing the crop and has a passion for understanding the parameters of growing a perfect spud.

Andrew Mildren is Craig and Leanne’s eldest son, who is a leading hand and key member of staff when it comes to the potato season. Andrew takes charge in the field, the harvesting and the logistics of moving the crop from farm to shed to complete the process.

Andrew is a vital part of the potato

season at Reck Farms; he takes control of planting, fertiliser application, and the harvesting schedule. Andrew continues the trend of generational potato growing, and his five-year old son Cooper is showing an interest in the family farm.

An evolving business

Over the past six decades, Reck Farms has progressed on-farm with a view to remain a sustainable and viable operation. The team has invested in new technologies to assist with crop uniformity, replacing hand tools with the latest GPS tractors and computerised implements.

There have also been changes in business direction. Craig indicates that the processing market has taken precedence over the fresh market, due to market and price stability in this market – although the Reck group still dabbles in the fresh brushed market.

“The business still practices the art of hand-picking brush potatoes through to mechanical and washed market. Over the years, the variety changes have been beneficial to the industry, especially in the

composition of the potato for specific markets,” Craig says.

Reck Farms’ stronger focus on the processing market has seen adaption of varietal change, and it is supportive of varietal trials during the growing season.

Facing challenges

Like the wider horticulture industry, labour is a concern – particularly in the brushed potato market as it is a dying art for handpicked product. Craig believes that the handpicked product is still as God created it.

“It is perfect compared to the mechanical processes that can cause blemishes to the final product,” he says.

Other factors that are of concern to Craig and the team are water availability and quality. Craig specifically investigates all aspects in crop preparation before any soil is turned over, to ensure that the crop has the best opportunity to perform and produce a higher-than-average yield.

“Gone are the days of planting the crop and seeing what happens. This is now a precise art,” Craig adds.



L-R: Andrew and Cooper Mildren. Photography by Rowena Dione.

Reck Farms is also continually reviewing new technologies and weighing up the pros and cons of the technology, and the ability to adopt it on-farm. The operation has introduced a new precision piece of AG into the mix of technology that supports the distribution of fertiliser to the crop.

“Andrew and I are always looking at publications and reading articles on best practice – not only within Australia, but also globally. This provides us with the benefits of having the finger on the pulse when it comes to the potato industry,” Craig says.

Innovation focus

Craig, Andrew and the Reck Farms team recently reviewed and purchased a new harvester to assist in extracting potatoes from the field with a softer approach that causes less damage to the product.

The team is always looking at new methods and variations to refine these practices. It has invested in further modifications to the washing plant to streamline the process and reduce mechanical damage to the potato. It has invested the time and patience in reviewing its bulk processing processes to be more efficient in this marketplace, with the view of moving from the labour demanding domestic markets.

“We see improved yields, quality and dry matter from new varieties as being an important element for the future of the potato market in our business and that of Australia,” Craig says.

“We are strong advocates in supporting

more research, especially in specific variety of spuds for a push into domestic and international markets, while still holding the integrity and marketability of the potato.”

Generation next

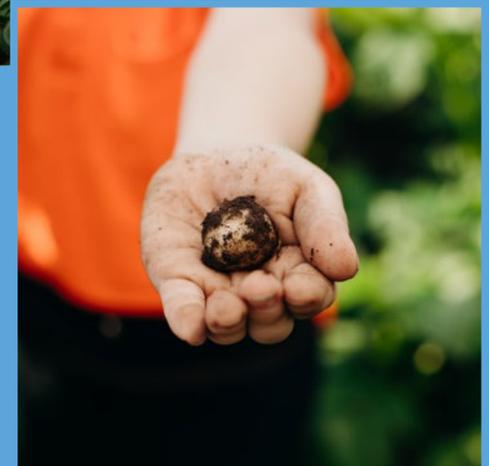
During a roundtable discussion, Reck Farms addressed the topic of engaging the younger generations to take up jobs within the potato industry.

The teams reflected over the past 25 years of working with potatoes and they have identified that this industry – with its own R&D – has demonstrated a strength in the adoption of technology which is supported by innovation.

It also identified that the industry should look at the way it networks with the next generation of young growers. It suggested using social media and virtual workspaces – combining these spaces or hubs will encourage collaboration with the next generation. With the age of technology and the diversification of networks within it, the team has also identified that podcasts are also probably another avenue to get the messages across to the next generation of grower, as they spend hours behind a steering wheel.

Looking ahead

Craig is very optimistic when it comes to the opportunities for potato industry growth in Australia. He can see the continual growth within the regions, thanks to the support of the industry and its researchers.



“The team members at Reck Farms are confident that they can talk to industry specialists to discuss current and future challenges within the industry. The team’s current focus is on three aspects: achieving higher yields, reducing costs in better paddock designs and the use of technology and stronger consideration of the chemical inputs on the crop,” Craig says.

Reck Farms also envisages a bright future for the Queensland potato industry. “With a small growing window and minimal overall domestic volume of potatoes grown, we see ourselves as being open to support our southern growers in the export marketplace,” Craig says.

“Queensland potato growers have the ability to provide support to the current exporters for fresh product to meet current commitments offshore.”



L-R: PPAA Chair Allan Smith and PPAA Vice Chair Josh Opas. Images courtesy of the Potato Processors Association of Australia.

Update from Potato Processors Association of Australia

Australians love their chips, and whether we are referring to French Fries or Crisps the good news is that most of these products are Australian grown and processed. While there is volume of French fry product being imported, the outlook for Australian production is encouraging in the medium-term, with processed volumes increasing and processors undertaking major capital development.

The main summer season production is wrapping up, with quality and yields the best for many seasons.

Australian-based processors are represented by the Potato Processors Association of Australia (PPAA). The focus of the group is to ensure that the processor levy is invested in R&D that will protect and enhance our domestic production.

One such area of investment is the recently launched *PotatoLink*, a Hort Innovation-funded potato industry communication and extension program. The processor levy is funding half of this initiative, which is being delivered by Applied Horticultural Research (AHR) and managed by Peter O'Brien, a potato industry expert with extensive national and international experience.

A robust communications and extension program is key to ensuring that any agricultural industry achieves returns from their R&D investment. *PotatoLink* has been developed on the back of an industry needs analysis that was funded by Hort Innovation and undertaken by RMCG in early 2019. As a result of this analysis, *PotatoLink* will be tailored for each region and delivered by local trusted delivery partners.

One of the key focuses of the program will be 'growing right'. As a high input crop, good planning and having the basics right goes a long way to mitigating production risks and maximising yield. This focus on growing right will be

supported by a Potato Handbook, which is being created by a SA group called Ag Communicators and funded via Hort Innovation.

For those growers who have the basics of production well in hand, *PotatoLink* will offer access to the latest in production innovation with linkage to the most recent in R&D developments and integration with Soil Wealth, VegNET and international initiatives.

The PPAA look forward to partnering in the *PotatoLink* initiative and hope to see you at an extension event in the not-too-distant future.

Next season planning

For those of you that are starting to plan for the next growing season, you might be interested to work through the following checklist to make sure all your bases are covered for the next season.

General

- Review the last season with your field officer and agronomist and decide what improvements you can make to increase yield, quality and reliability. What is working well for you and what could be improved? Are there different ways to approach things that might give you a better outcome?
- Create a new plan and work through it with your agronomist and company field officer. Advanced planning



for the next few seasons always pays dividends.

- It's a good idea to organise your contractors for the season. They like to know what work they have for the year.
- Negotiate hard with your suppliers for the best deal and conditions. If necessary, talk with your bank manager about an overdraft to cover the year's crop costs.
- Review staff requirements for health and safety training for potato operations.

Paddock

- Select the paddocks you intend to plant considering the paddock history, year of the last potato crop and what varieties have been grown in the paddock. Consider planning beyond the next season.
- Clean up the cropping area and remove self-sown potatoes.
- Soil fertility samples should be taken and a decision on fertiliser made. Make sure you order your fertiliser and gypsum.
- Talk to your agronomist about using PREDICTA Pt to test for soil borne pathogens.
- For those of you who are leasing land, make sure these deals are close to finalisation if not finalised. A formal agreement is a good idea so that everyone is clear as to who is responsible for what etc.

Seed

- Check your purchased seed – how is it holding, is the coolstore operating well?
- Plan for when you should be starting to warm seed to meet your planting times.
- Talk to your seed growers about your expectation for the following season's seed requirements in regard to size, tonnes, cultivars, planting schedule, quality, etc. Seed growers need to know what they should be striving to achieve.
- If your seed is contract cut, talk with the contractor about cut size and any treatment you might want applied.

Planting

- Make sure your planter is ready and the winter maintenance is done.
- Have a planting plan that is worked back from your contract tonnes and delivery schedule.
- Check in with your agronomist about the suitability of chemistries as furrow sprays.
- Do you have enough water? Are your irrigators ready to go?
- Finally, at the start of each paddock or new seed line spend some time checking your seed piece spacing, seed piece depth, fertiliser placement and fertiliser rate. It will be time well spent.

There's an old saying that you can't manage what you don't measure, so keeping accurate records from the start of the season is always advisable. These records are also a good basis for processor food safety records and can include soil test results, seed certification results, seed cutting results and so on.

Find out more

For more information or to provide your feedback to the Potato Processors Association of Australia, please contact Anne Ramsay on 0400 368 448 or at ppaa.eo@gmail.com.

AUSVEG's State Members

Introducing our state members

AUSVEG is the not-for-profit, peak industry body for Australian vegetable and potato growers. AUSVEG has State Member organisations across the country that appoint Grower Directors to the AUSVEG Board who provide state- and regional-level feedback and information to help inform national issues and agendas.



Want to get in touch?

New South Wales

NSW Farmers
P: 1300 794 000
W: nswfarmers.org.au

Northern Territory

NT Farmers
P: 08 8983 3233
W: ntfarmers.org.au

Queensland

Growcom
P: 07 3620 3844
W: growcom.com.au

South Australia

AUSVEG SA
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W: ausvegsa.com.au

Tasmania

Tasmanian Farmers and Graziers Association
P: 03 6332 1800
W: tfga.com.au

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Western Australia

vegetablesWA and WA Potatoes
(joint State Member)

vegetablesWA
P: 08 9486 7515
W: vegetableswa.com.au

WA Potatoes
P: 08 9481 0834
W: todatoes.com.au



Seed Potatoes Victoria (SPV) Committee

PO Box 123,
Toongabbie VIC 3856
Email: seed.potatoes.victoria@outlook.com
Website: spv.org.au

Seed Potatoes Victoria

The Victorian season has almost finished, with most crops harvested and grading taking place. Growing conditions were very good with favourable rainfall and high yields. Customer demand for many varieties has been high, meaning that crops could be sold and moved off-farm early.

Participation in the national tomato-potato psyllid (TPP) project has provided insights into how a national and state incursion would be managed. The Seed Potatoes Victoria (SPV) Committee would like to thank AUSVEG National TPP Coordinator Alan Nankivell for his work and commitment in running the project, as it recently concluded.

At the recent SPV meeting, AUSVEG Biosecurity Coordinator Callum Fletcher gave a very insightful presentation on pests and diseases growers need to look

out for. SPV and Callum will be working together on possible grower workshops and further information for pest identification and management in the field.

The Committee is keen to provide a range of new activities, events and services to members and industry. A brainstorm of ideas has been put together and SPV would like to hear from members about things they want to do, as well as industry partners to develop projects together.

The first SPV e-newsletter was distributed earlier in the year and well-received. New article topics or ideas are welcome and can be sent to admin@spv.org.au.

Thank you to all growers for their dedication and hard work over the season. Best wishes for the coming months and a restful break.



Tim Withers
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Executive Officer

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VGA trading as AUSVEG VIC

AUSVEG VIC

On Friday 7 May, AUSVEG VIC and E.E. Muir & Sons hosted the 2021 Victorian Awards for Excellence, which was well-attended by Victoria's vegetable and potato growers. Usually held annually, the awards were postponed in 2020 due to the COVID-19 pandemic.

Held in conjunction with a dinner, the awards night provides an opportunity to pause and recognise the tireless contributions that leading individuals make to ensure the Victorian vegetable industry remains strong and profitable into the future.

The event recognised Ric Muir, one of the key directors involved in the major expansion of E.E. Muir & Sons. AUSVEG VIC President Paul Gazzola paid tribute to Ric, who received the Service to Industry award from the Hon. Mary-Anne Thomas. This is a prestigious award that AUSVEG VIC – previously the Vegetable Growers Association of Victoria Inc. – present to industry members who have dedicated their entire lives to supporting Victoria's vegetable growers.

I am pleased to announce the Victorian Awards for Excellence winners:

- E.E. Muir & Sons Grower of the Year Award: Gazzola Farms – Colin, Andrew and Paul Gazzola.
- VISY Young Grower of the Year Award: Xavier Toohey.
- Boomaroo Nurseries Women in Horticulture Award: Jo Van Niekerk.
- Butler Market Gardens Environmental & Sustainability Award: Mark and Darren Todaro.
- VegNET Victoria R&D Adoption and Industry Impact Award: 2020 East Gippsland Vegetable Innovation Days – Bulmer Farms, Elders, Food & Fibre Gippsland and Stuart Grigg Ag-Hort Consulting.
- Elders Community Stewardship Award: Catherine Velisha.

A special congratulations to Xavier, Catherine, 2020 East Gippsland Vegetable Innovation Days and Mark and Darren Todaro for winning the national awards at Hort Connections. Having so many Victorians winning the national awards is a testament to the strength and quality of producers and industry members in the Victorian vegetable industry.



Jordan Brooke-Barnett
AUSVEG SA
Chief Executive Officer

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AUSVEG SA

AUSVEG SA hosted South Australia's leading growers, researchers and industry members at the 2021 AUSVEG SA and William Buck Vegetable Industry Awards for Excellence on Wednesday 19 May 2021, showcasing the exemplary contribution of leading growers companies and researchers to support South Australia's \$2 billion vegetable sector.

More than 280 growers and industry members gathered at the Arkaba Hotel to celebrate the important contributions of members of the state's vegetable and wider horticulture industry, and showcase their leadership, dedication and innovation.

The winners of the 2021 Vegetable Industry Awards for Excellence are as follows:

- Doug Nicol, BD and MC Nicol and Son – Grower of the Year (proudly sponsored by Peats Soil).
- Anthony De Ieso, Thorndon Park Produce – Young Grower of the Year (proudly sponsored by the South Australian Produce Market).

- Jon Ferguson, Viscon Australia – Industry Impact (proudly sponsored by William Buck).
- Maria Colangelo, Rainbow Fresh – Women in Horticulture (proudly sponsored by the Department of Primary Industries and Regions South Australia).
- Greg Baker, South Australia Research and Development Institute (SARDI) – Researcher of the Year (proudly sponsored by Rabobank).
- The South Australian Produce Market – Biosecurity Award (proudly sponsored by The Department of Primary Industries and Regions South Australia).

After a tough year of challenges brought on by COVID-19, the event was a fantastic opportunity for industry to come together and celebrate the people who make our industry great.

I congratulate every individual and business who was nominated and recognised at the awards and thank them for their continued dedication to our industry.



Daniel Kadwell
Crookwell Potato Association
Incorporated

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Crookwell Potato Association

The Crookwell Potato Association would like to extend their congratulations to the Bensley family. John, Sandra and Troy are third and fourth generation farmers marking over 100 years of the Bensley family growing potatoes in the Crookwell region. The Bensley family came to the Crookwell district in the 1870s and Mr Bensley said potatoes have been grown on the family property Stillbrook for over 100 years.

The Crookwell Potato Festival was conducted by the Potato Festival Committee and held over a period of three weeks from 3-10 April 2021. In a changed format, the festival was made up of a number of smaller events to ensure COVID-19 restrictions could be met. It was wonderful to see the festival go ahead, bringing a renewed focus on the potato. Miguel Palomino de la Gala, the Peruvian ambassador to Australia, and his wife Tersita, attended the festival, enjoying a luncheon featuring potato dishes, a farm

tour, and the activities of the Mad Spud Day Out.

Random audits by the Natural Resources Access Regulator (NRAR) have taken place on some properties with inspections of pumps and water use indicating potential future changes and heralding the introduction of water meters and telemetry systems. These changes will have the potential to impact the production of seed potatoes through changes to the harvest and use of water and the licencing of pumps.

The Crookwell region has been enjoying a good season. Good rainfalls during the growth period saw costs savings in fuel and labour through the reduction in the need to irrigate. Unlike 2020, the harvest season has been virtually free of rainfall, ensuring good access to paddocks and good digging conditions. The size and quality of potatoes have been excellent, with potatoes being true to form, with good size and firm, unblemished skins.



Potato Growers Association
of Western Australia Inc

Georgia Thomas
WA Potatoes
Senior Project Manager

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WA Potatoes

It has been a hectic period here at Horticulture House as we are undergoing renovations and therefore have had to pack the contents of the office into storage.

During this process we discovered many fascinating pieces from our history. Some of the most interesting date back to the war years and speak of a very different time. Some of these will be displayed once the office is completed.

Early season rainfall has seen a very promising start to the Autumn/Winter supply period. So far, we have had a warm, mild autumn that has crops looking very good. Unfortunately, these same rainfall events have caused some significant losses in seed crops in the Albany region. Individual growers have been affected to varying degrees, so growers need to confirm their orders and make any necessary adjustments. This loss is a significant setback to seed growers who are still recovering from the TPP incursion that devastated interstate sales.

Our marketing program is continuing

at pace with the Autumn/Winter magazine in circulation, radio advertising and digital promotions. We are also getting great feedback from schools participating in our Seed for Schools program with potato crops well underway.



Nathan Richardson
Tasmanian Farmers and Graziers
Association
Vegetable Council Chair

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Tasmanian Farmers and Graziers Association

In March 2021, the TFGA welcomed new CEO John McKew to the team. John joins the TFGA with an extensive agricultural background, particularly in the dairy, beef and fodder industries. With the state election being called shortly after John's arrival, he has had a busy few months of introductions, the finalisation of the TFGA Strategic Plan and getting out and about to meet members.

As Tasmania's 2020/2021 potato harvest draws to a close, growers have experienced one of the best seasons in many years with exceptionally favourable weather conditions. With a wet and warm Spring followed by higher than average rainfall in the Summer months, some drier weather throughout Autumn has allowed for ideal harvesting conditions with minimal disruptions. Quality has been very good and demand from processors has been strong. There have been some occurrences of hollow heart and pink rot in crops but no major disease issues, a vast

improvement on the 2019/2020 season where very wet conditions contributed to considerable crop losses.

Growers are optimistic of continued high demand for produce and are readily awaiting the coming negotiations with both major processors in the state, so that suitable land and water requirements can be locked in.

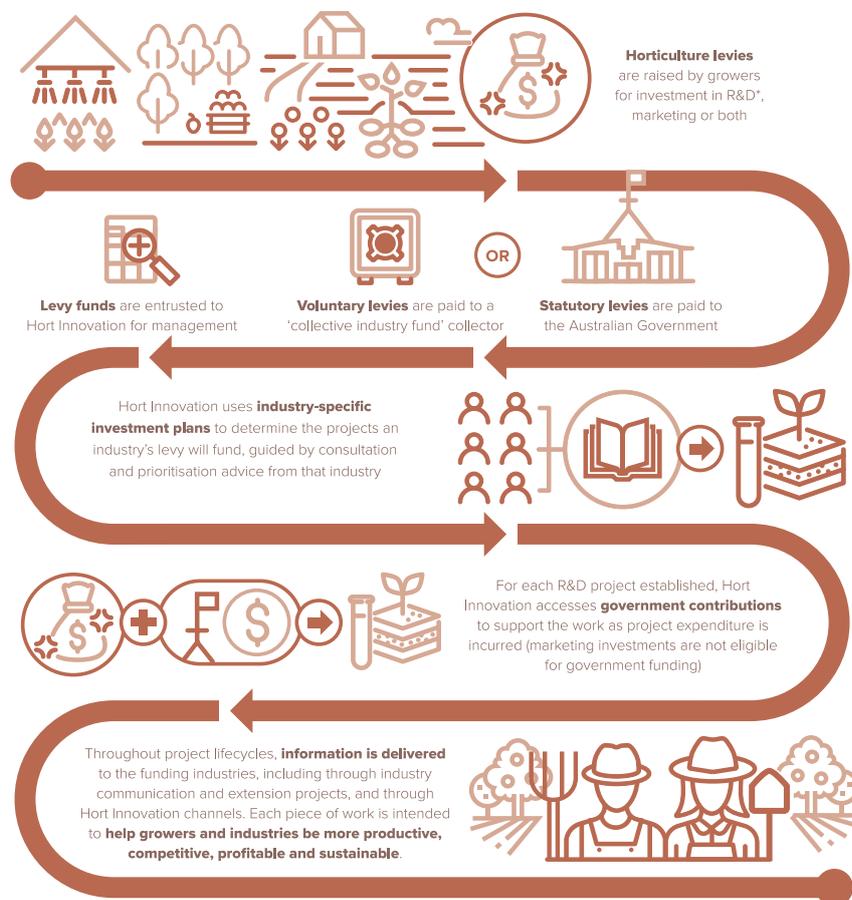
HORT INNOVATION

Hort Innovation is the grower-owned, not-for-profit research and development corporation for Australia's horticulture sector. We work closely with industry to invest fresh potato and processing potato R&D levies, together with Australian government contributions, into key initiatives for potato growers.

In 2021, Hort Innovation is refreshing the Strategic Investment Plans that guide the potato industry's strategic levy investment over the next five years. This has involved consultation with the potato industry on current opportunities and challenges and discussion on how levy investment can contribute to building a sustainable and profitable industry.

For more information on this process, visit www.horticulture.com.au/growers/sip-refresh.

The diagram below shows how Hort Innovation makes strategic levy investments on behalf of the fresh potato and processing potato industries. Both R&D levies are invested each year, guided by Strategic Investment Plans and advice from the industry strategic investment advisory panels.



Who to get in touch with at Hort Innovation...



Mark Spees

Industry Strategic Partner

As an Industry Strategic Partner, I work with the potato industry to identify and prioritise investments that will contribute to the profitability and sustainability of the sector.

This involves consultation with a wide range of potato growers and other industry stakeholders to understand their challenges and opportunities.

Please get in touch with me if you'd like to discuss investment opportunities or any other queries at:

Mark.spees@horticulture.com.au

0439 574 173



Jason Hingston

Regional Extension Manager

My role as Regional Extension Manager involves working to facilitate new, and strengthen existing, linkages between growers, researchers and others in the horticulture supply chain.

Part of my role involves working with the *Australian potato industry communication and extension project* (PT20000) which aims to support the potato industry in adopting improved practices on-farm and keeping up to date with the latest information.

I'm always happy to chat, so if you have any questions please get in touch at:

Jason.hingston@horticulture.com.au

0429 793 496

MASTERCLASS 2021

Soil Biology in vegetable and potato production 18-19 August 2021



Soil biology drives so many of the things happening in your soil. If you want your soil biology to work better to produce consistent yielding vegetable crops with less inputs, then this is the masterclass for you.

In recent years there has been a rapid growth in new knowledge, products, and soil testing for soil biology. The soil biology masterclass will hear from leading growers, and scientists on the new developments and their application and then work together to apply this to vegetable growing soils.

With state borders constantly changing and farm labour in short supply we have kept with the online format, which will involve two afternoon sessions 18–19 August.

The masterclass is targeted at vegetable growers and agronomists. To register your interest, please head to the Soil Wealth website in the Events section: www.soilwealth.com.au/events

There are spaces for 30 applicants only.

Contact **Kim Saville** at kim.saville@ahr.com.au

BASIC POTATO PATHOLOGY

an online course through the University of Pretoria

This course, conducted online over two days, has been highly recommended by previous participants. The next course is offered on 20th September at a cost of R3,500 – approximately \$325 at current exchange rates. Content includes:

- An introduction to plant pathology
- Types of pathogens
- The disease triangle
- Principles of epidemiology
- Integrated pest and disease management
- Potato diseases:
 - Fungal
 - Bacterial
 - Viral

The course teaches participants to identify a range of potato diseases, understand the climatic conditions under which they develop, and recommend control or management options.

The course is led by Professor Jacque van der Waals, a research pathologist specialised in the epidemiology, diagnosis and control of soil and seed-borne diseases of potatoes. Her current research projects are focused on powdery scab (*Spongospora subterranea*), black scurf and stem canker (*Rhizoctonia solani*) and blackleg and soft rot (*Pectobacterium* and *Dickeya* spp.).

She has a particular interest in the effects of crop rotations on soil health, and how growers can use this to improve management of diseases

in the field. She is highly cited in her field and internationally respected. Professor van der Waals is also a talented triathlete who represented South Africa at the 2019 World Triathlon Championships!



Contact Dolly Mabuza: dolly.mabuza@enterprises.up.ac.za for more information or register online at <https://www.enterprises.up.ac.za/basic-potato-pathology-11>

EYES ON THE WORLD

Recent advances in potato research and innovation

Potassium: A vital macronutrient in potato production—a review

Torabian, S., Farhangi-Abri, S., Qin, R., Noulas, C., Sathuvalli, V., Charlton, B., Loka, D.A. 2021. *Agronomy*, 11, 543. <https://doi.org/10.3390/agronomy11030543>.

Figure 1. Potassium deficient potato plant
(Photo by Y. LeHingrat, INRA)



WHAT'S IT ABOUT?

Potatoes need a lot of potassium: approximately 46kg of potassium is removed from the soil for every 10 tonnes of potatoes grown. Potassium (K) is the most abundant nutrient in the plant tissues after nitrogen, and is essential for photosynthesis, leaf expansion, root elongation and many other processes within the plant.

Optimising K results in larger tubers with reduced sugar concentrations, making them more suitable for processing. Availability of K is most important during the early stages of crop growth, as maximum uptake occurs within 30-40 days of

emergence. Uptake falls close to zero as tubers mature.

However, most soil K is unavailable, with 96-99% locked up in rocks and minerals. Available K exists as three distinct and interchangeable fractions: water soluble K, dissolved in water held in the soil (0.1-0.2%); exchangeable K held on clay particles and organic matter (1-2%); and slowly available K trapped between layers of clay particles.

This extensive study models data from 48 peer-reviewed studies to determine the potassium source, rates and application method that achieve ideal tuber yields.

WHAT WAS CONCLUDED?

Several soil factors affect levels of exchangeable K as well as tuber yield. These include soil pH, texture and organic matter. Key conclusions are:

- The highest yield of tubers occurs at an exchangeable soil K+ concentration of 200mg/kg, regardless of soil texture, pH or organic content
- Optimum application rates for increasing tuber yield were approximately 200kg/ha for potassium sulfate (K_2SO_4) and potassium chloride (KCl) but 100 kg/ha for potassium nitrate (KNO_3)
- If soils contain adequate K there is little response to additional K fertiliser
- Pre-planting K applications are enough to meet crop needs; there is usually no need to re-apply
- Soil exchangeable K should be considered in deciding a fertilisation plan
- Combining soil tests with plant tissue analysis provides the best basis for K fertilisation

in the 10-month period, but when combined with softer prices, the value of exports remained largely unchanged at \$27.3m.

Exports to Singapore stayed stable, with declines to Hong Kong (-5%), UAE (-10%), Taiwan (-16%), Qatar (-40%) and Indonesia (-87%).

"Indonesia's recent slump in demand reverses many gains made under the Indonesia-Australia Comprehensive Partnership agreement" commented Wayne, "However, this reflects delays in formalising this year's quota, rather than fundamental changes in trading. Despite the sharp drop to just 375t compared with 2,900t in the previous corresponding period, this does not indicate a deterioration in trade".

While South Australia remains the leading exporter by state, New South Wales has increased its share by 30 percent, representing 33 percent of exports for the 10-month period. South Australia, which accounts for more than half of national exports, declined by 11 percent in volume.

"Despite such large swings, this variability reflects changes based on seasonal variation, rather than ongoing inroads into SA's market dominance" says Prowse.

PROCESSED POTATO IMPORTS

Big changes also appear to have occurred in the frozen import sector but, as with the fresh market, explanations are largely benign. Frozen potato imports dropped 10 percent in the 10 months to the end of April, totaling 84kt, and were valued at \$118m, more than four times the value of potato exports.

The Netherlands made big inroads into the sector, increasing its share by 67 per cent to 28kt. New Zealand supplied 38 per cent less at 23.8kt, while imports from the US slumped 57 percent to 7kt from 16.8kt in the previous corresponding period. These changes reflect a different mix of frozen potato suppliers to Australia, which tends to switch between The Netherlands and New Zealand.

They also reflect the impact of COVID-19, which reduced demand for french fries by food service due to extended lockdowns and restricted trading.

According to Wayne, "with demand for frozen products remaining strong, importers are likely to maintain a mix of suppliers, not relying too heavily on any one country for extra supply

needed to supplement locally grown and processed potatoes".

"They don't want all their chips in one basket," Prowse said.

Interestingly, Belgium ousted the US as the third biggest supplier of frozen potatoes to Australia in the 10-month period, and is sending 7 percent more product into the country, although some of this product may also be sourced from The Netherlands. Along with The Netherlands and New Zealand, these three countries account for more than 80 percent of all imported frozen potatoes.

China, India and Argentina increased their supply of product, off small bases, with India now supplying more than China, and increasing its supply of product by more than 1,200 percent. According to Prowse, the strong growth from China of 159 percent reflects an increase in products targetted at restaurants and specialist retailers, rather than local supermarkets.

This report was prepared by Fresh Intelligence Consulting. Information was sourced from the Australian Bureau of Statistics via HIS Global Trade Atlas.

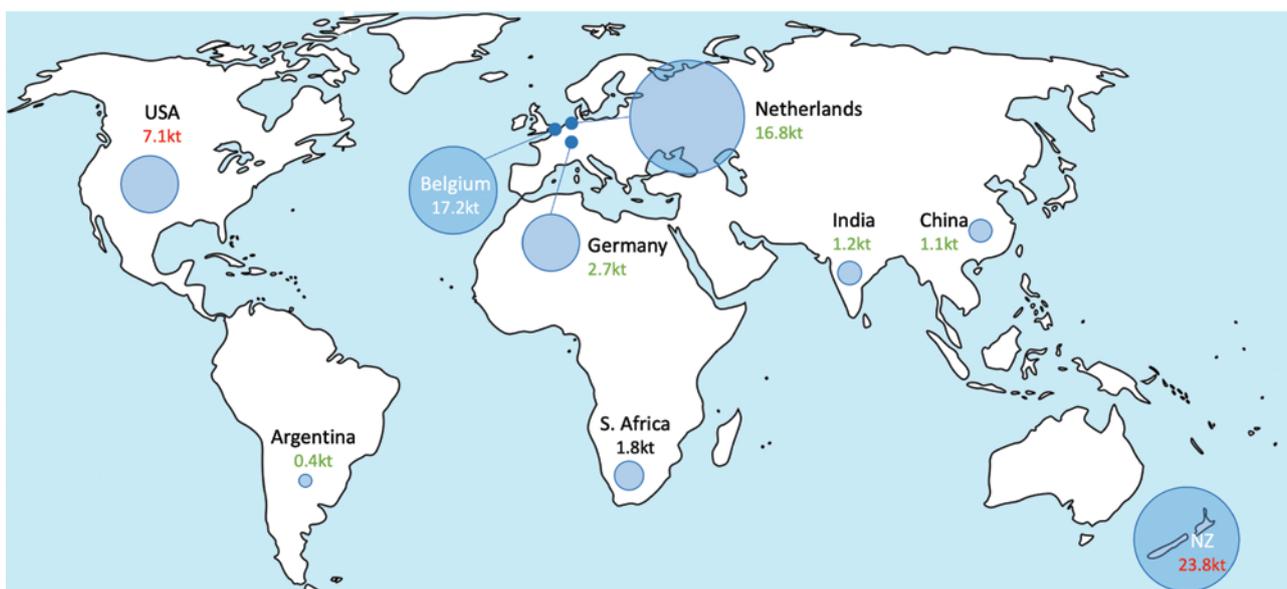


Figure 2. Imports of frozen potato products (all categories). The circle indicates the relative importance of each source. Total kilotonnes are marked in red if imports have declined, and green if increased.

TRADING PATTERNS CHANGE, BUT EXPORTS STAY STABLE

Wayne Prowse and Linda Drake report

AUSTRALIAN POTATO EXPORTS

South Korea's appetite for imported Australian fresh potatoes surged leading up to April this year, jumping more than a third compared with the previous corresponding period. Over 10 months, they imported 16.5kt, an increase of 36 percent from 12kt previously, accounting for 42 percent of all potatoes exported from Australia in this period.

The increase in exports to South Korea indicates a swap to Australian

suppliers from sources in the US, with total demand unchanged.

Overall export volumes and value of Australian potatoes remained reasonably stable, with increases in the Korean market offset by declines in exports to other countries.

According to Wayne Prowse, from Fresh Intelligence Consulting, "the change in the mix of suppliers, as seen in South Korea, also applies to other countries that increased imports of Australian product. The strong demand for exports in the first quarter

of the year was influenced by seasonal harvesting, and demand for fresh in-season potatoes for processing from offshore customers."

Exports to the Philippines and Malaysia grew by 12 percent and 15 percent respectively. Along with South Korea, these three customers accounted for more than 70 percent of Australia's fresh potato exports. Both the Philippines and South Korea have preferential tariffs for potato imports used for processing only.

Overall, potato exports rose 3 percent

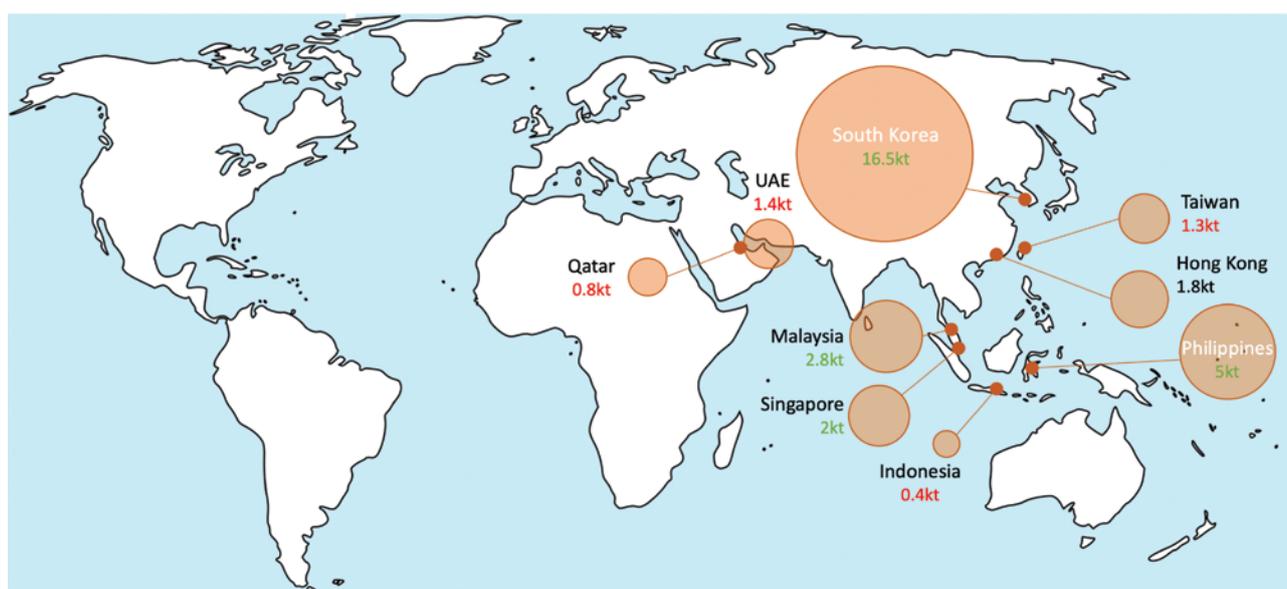


Figure 1. Exports of Australian potatoes (all categories). The circle indicates the relative size of each market. Total kilotonnes are marked in red if exports have declined, and green if increased.

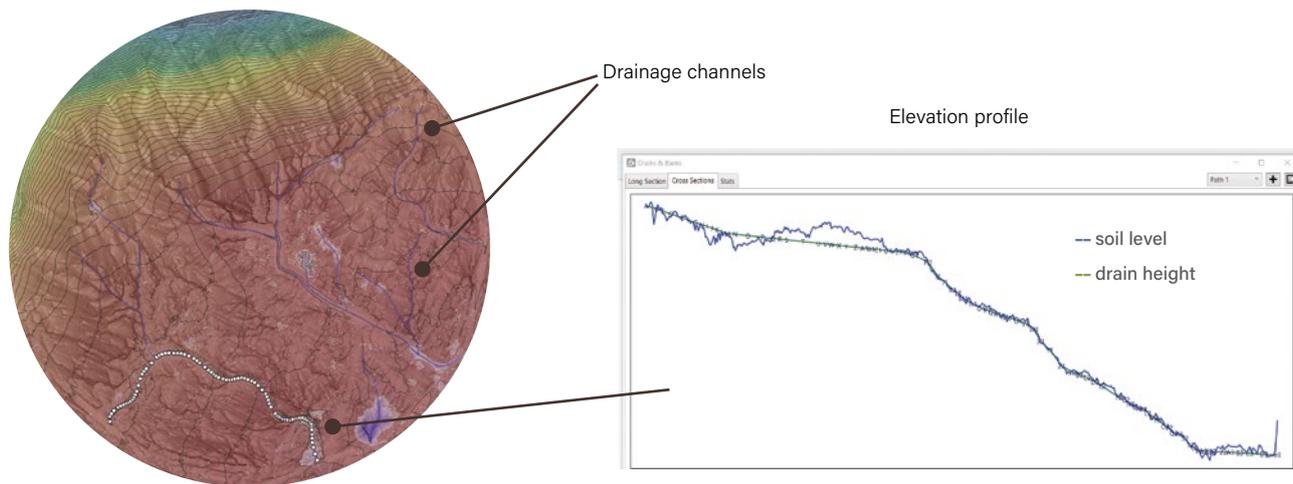


Figure 5. Elevation map of area under a pivot with drains marked in blue, white dots indicate the drain with elevation profile shown at right (Diagrams supplied by Ag Logic Tasmania)

According to Reuben, “drains can be several metres across but are often only 20cm deep. We map the drains onto GPS systems used for planting equipment, keeping them clear.”

“The drains are shaped with a flat base and smooth sides. This makes it easy to drive through the crop as normal, without getting 'bounced about' too much. Several systems are available, but we use the John Deere T3RRA Cutta software combined with a Wolverine ditcher. The great thing about the Wolverine is that the soil is thrown well away, preventing development of any lip” (Figure 6).

GET AHEAD OF PESTS AND DISEASE

Crop rotation is key to managing potato diseases. According to Kelvin, “checking images of row closure, can not only indicate a problem with irrigation and drainage, but also a pest or disease. Nematodes, for example, tend to populate in 'hotspots' Planting a green manure or cover crop in between potatoes is an effective way to help to break disease cycles, as well as enriching the soil. Such crop rotations need to be planned over winter so that, come spring, equipment and seed are ready to go.”

Many growers will already be familiar with the PREDICTA Pt service developed by SARDI. The test determines the amount of pathogen DNA present in the soil. This can be used to categorise the area as low, medium or high risk for diseases such as Black dot, Verticillium wilt and Powdery scab, as well as root knot nematodes.

Where clear links between pathogen population and yield loss have not been established, results are reported as a population density. This information can be used to rank different paddocks for a range of fungal diseases and nematodes, as well as confirm disease diagnosis.

Conducting a test over winter can help growers decide which paddocks should be used for potatoes, and which planted to other crops. However, it is also important to understand that the cultivar planted, weather, nutrition, drainage and other conditions will strongly affect whether disease occurs.

All PREDICTA Pt tests must be conducted through an accredited agronomist. A contact list is available on the SARDI website under the header '[Accessing PREDICTA Pt testing service!](#)'



Figure 6. Wolverine ditcher operated by Greenvale Ag Drainage (Photo by R. Wells, Ag Logic)

One of the most important jobs for winter is to review the previous season's performance. This is essential to identify and correct issues with soils, drainage and irrigation management (K. Montagu).

IRRIGATION IMPLEMENTED

According to Frank, "Plants don't eat, they drink. But although plants drink, they don't swim"

Accurate irrigation management is essential to maximise crop yield, so checking the performance of centre pivots is particularly important. The IrriSAT system (see p20) can be used to check how even the crop growth was at row closure. This will clearly show which areas grew well, and which were slower to develop.

Irrigation breakdown or malfunction, especially during peak irrigation periods, will cost yield. Sprinklers can be blocked by fine trash that moves through the filter. Moreover, sprinkler head packages are designed to operate at set distances and pressures, which may have changed.

Maintenance programmes should check whether:

- Operating pressure has changed.
- Sprinklers spin, wobble or rotate as designed.
- Static plate sprinklers have been damaged by wind or farm machinery.
- Regulators, nozzles and sprinkler plates are clean and unblocked.

- Sprinkler heads are positioned correctly (not put back in the wrong places after cleaning).

VARIABLE RATE IRRIGATION

Variable soil types present a common challenge for irrigation under centre pivots. Adjusting irrigation to sandy soils can result in overwatering of heavier soil types, increasing disease. Conversely, plants will struggle in well drained areas if irrigation is wound back for heavy soils. As with plant nutrition, applying irrigation according to **average** needs can reduce yield over the entire crop.

Variable rate irrigation (VRI) is a well-established technology that adjusts the amount of irrigation provided according to the water holding capacity of soil in different zones. Systems range in precision from simply adjusting pivot speed, to control of spans / zones, to individual control of sprinkler heads.

Irrigation researcher Dr Kelvin Montagu sees both benefits and costs in VRI systems. "Getting irrigation right is critical to maximise yield, especially during tuber formation and bulking. It is especially important under pivots, as once soils dry out it is very difficult

to 'catch up,' returning the soil profile to optimum moisture levels."

"However, precision systems don't come cheap, especially if retrofitting an existing pivot. Depending on system requirements, a VRI system may be \$60,000 to \$100,000. They are most likely to give a good return on investment if the paddock includes two or more very different soil types or has quite varied topography."

Electromagnetic (EM) soil mapping is the first step in developing a variable rate irrigation system. In-field soil moisture probes can then be used to develop irrigation prescription maps. The pivot is programmed to provide more or less water to each segment, or turn off completely in low lying areas (Figure 4).

DRAINING THE SWAMP

Poor drainage can have a major impact on crop yield, particularly as wet areas provide ideal conditions for disease. There are estimates that 80% of crop yield loss may be due to too much, or too little, water.

Reuben Wells, from Ag Logic, has many years' experience improving drainage in the rich, loamy soils of Northern Tasmania. His work combines highly accurate elevation maps (including the mounds used to plant potatoes) with water flow modelling software. The software uses this information to develop a dynamic drainage map for under the pivot.

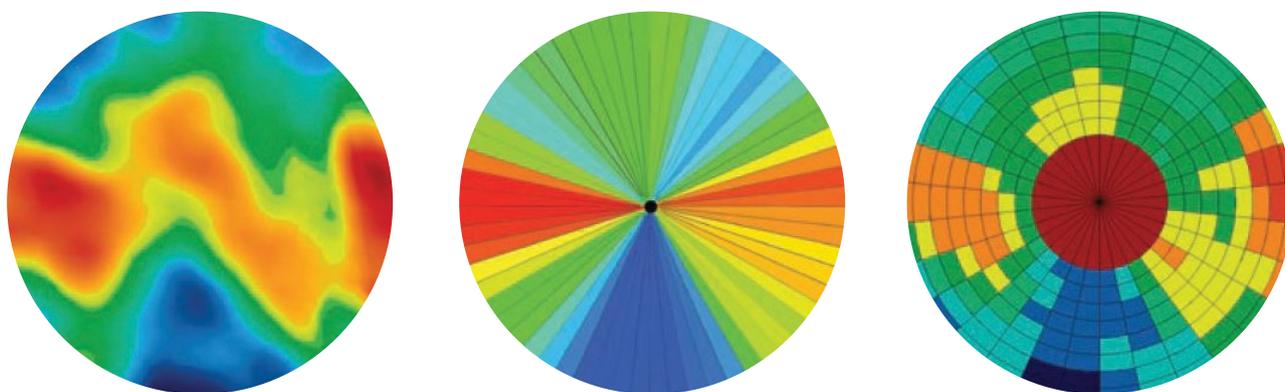


Figure 4. The data graph (left) based on EM soil mapping and soil moisture probe data; sector graph (centre), which adjusts the pivot speed to provide more or less irrigation, concentrating on the outer portions of the cropping area; zone graph (right) which further divides the area into concentric rings, allowing precise irrigation of each area (Images from Reinke www.reinke.com).

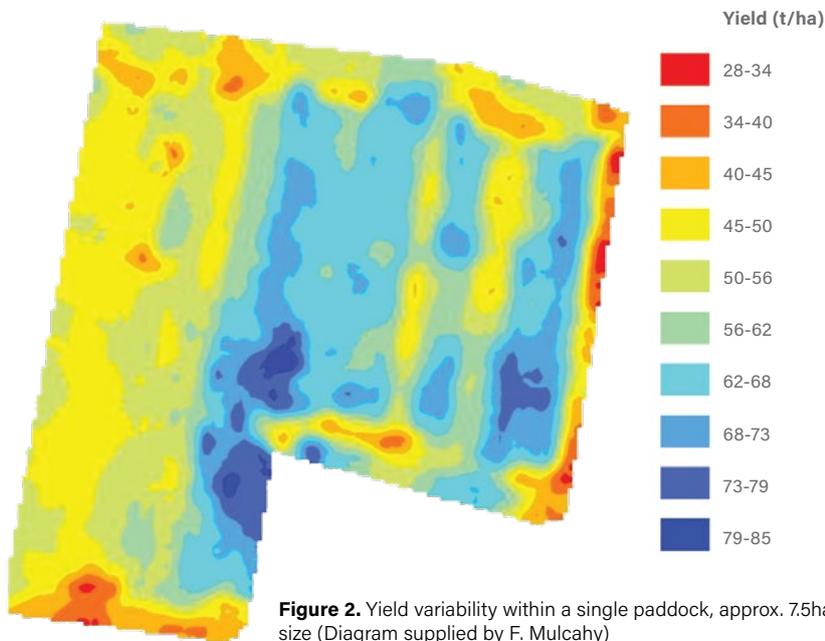


Figure 2. Yield variability within a single paddock, approx. 7.5ha size (Diagram supplied by F. Mulcahy)

A comprehensive soil test is the best way to ensure optimal levels of nutrients such as nitrogen, phosphorus and calcium, as well as a suitable balance of trace elements. Zinc, boron and many other micronutrients are essential for proper growth. However too much of one nutrient can block uptake of another. For example, high nitrogen can reduce calcium uptake, while if the ratio of calcium to magnesium falls below 2 then it is harder for plants to take up potassium.

A full soil fertility test costs a little more than a basic analysis but is likely to include micronutrients, organic matter and nitrates – useful information to have.

If a full soil analysis has been conducted recently and nothing has changed, it may be possible to simply test levels of soluble nutrients; nitrate, borate, molybdate and sulphate. Alternatively, total soil nitrogen is the most critical nutrient affecting growth and can be tested just before planting.

If more than one soil type is present within a paddock, or under a pivot, then these areas should be tested – and treated – separately. Blending two or more soil types together will result in something which is not the same as either. The result

could be a paddock where some areas have too much nitrogen – increasing susceptibility to disease and reducing specific gravity – whereas others have too little nitrogen – reducing yield. This is also important if expensive inputs are needed, such as compost; separating soil types allows inputs to be targeted where they are most needed.

It is also best to test the top layer separately to the underlying soil. Soil type can vary considerably with depth, as shown in Figure 3. Calcium, phosphorus and pH can all change considerably with soil depth. Depending on the stratification of soils within the cropping area, take samples from 0 to 15cm and 15 to 30cm.

According to Marc Hinderager, PotatoLink’s NSW regional representative, getting the best possible understanding of your soil is the first step towards a profitable crop.

Marc’s tips for soil testing:

- Take soil samples well in advance of planting: Samples can take a week in transit and another week for analysis. Time is also needed to interpret the results, purchase nutrients and apply.
- Samples should be taken before any fertilisers are applied, when the area is reasonably dry and

preferably before tillage.

- The more soil cores are sampled, the better the results will be: For a 30-hectare plot, combine at least 20-30 cores, using a zig-zag sampling pattern.
- Mix each composite sample thoroughly, breaking up clods and cores and removing plant matter.
- Best practice is to dry samples before submitting for analysis; this can take a day or two, but ensures results are not affected by transport delays.
- Sift 500g of the well-mixed sample into a ziplock bag.
- Label the bag precisely with sample location and depth and fill in the Analysis Request form with matching details.
- Send to the lab by Express post

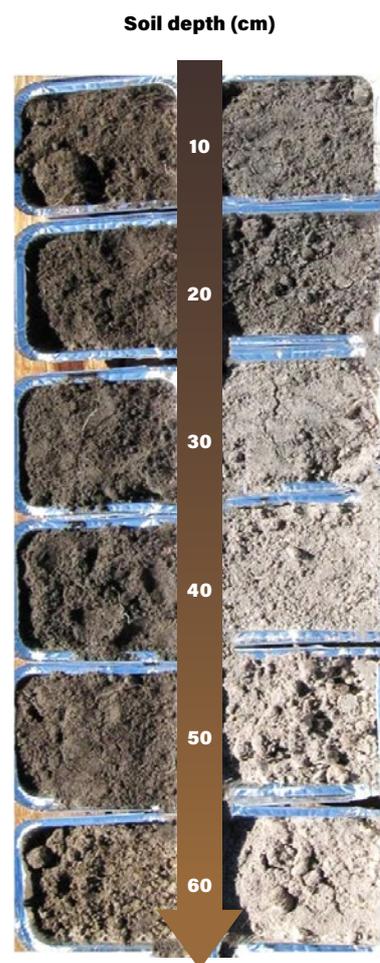


Figure 3. Two Tasmanian soils sampled from within a single paddock, showing colour and textural changes by depth (Photo by F. Mulcahy)

WINTER WARMERS - JOBS FOR JULY

Dr Jenny Ekman reports

In many regions, winter is when growers get to take a well-earned breather. Next season's crop is still a glint in a seed potato's eye, any crops still in are growing slowly and irrigation needs are minimised.

Winter also provides an opportunity for planning next seasons crop, checking equipment and, perhaps most importantly, reviewing the last seasons performance. Which means, there's still plenty to do around the farm.

According to PotatoLink's Tasmanian regional representative Frank Mulcahy, your jobs list should include:

- How's the weather looking – have you checked the long-term outlook?
- How variable is your soil? Have you conducted a soil test?
- Review the performance of your pivots – check operation, maybe cost a variable rate upgrade.
- Think about drainage – need improvement?
- Manage pests and disease – think about your cover crops or

rotations and do a PredictaPT test, especially if you suspect a disease hot spot.

- Seed – how is it looking in store? Is it on track to break dormancy at planting? OR is seed supply assured - contact and check.
- COVID is delaying some machinery parts – get your gear ready **now**.

Optimising conditions for storing seed is discussed on p14-19 and delays on machinery supplies are beyond our control. So, let's run through some of Frank's other jobs...

WATCHING THE WEATHER

According to the Bureau of Meteorology, the next three months are likely to be wetter than average, but also warmer.

Even though it's felt pretty cold over the last month or two, with early snowfalls delighting skiers, the models indicate a return to warmer conditions, particularly coming into September. Minimum temperatures are virtually certain to

be higher than median values across Australia. Maximum temperatures are also predicted to be higher than median values in many potato growing regions, particularly Tasmania, Victoria, WA and parts of NSW.

Rainfall is predicted to be similar to, or slightly higher than, median values in many potato growing regions.

What this indicates is possible increased pressure from water-loving diseases such as blackleg (*Dickeya dianthicola* and *Pectobacterium* spp.), *Rhizoctonia* and *Phytophthora*. It will also make it easier for overwintering pests to survive.

DIRT DOCTORING

In Frank's experience, yield can vary more than 350% across a single paddock. This means that while some areas are making money, others are costing it. Soil type and nutrition are key factors that can increase or decrease crop yield. This is clearly shown by the yield map in Figure 2; yield in this 7.5ha block ranged from only 30 to 80t/ha, a combination of soil type, drainage and incorrect fertilisation.

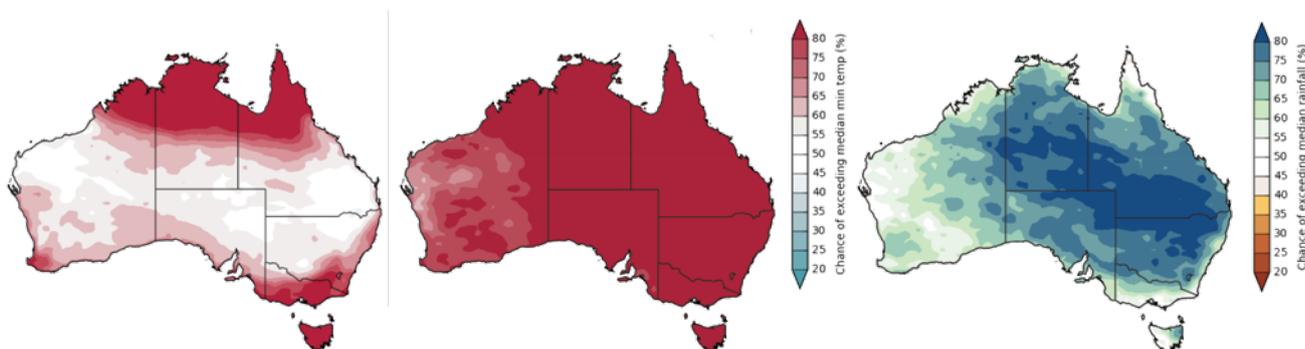


Figure 1. The chance of exceeding median daily maximum temperature (left); median daily minimum temperature (centre) and median rainfall (right) in the three months of July to September 2021 (Charts issued by the Bureau of Meteorology 17th June 2021).

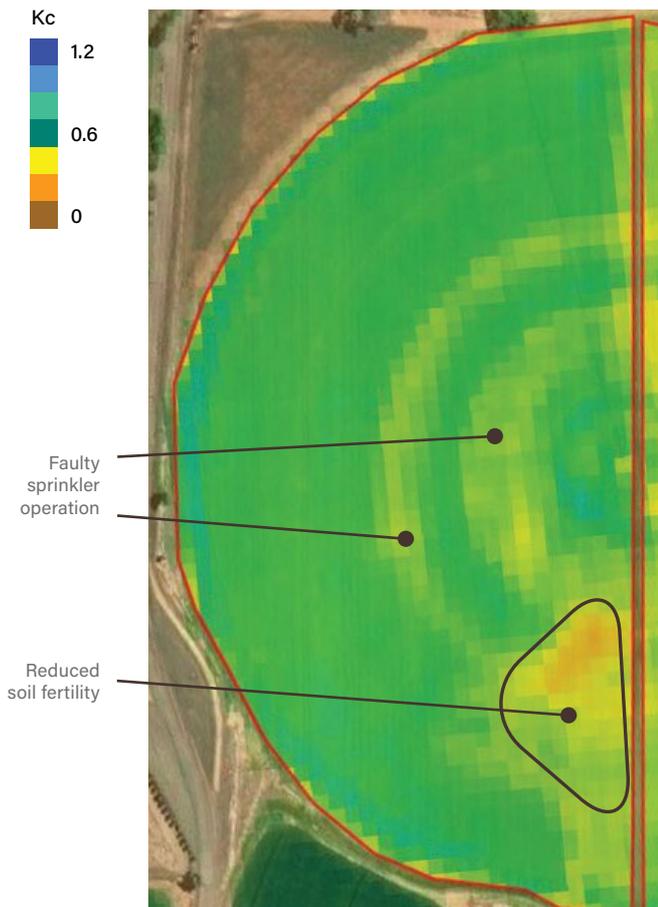


Figure 3. IrriSAT crop factor (Kc) image 49 days after planting, crop coverage is indicated ranging from full (blue) to nil (brown) as shown in the legend. Growth of the potato crop in a good (top) and reduced growth (bottom) areas



Figure 4. A faulty sprinkler head; for this crop, which was grown during hot weather, reduced irrigation limited growth and caused an estimated 10% drop in yield.

Benefits

Using IrriSAT to estimate crop water requirement could have enabled the grower to more closely track irrigation with crop growth. This could potentially have prevented the estimated 10% drop in overall yield that occurred due to moisture stress during tuber bulking.

It was estimated that the issue with the two faulty sprinkler heads reduced the yield in a 3.1 ha zone by 17 tonnes, costing the grower between \$4,800 – \$6,800. Early identification of this issue using IrriSAT could have prevented this occurring.

The soil problem that was detected under the same pivot reduced yield

by an estimated 27% over a 1 ha area. This reduced yield by 10 tonnes, potentially costing \$2,800 – \$4,000. However, the costs of remediating this area using compost, cover cropping etc need to be considered against the benefits.

Conclusion

There are clear benefits to using this system, if only to monitor crop performance visually over time. New,

high resolution images are acquired every seven days, making it easy to check for crop health issues. Linking IrriSAT information to irrigation requires more technical skills. However, there are major benefits for both quality and yield from accurate application of irrigation.

A useful resource on using IrriSAT can be found at www.soilwealth.com.au/resources/articles-and-publications/reference-guide-for-irrisat/

or structure, topography (high & low areas), a pest or disease outbreak or poor operation of individual sprinkler heads. However, identifying these areas from ground level can be difficult, especially if growers are running several concurrent pivots.

SHOW ME THE DATA

Meeting crop water requirements

The IrriSAT system was used to monitor a NSW potato crop. Two soil moisture probes (WildEye™ TDR system) were installed within the crop, with sensors at 20cm and 50cm depth. The half pivot was planted with cv. Snowden in October 2019. While the grower had access to information from IrriSAT, this was not used to schedule irrigation.

The data from IrriSAT demonstrates how water use by the crop changed during maturation (Figure 1). In this case, the grower generally matched demand well with irrigation. However, a delay in re-starting irrigation after

9mm rain meant the crop entered the rapidly growing vegetative stage with a significant soil moisture deficit.

To overcome this deficit, the grower ran the pivot hard to refill the soil and keep up with crop development. This got the crop back on track in time for the tuber bulking stage.

A second, larger fall of rain some weeks later (mid-January) filled the soil to capacity. In this case, irrigation was not restarted for 7 days. Again, the moisture deficit increased, as strong demand by the crop combined with high daily temperatures (over 35°C) reduced soil moisture below 10% VWC.

When the crop was harvested after 105 days, tuber quality was excellent with no disease evident. However, yield was approximately 10% lower than expected. It is likely this was due to water stress during the late tuber bulking period, which likely caused premature senescence in marginal areas of the pivot.

Using the IrriSAT data would have helped the grower anticipate the water requirements of the crop, thereby avoiding moisture stress and increasing yield.

Varietal differences

In another study, potato varieties cv. 'Snowden' and 'Crop 77' were grown under a single pivot. Crop 77 is an indeterminate variety with a large, deep root system. As a result, it can access water from a deeper soil profile than the more determinate, shallow rooted Snowden. As evident from Figure 2, canopy coverage increased estimated crop water use in Crop 77 relative to Snowden.

As the IrriSAT system measures canopy coverage, it could estimate the differing irrigation needs of each variety. While in this case it was not possible to adjust irrigation precisely to the needs of each variety, it may be useful to consider this when planting future crops.

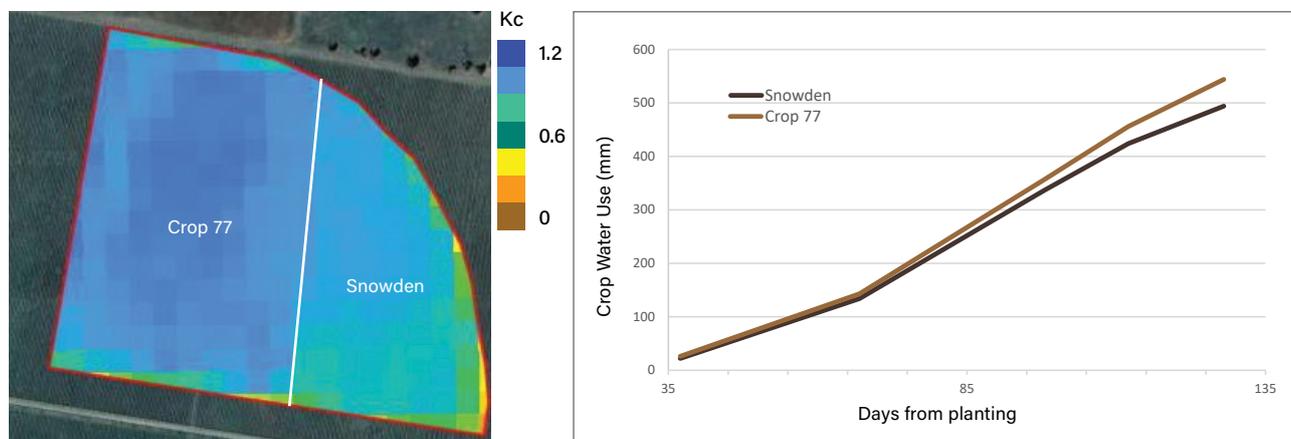


Figure 2. The IrriSAT image of a pivot planted with two different potato varieties clearly shows the difference in canopy coverage (left); this information can be used to estimate the irrigation requirement of each variety (right).

Identifying growth problems

The IrriSAT images can also show if a crop is not growing evenly. In the example shown in Figure 3, two rings of reduced growth were evident under spans two and three of the pivot. There was also an area of poor plant development at the bottom of the paddock. Investigation revealed that two of the sprinkler heads were not

operating correctly, something not obvious at ground level.

The area of poor growth appeared affected by laser levelling activities which had removed the topsoil. While improving soil fertility is more difficult than fixing a sprinkler head, identifying the issue is the first step to remediation.

COSTS VS BENEFITS

Costs

IrriSAT information is FREE online. However it does require technical ability in terms of using the app tools and understanding the information provided. Also, it is best combined with soil moisture probes, which are likely to cost around \$700 to \$1,000 for a single location.

TECHNOLOGY

TEST DRIVE IrriSAT

WHAT IS IT?

IrriSAT is a satellite-based irrigation scheduling app. It combines satellite images with weather data to estimate crop water use.

HOW DOES IT WORK?

Weekly satellite images of the crop are used to monitor growth changes through the Normalised Difference Vegetation Index (NDVI). A crop factor (Kc) is calculated and combined with weather data (temperature, wind, humidity) to estimate crop water use each day.

Crop water requirements can be predicted for up to seven days in advance, based on weather forecasts, helping to manage irrigation.

The IrriSAT system can also keep track of rainfall (automatically or via manual inputs from your rain gauge) and irrigation.

Information from IrriSAT can be combined with soil moisture probes installed within the crop. This can ground-truth estimates of crop requirements against actual soil moisture levels. The result is a soil water budget that can be used to answer the key questions about irrigation: when to irrigate and how much to apply.

WHAT PROBLEM DOES IT SOLVE?

Meeting crop water requirements

Potato crop water requirements change rapidly as the crop develops. For example, a potato crop may require less than 2mm/day during

sprouting and emergence but increase to 8mm/day after only 2-3 weeks of vegetative growth.

Once the rows close over, weather becomes a major driver in daily water use. Hot, dry winds and high daily temperatures can increase daily water use to over 11mm/day, which is likely to push the limits of most irrigation systems.

Estimating crop water use is made more difficult by short periods of

low temperatures and rain. Delaying irrigation for too long after rainfall is a common trap for many growers; this can result in soils drying down too low and irrigation needing to play catchup. This can be a problem under both pivots and laterals.

Identifying growth problems

Another issue for irrigators is that the area under a pivot can vary considerably in crop growth. This may be due to changes in soil type

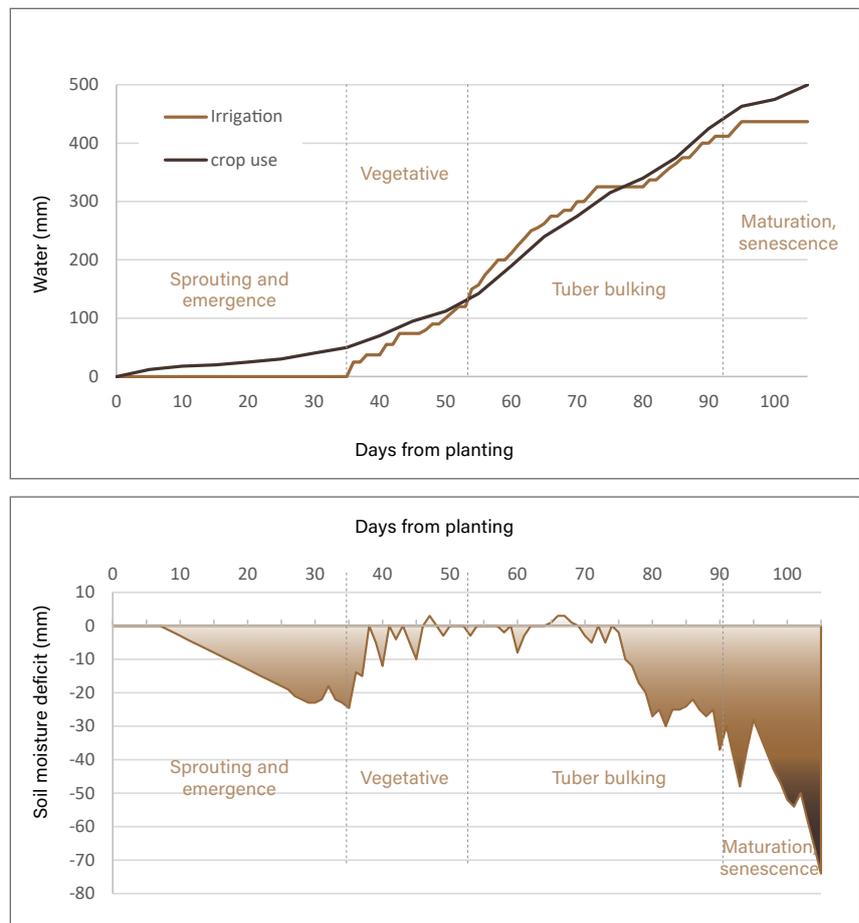


Figure 1. Irrigation applied combined with IrriSAT estimate of moisture requirements of the crop (top) and moisture deficit in the soil (bottom)

In this study, markers of physiological age were poor predictors of stem number and yield. It was concluded that factors other than physiological age of seed at planting can have major impacts on crop performance. Seed crop planting date, days to haulm kill, harvest timing and environmental

conditions at planting all had major effects on quality and yield of the resulting crop.

The author concludes that *"the interaction between seed physiological state and planting environment appears to have an overriding effect on plant growth"*.

In other words, there are no easy answers! However, physiological age is clearly important. Growers purchasing seed therefore need to consider the conditions under which the seed was produced, as well as how the seed is stored on farm, to optimise crop performance.

Take home message

- Stress during seed production, poor storage conditions and extended storage times increase physiological age
- P-age and sprout type can be used to estimate physiological age of potato seed
- Physiological age of seed affects potato crop success
- Understanding physiological age can maximise crop potential
- Investing in modern cool room technology – with optimised management of temperature, humidity, CO₂ levels and ventilation – will ensure growers get the best out of their seed potatoes.



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Temperature management is most important as the tubers reach the end of their natural dormancy. For example, trials in the Netherlands found that seed initially stored at 4°C but warmed to 16°C for several weeks before planting had lower yield

than seed that had the same period of warm temperatures before cold storage.

The best results were achieved when tubers were kept continually at 4°C throughout the storage period.

It was noted, however, that the effects of storage temperature varied considerably between varieties; 'Desiree' was relatively insensitive to ageing, whereas 'Astarte' and to a lesser extent 'Jaer' aged rapidly (Struik et al., 2006).

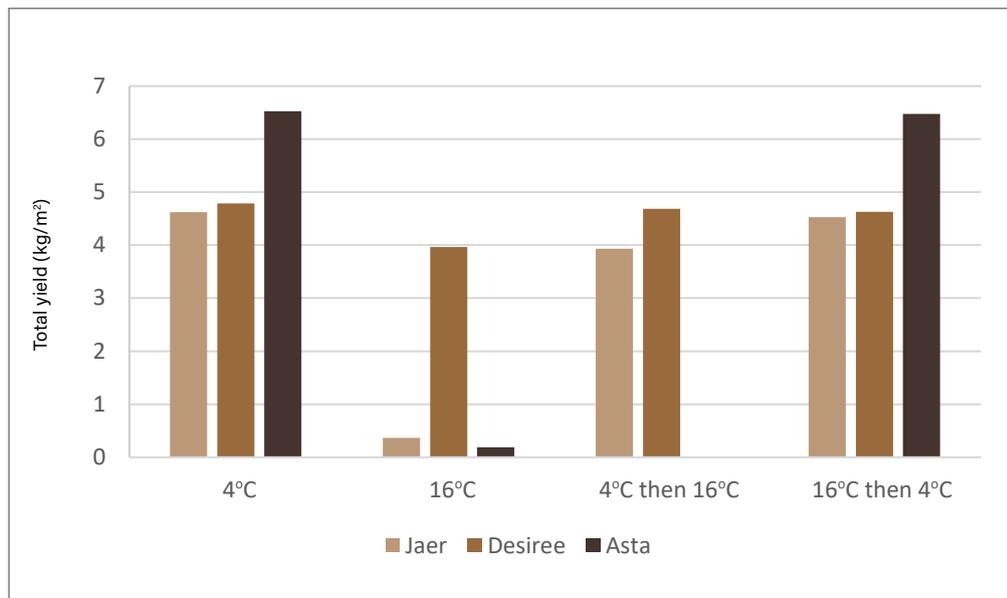


Figure 4. The effect of temperature regime during 32 weeks storage of seed on total yield of three potato varieties. Seed were stored at 4°C, 16°C, 16 weeks at 4°C then 16°C or 16 weeks at 16°C then 4°C. From Struik et al., 2006.

BUT SEEDS NEED TO BREATHE ...

Physiological age reflects the biochemical changes taking place within the tuber. These are fuelled by respiration; just as we do, potatoes stay alive by burning their energy reserves, a process that consumes oxygen (O₂) and produces carbon dioxide (CO₂).

Respiration is therefore a good indicator of the rate at which changes are occurring. Factors that increase respiration, such as bruising, disease, cutting seed, exposure to ethylene and high temperatures, all increase ageing during storage and handling.

While open vents and doors are clearly undesirable from the point of view of temperature management, it is important that seed potatoes can breathe. If O₂ falls too low, or CO₂ rises to high levels, then potatoes are unable to respire normally. This initially



Figure 5. The disorder black heart is caused by lack of ventilation during storage (Cunnington and Pringle, 2012)

causes stress, and in severe cases leads to the condition black heart (Figure 5).

It has been reported that as little as 4,000 ppm CO₂ (0.4%) can reduce seed vigour after planting. Moreover, levels of 2,000 ppm CO₂ can affect human health, with 5,000 ppm the workplace limit.

Rooms need to be ventilated to maintain O₂ and CO₂ close to ambient levels, especially before entering.

Simply opening the door to vent is risky for human health and bad for temperature management.

One option is to install an energy recovery ventilator (ERV). These use exhaust air from inside the room to pre-cool fresh air coming from the outside. Monitoring gas concentrations inside the room, using an ERV and ventilating at night when air is cool can reduce energy use while improving the room environment.

SO, HOW MUCH OF A PROBLEM IS SEED AGE?

The project PT0212 'Optimising production and storage conditions for seed potato physiological quality' aimed to identify how all industry sectors could maximise seed productivity. The research initially tested ways of measuring seed physiological age and linking this to yield and quality.

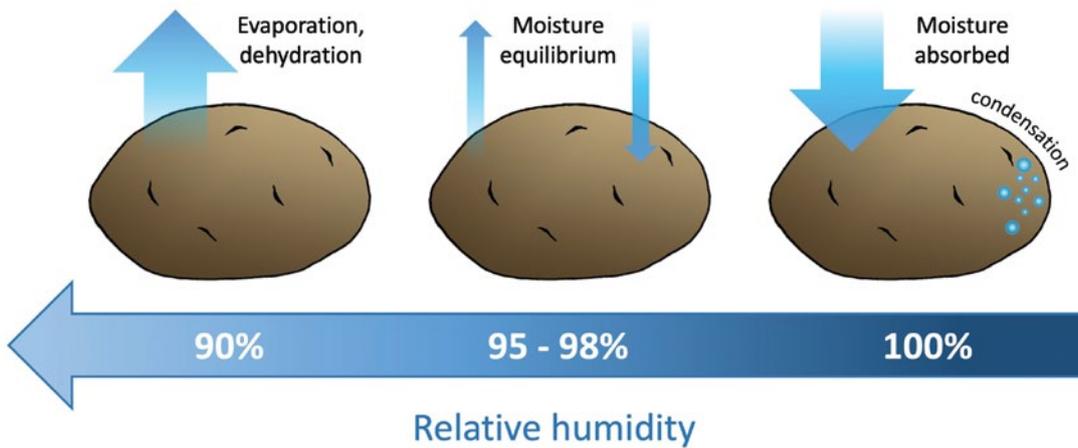


Figure 2. Moisture exchange between the tuber skin and surrounding air. Derived from Cunnington and Pringle, 2012..

condensation forming on the tubers; the fungi and bacteria that cause breakdown in storage flourish under wet conditions.

Temperature fluctuations inevitably occur as the room cycles between its maximum (when the system turns on) and minimum (when the system turns off) temperature setpoints. Setting these maximum and minimum points close together avoids the fluctuations that reduce average RH in the room and/or cause condensation.

For example, if the room is at 4.5°C with 90% RH, but air temperature falls to 3°C when the cooling system turns on, then moisture will condense out

of the air onto the stored potatoes. Conversely, if the room air is then allowed to warm up to 5.5°C, then humidity will drop to 81%. Adjusting the setpoints to, for example, 3.5°C (minimum) to 4.5°C (maximum) minimises this effect.

Humidity will also be higher and temperature more uniform if spatial variation is minimised; leaky insulation, frequent door opening and high ventilation rates all increase temperature variability within the room.

Humidity can be increased by plumbing in an automatic humidifier, but it is important to ensure it creates

an extremely fine droplet size and is properly serviced and calibrated, to prevent condensation.

TAKE THE HEAT AWAY

Even at 4°C, seed potatoes are still respiring and producing heat. This heat needs to be removed by the cold room air; if the air can't penetrate the bins, hot spots can develop. For this reason, it is essential to consider how air will circulate around the room and between the bins. Leaving gaps between pallets and around the walls, considering how the air will flow from front to rear and keeping a path clear for the return air will all help get the best out of the cold room.

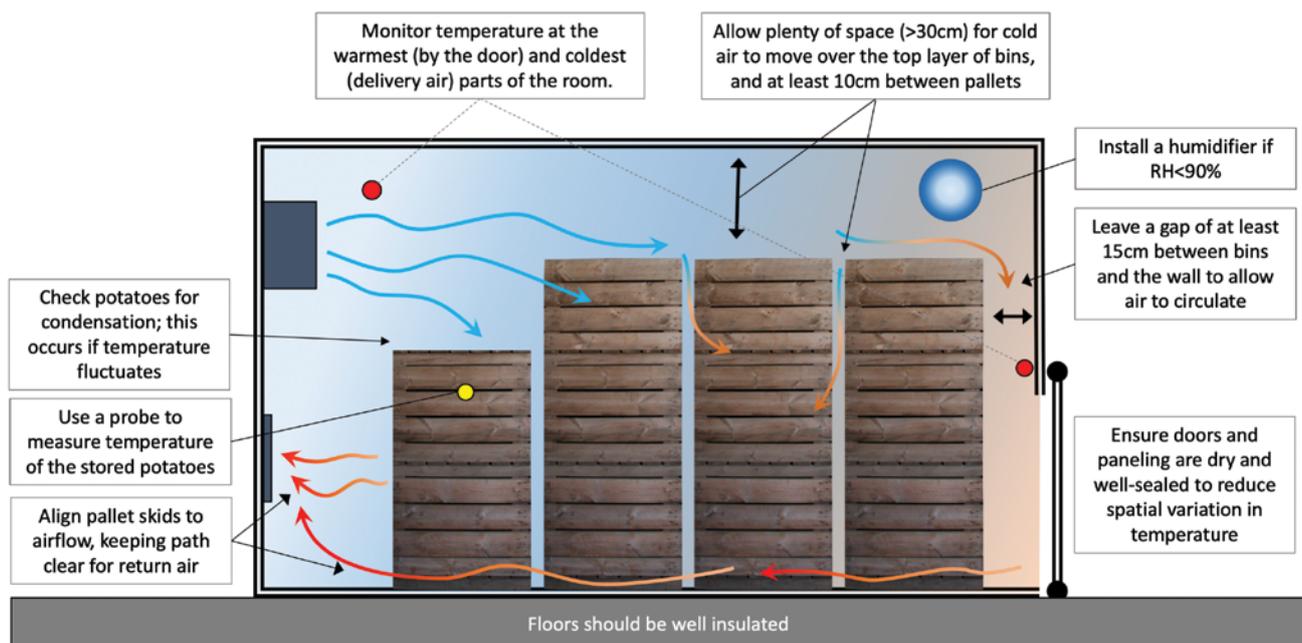


Figure 3. Cold storage rooms should be set up to allow the cold air to circulate around the bins; leave gaps between pallet stacks and the walls, align pallet skids to airflow; leave clear space for the return air intake. Temperature should be monitored and condensation checked in different parts of the room as well as in the stored seed.

Size	Weight	Spacing		Tonne/ha	
		Young	Middle	Young	Middle
Small	50-60g	23cm	30cm	3.0	2.3
Medium	80-90g	30cm	38cm	3.4	2.8
Large	100-120g	30cm	45cm	4.5	3.0

Table 2. Planting rates for different sizes and ages of seed (Bohl et al., 1995)

Cooling down

Temperature is the most important factor affecting physiological ageing of seed potatoes. However, before

seed potatoes can be cold stored it is essential that they are 'cured', allowing suberisation (healing) of wounds caused during harvest. This greatly reduces the risk of rots during

storage. While suberisation occurs more quickly in physiologically young crops, it mainly relies on temperature (Table 3).

Tuber temperature (°C)	Initial suberisation (days)	Wound healing complete (days)
<5	7 - 14	21 - 42
10	4	7 - 14
20	1 - 2	3 - 6

Table 3. Wound healing in relation to temperature (Cunnington and Pringle, 2012)

Once cured, it is typically recommended that seed potatoes are cooled gradually. However, unless a forced air (positive pressure ventilation) system is used, dropping the temperature directly to 4°C will result in condensation and may 'shock' the tubers.

The seed potato best practice guide (Blaesing, 2004) recommends dropping the delivery air temperature by approximately 2°C per week until the room and seed both reach 4°C. This reduces the likelihood of condensation forming, especially if air circulation is poor.

Unfortunately, such slow cooling rates increase physiological age and can potentially allow rots and dehydration to occur. A moderately fast cooling rate, where the temperature is dropped by up to 2°C daily, may provide a compromise, so long as there is good air circulation between the bins.

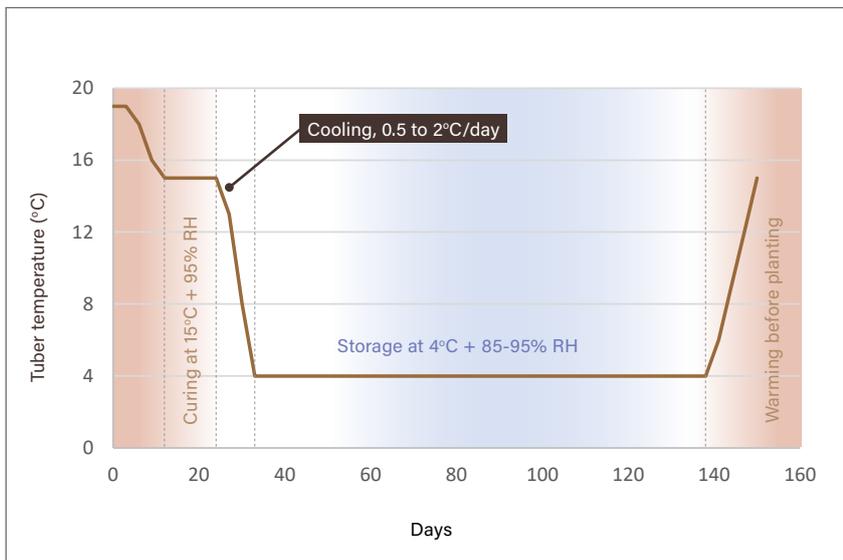


Figure 1. Ideal potato seed storage temperatures

As both avoiding condensation and reducing ageing are important, the cooling rate used will depend on the setup and capacity of the room; if bins are placed tightly together, or seed is stored in bulk bags, cooling rates will need to be slower than if bins are spaced with gaps that allow good air circulation.

STEADY IN STORAGE

Maintaining uniform temperatures and high (85% to 95%) relative humidity (RH) during storage is critical to seed quality. Low RH allows dehydration and shrinkage. However, at high levels of RH, it is essential to minimise fluctuations in temperature to avoid

was similar across all treatments (Mediouni et al., 2020). This was possibly because all plants were spaced the same; older seed needs to

be planted further apart to allow space for the additional stems. The rates shown in Table 2 all result in a similar number of total stems/ha.

Understanding physiological age can therefore help growers set plant spacing to maximise returns.

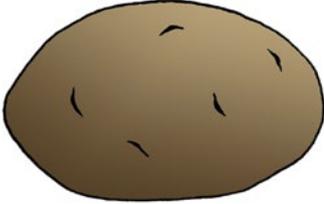
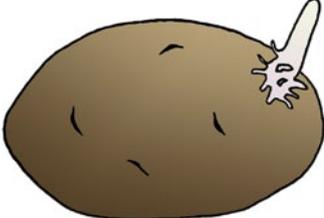
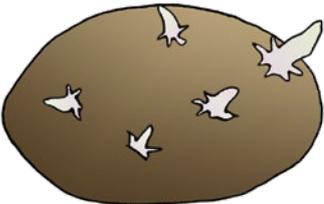
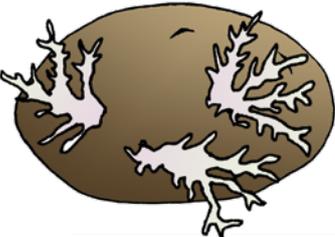
Physiological age	Appearance	Characteristics
Dormant		<ul style="list-style-type: none"> No sprouts Dormancy varies by cultivar Growing conditions, storage environment and chemical treatments can be manipulated to extend or reduce dormancy
Young		<ul style="list-style-type: none"> Strong apical dominance (i.e. one or only a few sprouts from the eyes on the bud end of the tuber) Minimal sprouts Few stems (1-2) per plant Thick foliage Extended maturation time – suited to sites with long available growing periods Longer period of tuber initiation, growth and bulking Fewer tubers but large in size High potential yield
Middle aged		<ul style="list-style-type: none"> Apical dominance lost Multiple sprouts, potentially from all of the eyes on the tuber Multiple stems (3-6) per plant Less foliage cover Shorter maturation time – suited to sites where growth may be limited by frost, disease incidence, market requirements etc. Uniform tuber set High number of tubers but smaller size Middle aged seed that has been de-sprouted should be considered 'old'
Old		<ul style="list-style-type: none"> Highly branched sprouts with 'hairy' appearance Sprouts are weak Plants lack vigour Large numbers of small tubers that fail to bulk up Very old seed may give rise to "little tuber disorder" where small tubers form on sprouts – these should not be used

Table 1. Characteristics of crops grown using tubers of different ages (Adapted from Johnson, 2021 and Crump, 2018).

STORING AND AGEING SEED POTATOES

Many potato growers would already be aware of the critical importance of seed age in terms of planting density, timing of emergence and size and yield of the end crop. However, physiological age is a combination of time (chronological age) and environment (primarily temperature). Managing the storage environment to optimise seed performance at planting is a complex process that requires thought and planning.

Dr Jenny Ekman reports

SEED AGE MATTERS

The **chronological** age of a potato tuber starts from when it is initiated on the parental stem. This is clearly difficult to measure, so age is more commonly expressed as time from harvest.

While chronological age can affect seed performance, **physiological** age is more important. Physiological age reflects what is going on inside the tuber, so is central to optimising crop management.

Seed that has experienced stressful conditions, such as high temperatures in the soil or after harvest (over 22°C), insufficient irrigation, poor nutrition or extreme pest pressure is likely to be prematurely aged. Conversely, seed produced under optimal conditions will be physiologically younger. For example, a previous project found that seed grown under well-nourished conditions in clay soil aged more slowly than that grown under more stressful conditions in sandy soil (Brown, 2006).

HOW OLD AM I?

Physiological age is difficult to calculate. Approximate physiological age may be expressed as P-age or 'day-degrees'. This is calculated by multiplying temperature (minus baseline 4°C) by time from haulm kill or harvest. However, this does not take into account conditions during growth, varietal differences and other factors that influence ageing.

There have been many attempts to test actual changes inside the tuber. These include analysis of 2-methyl-1-butanol (a biochemical that accumulates during ageing), measurement of total sugars (sucrose, glucose and fructose), the time taken for 80% of tubers to produce 3mm sprouts and total weight of sprouts produced after four weeks at 15°C. However, none of these have proven to be reliable indicators of physiological age.

The simplest way to estimate physiological age is to take a sample of tubers, place them in the dark at

room temperature, and allow them to sprout. The sprouts can then be compared with the development stages shown in Table 1.

As physiological age affects how seed should be managed, open and honest communication between seed producers and their customers is essential to maximise yield. For example, seed that has been exposed to high temperatures should be cooled as soon as possible to minimise further ageing, as well as potentially planted earlier than seed produced in cool conditions.

A recent study of the effect of seed age on plant vigour demonstrated the significant increase in stem number that can occur as storage time increases. One month after planting, seed stored at 4°C for 30, 70 or 100 days averaged four, six or eight stems per plant respectively.

While high stem counts have been associated with increased numbers of tubers, in this study tubers per plant

Highly susceptible		Moderately susceptible		Moderately resistant		Good resistance	
Nicola	12.19	Gold Rush	6.8	Dutch Cream	4.93	Toolangi Delight	2.5
Liseta	10.32	Yukon Gold	6.72	Pink Eye	4.76	Tolaas	2.02
Kranz	9.65	Tasman	6.52	Banana	4.66	Granola	1.57
Shepody	9.4	Pink Fir Apple	6.51	Red Pontiac	4.66	Russet Nugget	1.24
Shine	9.29	Spunta	6.44	Spey	4.54		
Patrones	8.82	Frontier Russet	6.4	Nampa	4.26		
Delaware	8.76	Lustre	6.4	Cranberry Red	4.16		
Nooksack	8.67	Wilwash	6.34	Purple Congo	3.75		
Coliban	8.24	Leven	6.13	Fontenot	3.65		
Red Ruby	8.12	Bintje	6.12	Ruby Lou	3.61		
Southern Cross	8.12	Pentland Dell	5.98	Brake light	3.36		
Kennebec	8.06	Mainstay	5.94	Sebago	3.3		
Diament	7.91	Cariboo	5.85	Russet Burbank	3.29		
King Edward	7.67	Atlantic	5.71	Dawmore	3.24		
Sapphire	7.59	Pontiac	5.55	Desiree	3.15		
Sunrise	7.48	Chieftain	5.52				
Crystal	7.35	Sequoia	5.47				
Bison	7.27	Bismark	5.36				
Kipfler	7.25	Yellow King	5.27				
Up-to-Date	7.08	Maris Piper	5.17				

Table 1. Selected variety resistance rankings based on the novel root attachment assay.

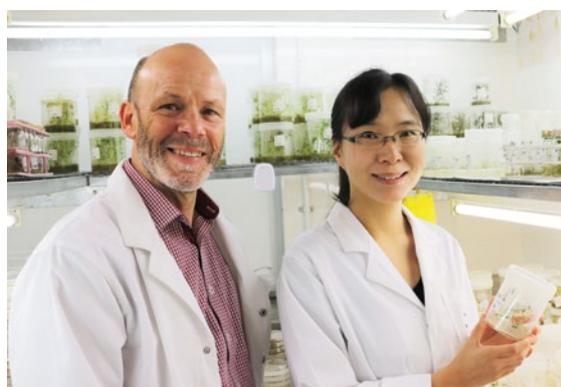


Figure 1. Powdery scab pathogen spores (arrowed) attached to potato root hairs (left)

Figure 2. Professor Calum Wilson and PhD student Xian Yu inspecting tissue culture potatoes (right)

The team at TIA found that higher numbers of zoospores attached to the roots of varieties known to be susceptible to powdery scab root infection by traditional assays. Similarly, those varieties with known resistance to root infection had low numbers of zoospores attached to the root. These results validate the effectiveness of this robust, quick assay.

This may now enable the screening of hundreds of potato cultivars for resistance to powdery scab within weeks, instead of the traditional

glasshouse or field methods that take many months and are more expensive.

“The importance of this early phase of root infection cannot be underestimated. Interventions at this stage can provide major benefits in disease outcomes later in the season. The project is also looking closely at how the spores bind to roots and how resistant varieties reduce root infection. These may lead to novel controls focused on preventing root infection and tools to assist breeding for disease resistance,” Professor Wilson says.

**Hort
Innovation**
Strategic levy investment

■ For more information from this project, please contact Dr Calum Wilson at calum.wilson@utas.edu.au

This project, *Mechanisms and manipulation of resistance to powdery scab in potato roots* (PT17003) is being funded by Hort Innovation, using the processing and fresh potato research and development levy, in-kind contributions from the Tasmanian Institute of Agriculture and contributions from the Australian Government.

A NEW, RAPID TOOL TO SCREEN FOR POWDERY SCAB RESISTANCE

Half-way through a three-year project to improve understanding of *Spongospora* (powdery scab), the Tasmanian Institute of Agriculture has successfully developed a method that rapidly identifies varietal differences in susceptibility to this disease. *PotatoLink* spoke to Professor Calum Wilson about the novel root attachment screening component of the project.

Powdery scab can be a devastating disease. Not only does it reduce quality and marketability, it also disrupts root function, and can greatly reduce yield.

However, there are clear differences in disease susceptibility between varieties. Traditionally, varietal screening requires either glasshouse or field trials. Potatoes are grown in pathogen-infested soil in large, replicated experiments.

Such trials take many months to complete as the potato plant needs to grow to full maturity. This makes them expensive in both resources and skilled labor. The results, especially in field trials, can also be variable as soil-borne sources of pathogen may be patchy across the trial site.

The research team, headed by Professor Callum Wilson at the Tasmanian Institute of Agriculture (TIA) at the University of Tasmania, has developed a rapid and robust laboratory test to screen potato varieties for resistance to the root infection phase of powdery scab disease. Professor Wilson says, "The new test we have developed allows varieties to be tested within a period of days without even having to leave the laboratory. This greatly reduces the time required for screening, as well as costs associated with resource inputs."

Root infection is the first and most important phase of this disease. Successful root infection allows the pathogen to multiply exponentially within the root zone, leading to

extensive root damage and eventually to tuber disease. Varieties that have increased resistance to root infection will be impacted less by the pathogen in terms of both tuber yields and quality.

"Targeting early stages of root infection was the key to this screening technique. This is when the powdery scab pathogen releases motile spores. The spores swim through the water in the soil and bind to potato roots, leading to infection and disease. The efficiency of potato root attachment by the pathogen spore has been demonstrated to impact subsequent root and tuber disease development" explains Professor Wilson.

PhD student Xian Yu has been working on developing this assay and has used it successfully to screen a large number of potato varieties for resistance to root infection.

The varietal resistance rankings determined by the new laboratory assay for a selection of lines are shown in Table 1.



WHAT BUG IS THAT?



Potato grower Steve Michelmore with a copy of the guide.

- Photo by P. Horne

Pests and beneficial species of potato crops

IPM Technologies has been demonstrating Integrated Pest Management to potato and onion growers around Australia as part of project MT16009 – *An IPM extension project for the potato and onion industries* (funded through Hort Innovation using industry levies and contributions from the Australian government). This has been highly successful, with extensive participation from both growers and agronomists in many regions.

One clear message from potato growers was the need for a simple photo guide to help with identification of insects, both pest and beneficial. IPM Technologies has responded with a pocket-sized guide to the key species of importance in many regions. Although not a manual on IPM, this new tool can assist with identification, helping growers manage their IPM programs.

A copy is included with this magazine. Additional copies are available by emailing info@potatolink.com.au, contacting your PotatoLink regional representative, or directly from IPM Technologies info@ipmtechnologies.com.au



Dear Doc,

I have been having a lot of trouble with early blight late in the season, especially in wetter areas of the paddock (photos attached).

I have tried several fungicides registered for this disease but they don't seem to be working very effectively. Is there a problem, and what else can I do to manage this?

Blighted



ASK THE SPUD GP

The leaf spot symptoms could be a fungal disease, Target Spot caused by *Alternaria* species, or Bronze Wilt caused by Tomato spotted wilt virus (TSWV). Target Spot mostly occurs in the older leaves while TSWV affects younger growth and often includes stunting of the shoots. Both diseases can occur simultaneously, so laboratory confirmation is recommended.

Alternaria solani, the cause of Target Spot, is often accompanied by another species, *A. alternata*, which causes separate leaf spots or co-infects Target Spot lesions. Both of these fungi multiply on decomposing organic matter and spread onto potato leaves under warm and wet conditions. Frequent rainfall in Eastern Australia over the last season has probably contributed to elevated disease levels. Like all epidemics, the fungal populations can 'explode' and overcome plant resistances. There

are many preventative strategies to consider.

Adequate nutrition is important, particularly as plants mature and older leaves begin to senesce. It is well known that Target Spot generally appears on older senescing leaves. At the end of the season this isn't a problem. However, when it occurs because plants are nutritionally deficient or stressed, it can defoliate plants prematurely.

Masses of spores developing in the lesions can give rise to a new cycle of infection. Spores then infect younger leaves and can be blown onto surrounding crops.

Excess nitrogen can give rise to luxuriant foliage that is more susceptible to disease. A thick canopy also allows longer periods of leaf wetness. Irrigation scheduling should avoid leaves remaining wet overnight.

An effective fungicide spray program

requires regular use of protectant fungicides as well as strategic use of chemicals with specific activity that can move within the plant. Good spray coverage is clearly important, especially for protectant chemicals.

The success of fungicides with specific activity may also be affected by emergence of resistance within *Alternaria* populations. In recent times growers in New Zealand and the UK have experienced failures in chemical controls. Resistance is suspected in the FRAC Groups 7 (SDHIs) and Group 11 (strobilurins) fungicides. There may also be decreased sensitivity to chemicals in Group 3 (DMIs). It is early days, so this still needs to be confirmed. However, it definitely requires further investigation and possibly a revision of chemical management guidelines.

Contact the spud GP by emailing info@potatolink.com.au



Peter O'Brien is an experienced horticultural extension specialist. He worked as a district horticulturist with NSW

Department of Primary Industries, and has practical farm experience as a grower of potatoes, beans and asparagus.

Peter has 24 years' experience with PepsiCo in supply chain management as regional senior director, sourcing potatoes, and supporting farmer development in Australia, New Zealand and Asia. He has detailed knowledge of the Australian potato industry and until recently led the PepsiCo Asia Pacific agronomy team.

Well-respected by growers, advisers and corporate managers and internationally connected, Peter will be a driving force to help the Australian potato industry take full advantage of international research and expertise. In recent years Peter has been a small business owner and restaurateur based in Orange, NSW.

Peter is National Co-ordinator of the PotatoLink project, overseeing all communication and extension activities.

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Raised in Idaho in the US, Marc first learned about the Russet Burbank in the sandy loam soils of eastern Idaho. For 20 years he was

with the Simplot Food Group, working as an agronomist on processing potatoes. He also spent a year in China growing Burbank and Shepody potatoes for processing into french fries, as well as seven years in a quarantined, seed potato only production area.

The long, hard winters took their toll on Marc's Australian wife, so in 2004 the family moved to Cowra NSW. In Australia, Marc has primarily worked as a vegetable agronomist. He also advises potato growers, working closely with a large processing (crisps) potato producer. In recent years he has been heavily involved with the Soil Wealth & Integrated Crop Protection project as well as conducting research on cover crops, irrigation and disease management.

Marc will assist Peter O'Brien with managing the project, as well as being the regional representative for NSW.

E: marc@potatolink.com.au



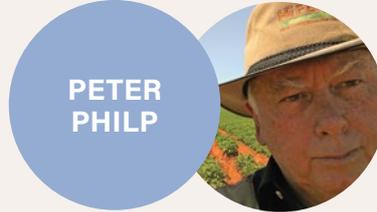
Ray has more than 40 years' experience in the agricultural and supply chain area. He worked with PepsiCo for 19 years, eventually

leading the agronomy function for the Asia Middle East and Africa region. This was followed by a period as Agricultural Director for McCain Foods for Asia Pacific, Middle East and Africa, and a year working on GSK's African Nutrition Ventures in West Africa. He is currently an advisor to a large ware potato business.

Ray's supply chain experience has built over many years living and working in both developed and developing countries. He has lived in Australia, China, Dubai, Nigeria and Thailand and has travelled extensively throughout all the major agricultural supply regions of the world.

Ray will be the regional representative for northern Victoria and the Riverina, as well as the key contact for the fresh potato market sector.

E: ray@potatolink.com.au



Peter Philp has worked in horticultural nutrition, crop protection, variety development and potato seed

management for more than 30 years. Peter previously held the role of Agronomy Manager with PepsiCo Australia and New Zealand, managing sustainable supply to factories in SA and WA. The role also managed the potato seed pipeline, variety assessment and variety qualification with links to global support.

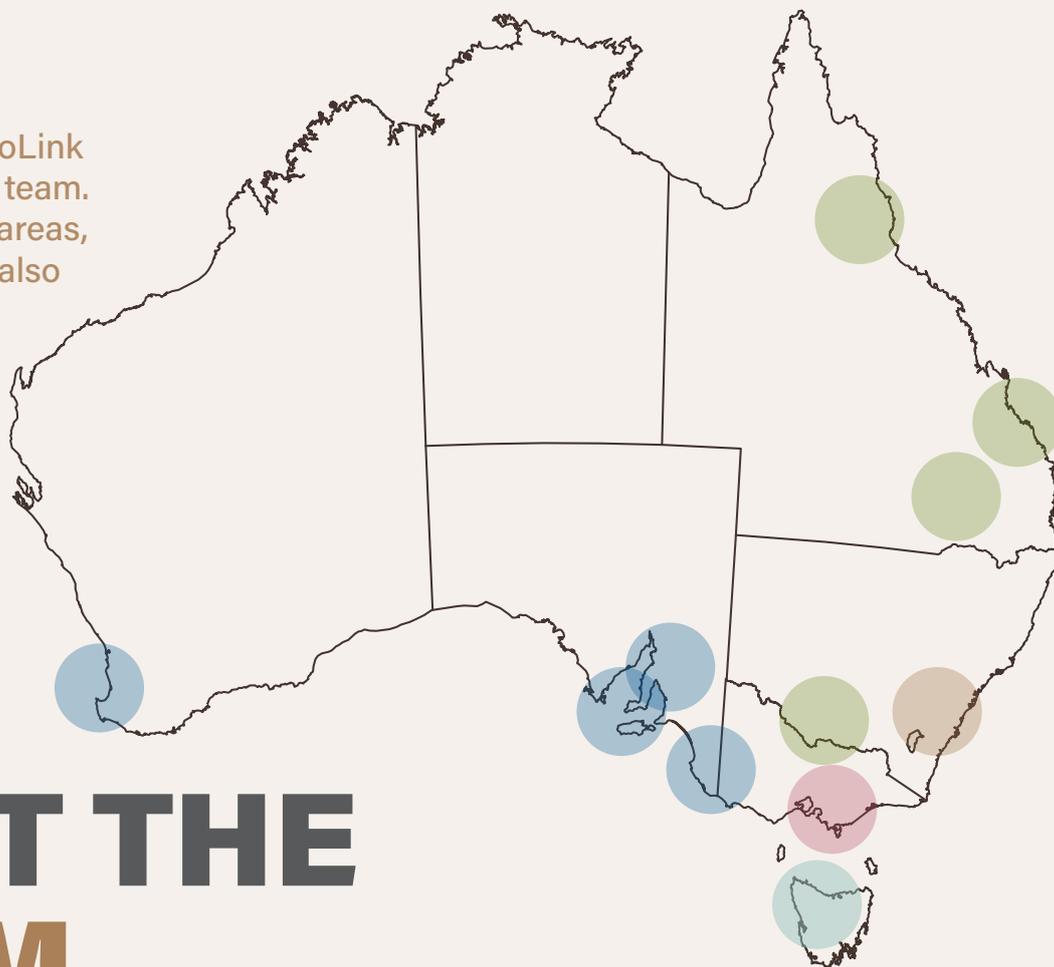
In 2015 Peter established Philp Horticultural Services, which specialises in crop nutrition, variety development and potato seed dormancy. His projects have included market development, nutrition and variety management in fresh market, processing and seed potatoes across Australia, New Zealand and overseas. The projects deliver innovative crop system development, sustainable quality and improved efficiency in potato yield and profitability.

Peter will be the regional representative for PotatoLink in South Australia as well as the key contact for the processing (crisps) sector.

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The key to the PotatoLink project lies with our team. Located in regional areas, our representatives also reflect the diversity of the industry, with expertise in seed, ware and processing potatoes.



MEET THE TEAM



Dr Nigel Crump is a potato pathologist with 19 years' experience in the Australian potato industry. Nigel is the General Manager for

the Australian Seed Potato Industry Certification Authority (AuSPICA), an industry-based organisation that operates the seed potato certification Scheme in South Australia, Victoria and northern New South Wales.

Nigel also oversees the day-to-day operation of the Toolangi Elite business which produces G0 potato minitubers and tissue culture plantlets.

Nigel holds adjunct roles that include secretary of the Australian Seed Potato Council (ASPC), deputy chair of the UN Economic Commission specialised section on seed potatoes, and other local industry subcommittees. Recently, Nigel was appointed as a director of the World Potato Congress Inc. His research includes involvement in international projects in Vanuatu, Ethiopia, Indonesia and New Zealand.

Nigel will be the regional representative for eastern Victoria and key contact for the seed potato sector.

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Born into a fine wool farming family in Tasmania, Frank began his horticultural career as an extension officer at the

Forthside Vegetable Research Station. This was followed by six years managing seed potato certification in Tasmania before moving on to working with Simplot seed potato producers. During this time, adjustments to planting and harvesting dates resulted in seed with enhanced vigour, and significant recovery of seed previously rejected due to common scab.

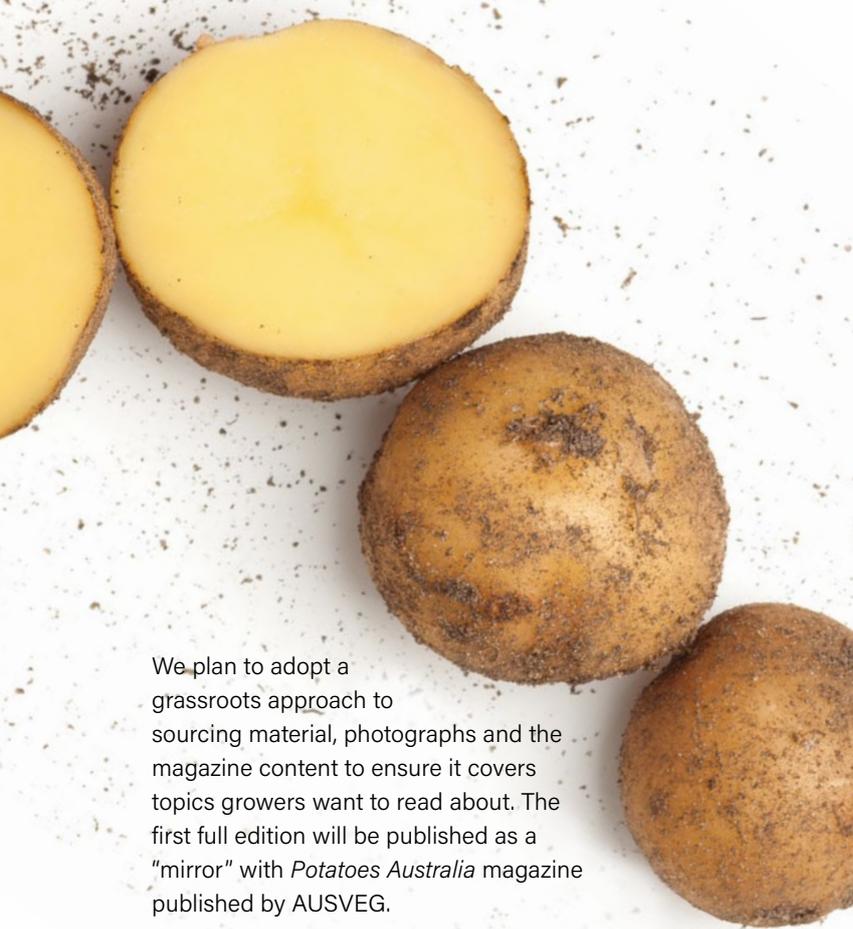
Frank then joined Australian biotechnology company Technico to assist with the global rollout of TECHNITUBER™ derived tubers. He is a recognised expert in this field, having helped develop accreditation guidelines for tissue culture laboratories.

After re-joining Simplot, where he spent a further 12 years, he is now an independent adviser based in Tasmania.

Frank will be the regional representative for Tasmania and key contact for the processing potato (chips) sector.

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We plan to adopt a grassroots approach to sourcing material, photographs and the magazine content to ensure it covers topics growers want to read about. The first full edition will be published as a "mirror" with *Potatoes Australia* magazine published by AUSVEG.

The website

We are currently establishing potatolink.com.au as a one stop shop for industry to access R&D information. The site already contains a wealth of R&D reports, fact sheets and other materials. We have even uploaded copies of "Eyes on Potatoes" (1997-2005) and "Potato Australia" (1990-2005). While these resources may be getting on in years, they contain much that is still relevant and true today.

The website will act as a hub for updates on events, progress of crops at demo sites and social media, as well as for technical information, webinars and other resources.

Building networks and capacity

This project is all about comprehensive communication, to the entire industry. In addition to regional events, we plan to introduce a leadership program, organise an annual potato extension meeting and link to international events and conferences, particularly in the US and Western Europe.

But communication is a two-way street. We want to hear from you, the growers, processors, wholesalers, advisers, or anyone in the potato supply chain, about what YOU want from this project. Whether it's a workshop on a specific disease, a demo site testing an agronomic change, or an article examining the pros and cons of new technology from overseas, we are keen for your feedback.

This project is all about the potato supply chain. Help us make it as relevant, useful and targeted as we can, and we will all gain.

To join our mailing list please contact info@potatolink.com.au

EVENTS GUIDE

EVENTS

The project is still in its early days, so the following is a "loose and fast" list of workshops planned so far. Dates and locations will be confirmed by your regional representative.

Activity	When	Where
Seed Dormancy Workshop & Demo	July 2021	Mallee, SA
	Aug 2021	Robinvale, VIC
	Dec 2021/Jan 2022	Busselton, WA
Potato Virus Management in Crops Workshop	Dec 2021	Victoria or online
	Feb 2022	Murray Bridge, SA
Potato Pre-planting Considerations and Fumigation Workshop	Feb 2022	Murray Bridge, SA
Final Crop Management & Canopy Recovery	Feb 2022	Mt Gambier, SA
	Feb 2022	Tasmania
Seed Dormancy Workshop	August 2021	Mareeba, QLD

DEMONSTRATION SITES

We are still identifying suitable sites for some of these trials. If you are interested in being involved, or have other ideas of technologies or techniques you would like to see in the field, please contact your PotatoLink representative.

- Early blight fungicide resistance
- Serenade Prime, effectiveness as a biological way of controlling disease, as well as potentially reducing "cluster clumping" in crisping potatoes
- Slow release nitrogen fertiliser; interactions with site and variety
- Varietal differences in specific gravity

For more information, or to be notified of future events, please contact info@potatolink.com.au

INTRODUCING POTATOLINK



PotatoLink is the new extension and communication project for the Australian potato industry. It is being led by Applied Horticultural Research (AHR) with funding through Hort Innovation using potato industry levies and contributions from the Australian Government.

BACKGROUND TO THE PROJECT

Profit margins for potato growers are lower than for many other vegetable crops. The difference between farm-gate price and break even fluctuates from year to year, but can be less than \$100/tonne.

Other pressures on the industry include water availability and quality, pest and disease pressure, rising energy and labour costs and the increasing frequency of extreme weather events such as heatwaves and floods.

While costs have increased, so have the requirements for record keeping, staff training and business management. Maintaining or improving yield and quality is critical for profitability.

The aim of this project is to assist growers and their advisers maintain yield and quality, as well as reduce input costs where possible. The project team feels strongly that helping growers to access current global best practice information is critically important to improve the viability and resilience of the Australian potato industry.

SO, WHAT ARE WE GOING TO DO?

The national co-ordinator of the project is Peter O'Brien. Peter has grown potatoes, been an extension horticulturist with NSW Department of Primary Industries, and worked for more than 20 years with PepsiCo on supply chain management.

Peter will be ably assisted by regional representatives, chosen to reflect key potato growing regions as well as processing, fresh market and seed production. See Page 4 to learn more about your regional representative.

Workshops and field days

Regional delivery partners, with help from Peter O'Brien and the rest of the Applied Horticultural Research team, will organise regional workshops and demonstrations focussed on the needs of local growers. These will include "Back to basics, Growing right" workshops focussed on irrigation, nutrition, crop scheduling and pest and disease management. Specialised workshops will also be available on specific issues – such as, for example, the IrriSAT technology described on Page 18 for optimising irrigation.

The project also aims to engage with local commercial advisers, providing information, expertise and resources where possible. Supporting advisers will help growers get the best possible advice.

Technical support will be available from researchers within the AHR team, including Dr Kelvin Montagu (soil health, cover crops, irrigation), Dr Len Tesoriero (disease), Dr Jenny Ekman (postharvest) and agronomy and nutrition (Marc Hinderager)

The magazine

The magazine you are currently reading is a "sampler" of what we hope will be a valuable resource for the whole industry. The purpose of PotatoLink is to communicate R&D outcomes from Australia and overseas in a clear and engaging manner, with a focus on how this information can be used in a commercial environment.

Content will include:

- Information and results from local research projects, past and present
- International technical advances, including new and innovative practices, technology and research
- Independent "road tests" of equipment and technologies
- Regular case studies based on innovative producers
- Answers to growers' questions about pests and diseases: "Ask the Spud GP"
- A calendar of demo sites and field days in "What's On"

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A new, rapid tool to screen for resistance to powdery scab

Dr Calum Wilson discusses a novel method to screen for *Spongospora* resistance

014

Storing and ageing seed potatoes

Our major feature examines how to optimise seed storage to maximise crop potential

020

Technology test drive

IrrisAT combines satellite images of your crop with weather data to estimate crop water use



023

Winter warmers - Jobs for July

Winter is the time to review last seasons' performance as well as get on top of jobs around the farm



027

Trading patterns change, but exports remain stable

Wayne Prowse analyses the last 10 months of fresh potato exports and frozen potato product imports

029

Eyes on the world

The latest overseas research explained. This issue - potassium

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Getting soil biology working for you

A new online soils masterclass coming this August

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Basic Potato Pathology

An online course from South Africa lead by pathologist Professor Jacquie van der Waals

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Hort Innovation

How your levy investments build a better industry



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Our regional representatives are the heart of PotatoLink

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Ask the spud GP

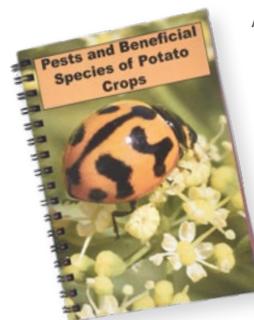
Our resident pathologist diagnoses your spud problems



011

What bug is that?

A new guide to pest and beneficial insects - included with your magazine





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POTATO LINK
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Cover: Project coordinator Peter O'Brien examines a fine crop of chipping potatoes with grower Dominic Pace - *Photo J. Ekman*

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