

# potatoes

## australia

August/September 2013

### Bruce Wickham

A land of ragged  
mountain ranges,  
of droughts and  
flooding rains

Sam and Ben  
Humphries  
Young growers

Jim Mole  
On Impact

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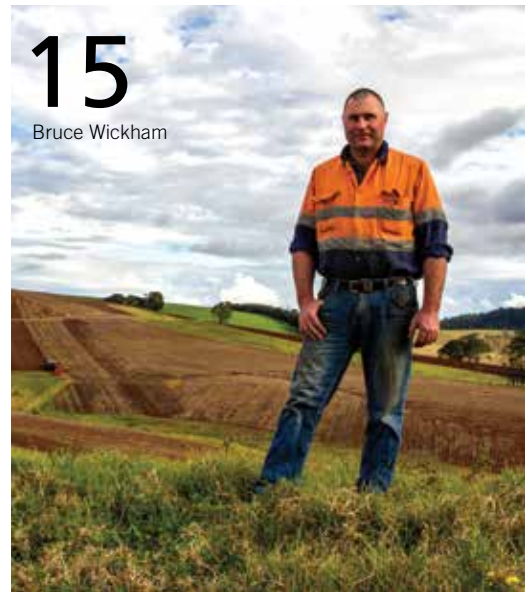
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## AUSVEG Chairman and CEO messages



## John Brent

AUSVEG Chairman

Recently, the Australian Government underwent significant changes, including a change of leadership, with a new prime minister and the re-allocation of several ministerial portfolios. For the Australian horticulture industry, perhaps the most important change made was the appointment of The Hon. Joel Fitzgibbon as the new Minister for Agriculture, Fisheries and Forestry, replacing Senator The Hon. Joe Ludwig.

AUSVEG maintains strong relationships with all political parties in order to address and provide an appreciation for the concerns of potato growers around the country. I urge Minister Fitzgibbon to consider the vital role that vegetable and potato growers play in providing food for Australian consumers and ensuring that this country can remain food secure. Australian produce is amongst the best in the world. It is grown to extremely stringent standards of safety and quality, of which we should all be immensely proud. Yet if Australia is to become the exporting nation that many believe we have the potential to be, then we must first ensure that good policies are in place that will enable growers to capitalise on their strengths in order to realise our export potential.

Greater investment in the Australian horticulture industry to ensure its future is critical. We congratulate Minister Fitzgibbon on his appointment and we look forward to working closely with him to achieve positive outcomes for industry.

Last month, Russian authorities announced that the country would be placing

a temporary ban on potato imports from Europe. The Russian Government told the European Commission's Director for Health and Consumer Production, Eric Poole, that it found the European Union's phytosanitary regime to be dissatisfactory, after it discovered the presence of yellow potato cyst nematode in Dutch potatoes.

Developments in the export market such as this further prove the importance of investing in industry research and development. As demonstrated, crop diseases and other plant health issues can result in serious economic losses. We owe it to ourselves to do all that we can to prevent this from damaging our own industry by focusing our efforts on rigorous scientific enquiry. If we continue to deepen our understanding of potato production issues and invest in the betterment of crop and business management practices, the results will manifest in the quality of our product, efficiency of our operations, and the competitiveness of our industry as a whole.

John Brent  
Chairman  
AUSVEG



## Richard Mulcahy

AUSVEG Chief Executive Officer

Earlier this month, nine potato growers and processors arrived back on home soil, after having completed an educational and rewarding study tour across North America.

The 10-day Potato Growers Study Tour of the USA and Canada gave potato levy payers the opportunity to deepen their knowledge of different approaches to potato production, in order to improve their own operations, as well as share this information with their peers. The group also had the opportunity to attend the Potato Association of America's annual conference in Québec City, which featured a one-day Symposium on cutting-edge potato R&D activities relating to bacterial diseases.

The tour began in Boise, Idaho, where attendees visited local growers and processing operations in the largest potato producing state in the US. The tour moved on to Twin Falls, Idaho, where the group visited the University of Idaho Potato Research Centre to discuss potato disease and pest management. Over in Canada, the tour explored New Brunswick, where over 250 varieties of seed, table and processing potatoes are grown. The group also visited the Fredericton Potato Research Centre, several growing operations, as well as research plots and an early generation production facility in the island's south.

By all accounts, the tour was an enormous success. Knowledge and information gained on the tour will be shared with members of the industry through upcoming Potato

Industry Extension Program Workshops held throughout the remainder of the year.

Locally, the Potato Industry Extension Program recently invited potato levy payers and other industry members to attend one of three R&D workshops which were held in potato growing regions in Victoria, Tasmania, and South Australia. The Potato Industry Extension "road-show", provided levy payers with the opportunity to further enrich their understanding of potato R&D, and discuss the key issues the potato industry is facing at the current time.

At the final workshop held in Coonawarra, South Australia, which was well attended by many of the growers operating in the Mt Gambier/Penola area, I spoke about the importance of the R&D process, the number of valuable investments being made in the industry and how AUSVEG is representing the interests of local potato growers. More detailed reports on the three events can be found in this magazine.

Richard J Mulcahy  
Chief Executive Officer  
AUSVEG

**AUSVEG Chairman**

John Brent

**AUSVEG CEO**

Richard J Mulcahy

**Communications Manager**William Churchill  
william.churchill@ausveg.com.au**Senior Writer/Journalist**William Gregory  
william.gregory@ausveg.com.au**Writer/Journalist**Felicity Powell  
felicity.powell@ausveg.com.au**Graphic Design**Nina Siciliano  
nina.siciliano@ausveg.com.au**Editorial Enquiries**AUSVEG  
Ph: (03) 9882 0277  
Fax: (03) 9882 6722  
info@ausveg.com.au**Advertising**Marc W. Wilson  
Gypsy Media  
Ph: (03) 9580 4997  
Fax: (03) 9523 2270  
M: 0419 107 143  
marc@gypsypress.com.au**Print**

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**Contributors**

Karen Shaw



Horticulture Australia

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**FRONT COVER:**

Bruce Wickham

Photograph by Callum Harris

## Editorial

Fields around Australia are beginning to thaw, as winter turns and growers prepare for the most fertile period of the year. Seasonal shifts bring excitement but also apprehension to growers, whose livelihoods are subject to Australia's increasingly volatile weather patterns.

Queensland grower, Bruce Wickham has endured devastating natural phenomena over the 45 years that his business has been in operation. In "A land of droughts and flooding rains" (page 15), Bruce reflects on his experience of the 2011 Queensland floods, and

shares his predictions for the future of the Australian potato industry.

This edition of *Potatoes Australia* also profiles brothers, Sam and Ben Humphries, who specialise in fresh washed potatoes, which they grow in Victoria's Mallee region. In "Young Grower Q&A" (page 18), Sam and Ben discuss their plight to grow demand for potatoes in Australia, and the business that their family has managed for over half a century.

Impact Fertilisers' new managing director, Jim Mole, also features in this edition (page 28). Mr Mole describes

the company's increased focus on horticulture in recent years - a sector he believes has as many unique opportunities as it does challenges.

In our regular international R&D update, this edition details new technology that allows for more sophisticated potato defect analysis, as pioneered by researchers in the United Kingdom (page 30). In this edition's Potato Extension Program column, South Australian grower, Terry Buckley, talks about his family's focus on building on-farm machinery and his keen adoption of beneficial soil health practices and

technology (page 24).

We also recount the success of the Potato Extension Program's recent R&D roadshow, which provided potato growers in South Australia, Victoria and Tasmania with a valuable insight into the state of their industry and an update on a range of research and development activities (page 20).

Other R&D articles include an investigation of the recently launched Predicta Pt soil testing service (page 32), and the importance of tuber-borne inoculum in seed potato health (page 12).

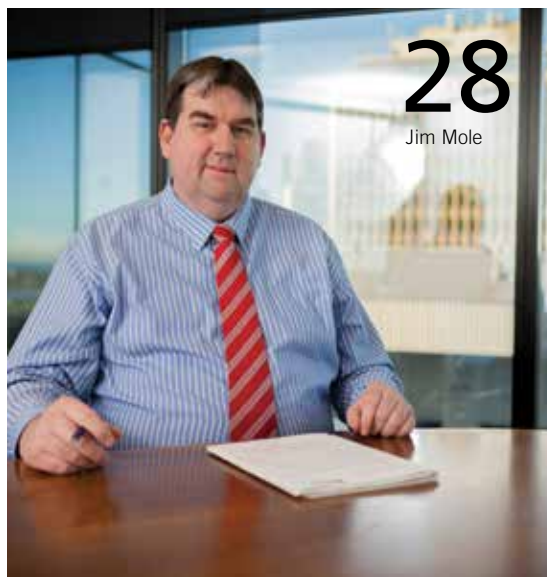
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Bruce Wickham



# 28

Jim Mole



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## Potatoes helping to feed Ethiopia in era of climate change

With changing climactic conditions bringing unpredictable rainfall and regular drought to the African continent, the potato is becoming an increasingly important crop in Ethiopia.

As reported on the Cornell University website, Mr Semagn-Asredie Kolech, a Cornell University doctoral candidate in the field of horticulture, recently studied potato cultivation practices in Ethiopia and the effects of climate change on the Ethiopian growing season.

"The potato is a good strategy crop for global warming. It has a short growing season, it offers higher yields, it's less susceptible to hail damage, and you can grow 40 tonnes per hectare. With wheat and corn, you don't get more than 10 tonnes a hectare," Mr Kolech said.

Climate change is reportedly having a big impact on Ethiopian growing practices. Rainfall distribution has changed drastically within the

past 25 years, and diseases associated with the change in climactic conditions are becoming aggravated.

Ethiopian farmers are taking measures into their own hands by testing both old and new varieties on their farms. Unlike other sub-Saharan African countries, the conditions in Ethiopia are diverse, allowing 29 local potato varieties to be grown.

Speaking at the Atkinson Centre for a Sustainable Future Forum in March this year, Mr Kolech presented preliminary research gathered in mid-2012. He surveyed Ethiopian farmers in several potato growing regions to understand their varieties and crop practices.

Mr Kolech found that many growers had experimented with new varieties, but often reverted back to using their traditional cultivars. For example, in the Shashemene district of southern Ethiopia, about 47 per cent of farmers trialled new varieties before 2012 - a figure which

dropped back to 17 per cent of growers willing to use new varieties at the time of Mr Kolech's 2012 study.

Mr Kolech found that the usage drop-off was mostly due to poor storage qualities. While the new varieties trialled have favourable attributes, such as high yields and disease resistance, in north-west Ethiopia, where more than 40 per cent of the country's potatoes are grown, the colour and taste of these varieties are affected much earlier while in storage than the local varieties. To hedge bets on unpredictable climactic conditions like drought, Mr Kolech discovered that the growers have reverted to using traditional varieties in the Shashemene district to alleviate any food shortage concerns.

Ethiopian growers plant their potato in spring and late summer. However, they continue to search for optimum planting dates and tend to choose local drought-tolerant

varieties when planting in the "short-rain" season, and varieties that are more resistant to Late blight when planting in the longer rainy season.

In 1970, Ethiopian farmers planted less than 30,000 hectares of potatoes. Today, more than 160,000 hectares are planted. Through his research, Mr Kolech found that with a population of 86.6 million in 2013 and a land size slightly smaller than the Northern Territory, Ethiopia can accommodate growing up to 3 million hectares of potatoes.

## Upcoming Potato Extension Program Events

### Simplot Potato Futures events in Tasmania

The Potato Extension Program will attend the three Simplot Potato Futures events, to be held in Tasmania on 10-12 September. Both Simplot research and development

and levy-funded research and development programs will be discussed. AUSVEG will present an update on the Potato Extension Program and recent activities. The three events will provide an excellent opportunity to investigate current developments in the industry.

### R&D Workshop in Pemberton, WA

A Potato Extension Program R&D Update will be held in Pemberton, Western Australia (date to be confirmed). Yara agronomist Matt Wetherall will discuss potato skin and tuber

quality issues. He will be joined by AUSVEG Potato Extension Coordinator, Luke Raggatt.



For more information, contact AUSVEG on (03) 9882 0277 or email [info@ausveg.com.au](mailto:info@ausveg.com.au)





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## Ask the industry



with Scott Mathew

## SCOTT MATHEW FROM SYNGENTA SHARES INSIGHT INTO THE MOST EFFECTIVE WAYS TO MANAGE COMMON SCAB IN POTATOES.

With Common scab (*Streptomyces scabies*) becoming an increasing concern to growers across Australia, I have picked out a few of the most frequently asked questions that I encounter in my travels.

**Question: What are the ideal conditions for Common scab development?**

Common scab infects young, developing tubers through the lenticels and occasionally through wounds, which usually begins with the onset of tuberisation (formation of tubers). The disease can attack tubers at a wide range of temperatures from 10-31°C, with the ideal temperature range being 20-23°C. Common scab may be particularly severe when potatoes are grown in neutral or alkaline soils (pH 7.0 and above). However, some strains of the disease may cause damage in soils which have a pH rating of five or lower.

The initial infection appears as superficial reddish-brown spots on the surface of tubers. As the tubers grow, these disease lesions expand, becoming

corky and necrotic. When the Common scab sporulates in the lesions, some of the spores are released into the soil or onto the surface of tubers and crop residues.

Common scab also survives in lesions on tubers in storage, but the disease does not spread or increase in severity during storage. When planted the following season, however, the infected seed tubers can produce disease on daughter tubers.

**Question: What are some of the ways in which I can manage my potato crop to reduce Common scab infection levels?**

There are several cultural and chemical control measures that can be used to manage Common scab, including:

- Soil moisture levels during the tuberisation stage of crop development can have a dramatic effect on Common scab infection. Maintaining your soil moisture level near field capacity during the two to six weeks following tuberisation can reduce infection. However, the management of other diseases such as Pythium Leak

and Pink Rot may be aggravated by excessive irrigation.

- Acidic soils with a pH level below 5.2 can also significantly reduce the severity of Common scab.
- The disease population can be reduced to some extent by managing crop rotations such as cereal crops or other non-host crops like legumes. These rotations should be between three to five years, with five years being the most preferred. Common scab is unlikely to be completely eliminated, due to the fact that it can reproduce spores to some extent on organic matter in the soil.
- Potato varieties are known to have different levels of resistance to Common scab and it is recommended to plant varieties that are less susceptible to infection.



For more information or to ask a question, please contact your local Syngenta Territory Manager, the Syngenta Advice Line on 1800 067 108, visit [www.syngenta.com.au](http://www.syngenta.com.au) or email *Potatoes Australia*: [info@ausveg.com.au](mailto:info@ausveg.com.au). Please note that your questions may be published.

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# The importance of tuber-borne inoculum in seed potato health

RESEARCH CONDUCTED WITHIN THE AUSTRALIAN POTATO RESEARCH PROGRAM PHASE 2 CONTINUES TO HELP GROWERS BETTER UNDERSTAND THE IMPORTANCE OF TUBER-BORNE FUNGAL, BACTERIAL AND NEMATODE INOCULUM IN DISEASE IN POTATO CROPS, AND METHODS TO ACCURATELY DETECT LEVELS IN SEEDS, WRITES ROBERT TEGG FROM THE TASMANIAN INSTITUTE OF AGRICULTURE.

Researchers at the Tasmanian Institute of Agriculture (TIA) are evaluating the importance of seed-borne inoculum on disease outcomes as part of the Australian Potato Research Program Phase 2 (APRP2). The work utilises some of the molecular polymerase chain reaction (PCR) detection tools generated by the South Australian Research and Development Institute (SARDI), as part of its research in the Australian Potato Research Program Phase 1 (APRP1).

The team, led by Associate Professor Calum Wilson, includes researchers from both TIA and SARDI. Key pathogens and diseases targeted in this seed-health project include: Black scurf (*Rhizoctonia solani* AG3); Root knot nematode (*Meloidogyne fallax* and *hapla*); Powdery scab (*Spongopora subterranea*); and Common scab (*Streptomyces scabiei*).

Key objectives include the comparison of PCR diagnostics versus visual assessment for usage in certification schemes; the relative importance of seed borne-inoculum for various potato pathogens in the development of disease; and the subsequent impact on commercial production. This information may ultimately lead to improved disease management for these important potato pathogens.



Tuber evaluation.

### Point versus continuous sampling for certification

Standard seed certification practices have utilised "point" sampling, whereby tuber samples are taken from the beginning and end of a seed lot and assessed for disease. There is some speculation as to whether this sampling strategy accurately reflects the overall disease loading of a given seed lot.

Studies over the first three years of the project tested the differences between two different sampling strategies: the traditional point sampling (two samples in total from beginning and end of seed lot) versus the more labour-intensive continuous sampling, where random samples are collected continuously from the whole seed lot (10 randomly collected samples).

The results show that current certification practices (point sampling) accurately predict the relative disease loading of a given seed lot in greater than 95 per cent of cases. The conclusion from this work is that the current sampling practices are a valid and adequate sampling technique that provides reliable information for visual assessment.

### Tuber grading in certification: is it protecting our seed or masking an underlying problem?



Tuber grading is carried out to remove obviously diseased tubers from a grading line, prior to certification. However, one question from industry is: Even though the seed is visually cleaner, does it still carry significant inoculum load and therefore disease risk?

Ongoing work within this project suggests that occasionally a crop which has been heavily graded may contain significant pathogen DNA on the seed source (as detected through PCR diagnostics), which may not

be detected visually. The significance of this pathogen load is currently being tested by planting this seed and determining disease outcomes. However, in most cases it appears that seed grading is adequately reducing inoculum load to low risk levels. Work is continuing in this area.

### Powdery scab: a complex beast

The project has previously shown that increasing pathogen

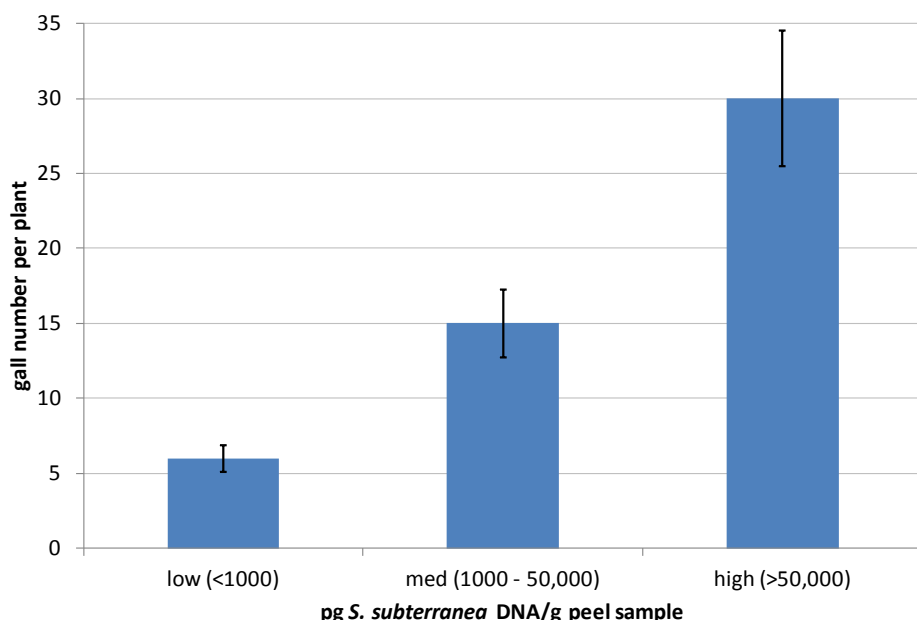
loads on tubers leads to increased risk of certain diseases in the crop, such as Black scurf and Common scab.

The story for Powdery scab is not as simple. Planting seed that contains *S. subterranea* can produce mixed outcomes, depending on the trait of interest being measured. As an example, planting dirty seed that carries visually obvious Powdery scab does not always result in the presence of Powdery scab on the harvested tuber, because tuber symptoms are also heavily driven by environmental conditions, and if soil is not cool enough then symptoms may not develop. This has been particularly obvious in Tasmania this last season, where less Powdery scab has been observed in the field due to warmer soil temperatures through the growing season. This may lead growers to question the role of using certified seed if they can plant dirty seed and harvest a clean crop.

However, long ignored over the years, it is apparent that planting dirty, Powdery scab-infected seed is likely to present other negative impacts. This includes the phenomenon of "root galling". A strong relationship between the level of tuber inoculum and root gall production has been demonstrated consistently across a number of pot trials with the key processing varieties.

While this may not always result in subsequent tuber

Figure 1: Relationship of *S. subterranea* DNA levels with root gall production.



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Common scab symptoms.

infection, the negative impacts of root gall production can include reduced yield. Additionally, as the roots decay, the galls are left in the soil, increasing soil inoculum loads

for subsequent crops. The role of *S. subterranea* (Powdery scab) soil-borne inoculum and risk associated with varying inoculum levels is part of the SARDI Predicta Pt soil testing

service, which is soon to be commercially launched (see page 32 for more information).

### Practical usage

The work undertaken in this project has already delivered valuable information, such as the knowledge that seed containing high amounts of *R. solani* AG3 (Black scurf - large size) and *S. scabiei* (Common scab - deep lesions) on the tuber is likely to result in disease. This supports previous findings from related research, though it provides validation of visual and PCR measurements across a larger range of pathogens.

Further work may show that there are particular thresholds beyond which fungicide dips should be applied for Black scurf control. This will increase the available tools to industry and allow better prediction and prevention of disease risk attributable to seed quality.

The research presented in this article is preliminary in nature, and the strategies discussed

are part of a novel research program. Key recommendations and findings making use of these tools will be made available to growers during the last year of the five-year project, when industry and grower workshops are planned.

This project has been funded by HAL using the potato industry levies (processed) and matched funds from the Australian Government and funding from the Tasmanian Institute of Agriculture.



Dr Calum Wilson  
Associate Professor in  
Plant Pathology  
Tasmanian Institute of  
Agriculture  
University of Tasmania  
Phone: (03) 6233 6841  
Email: Calum.Wilson@  
utas.edu.au

Dr Robert Tegg  
Phone: (03) 6233 6830  
Email: Robert.Tegg@utas.  
edu.au  
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## A land of ragged mountain ranges, of droughts and flooding rains: Potato production in the Southern Downs



POTATO FARMING IS IN BRUCE WICKHAM'S BLOOD. HIS FATHER AND UNCLE STARTED GROWING POTATOES IN THE KILLARNEY RANGES IN THE 1960s, AND, TODAY, WICKHAM FARMS REMAINS A FAMILY-RUN OPERATION. BRUCE SPOKE TO WILLIAM GREGORY ABOUT HIS LOVE OF POTATOES, THE DIFFICULTIES HE HAS FACED AS A RESULT OF TURBULENT WEATHER PATTERNS, AND HIS HOPES FOR THE FUTURE OF THE AUSTRALIAN POTATO INDUSTRY.

**B**ruce Wickham says that the proximity of his family's Killarney operation to Brisbane markets was what first put their business on the map 45 years ago. Being situated 10,000 kilometres closer to the city than most Queensland potato-growing operations was "pretty handy," he says, considering that at the time, there were far fewer trucks connecting growers to major cities than there are today.

Killarney is one of Queensland's most important areas of potato production. Wickham Farms grows several crops, including potatoes, onions, pumpkins, sugarcane and grain crops. They produce fresh loose and pre-packed potatoes, and their specialty variety is the Sebago, which they describe as an old-fashioned,

robust, all-purpose potato.

"We try and do mainly Sebagos if we can, for the brushed market," Bruce says. "We process as well."

"We try to use every part of the crop," he says. "Everything I create off there - the large, the small, the rejects - can go through my processing shed."

Wickham Farms operates multiple properties, widely distributed across the sunshine state. Bruce is the manager and director of the company, supported by his three brothers-in-law.

"Our farms go from the Queensland border through to Cairns, so we've got a string of farms all the way," he says. "I've got farms in Killarney. We've got multiple farms in Clintonvale, in Warwick...[and] in the Lockyer Valley. We've got a farm in

Bundaberg, and another in Atherton Tablelands."

Queensland's hotter seasons are merciless. In much of the state, crops dry up, rendering all-year production impossible. But choosing Killarney to sow their seeds was a good decision by Wickham Farms. Potatoes grow in the highlands of that area without irrigation, thanks to considerably higher rainfall than most other farming areas of the state. Wide distribution has also been a key contributor to their success.

"We're always harvesting," he says. "If you've only got one farm in one area, you can't deal with all that, all year-round. You can't get the season," he says. "You've got to be able to spread it around to be able to get your winter and summer crop. So what I do is I start mid-January

in Killarney and dig through until June...And then, we go to Bundaberg and then we go to Atherton. By then, it's Christmas time and I start again."

Killarney is hilly, however, which presents obvious challenges. Dissatisfied with their options for harvesters, Wickham Farms created their own to suit the uneven terrain on which they farm.

"It's created for the environment that we have because we have some very steep country," Bruce says. "We've designed [a harvester] for ourselves here that will pick uphill and also downhill...It's nice, red soil, so it flows well."

Wickham Farms supplies several large Australian retailers, with whom Bruce says they have

*continued over page* ►

a very good relationship. They supply processed potatoes to Lite n' Easy and Sizzlers, and brushed potatoes to Coles.

"We've been supplying Coles direct since 1972," he says.

Despite seeking an area of Queensland where conditions are optimal for potato growing, Wickham Farms is not immune to destructive weather. Like many growers in the state, Wickham Farms was hit hard by the devastating Queensland floods of early 2011, an event from which their business has still not fully recovered.

"I didn't fare better than anyone else," Bruce says. "It was definitely a hard environment. There are a lot of farms from Atherton to New South Wales, and everyone was affected. On the Clintonvale farm, we were five feet underwater."

"We didn't really have a wet weather plan, because there had been a drought for the 10 years before," he says. "We'd gone from one extreme to the other, where the farms were literally nearly running out of water to be being underwater."

"Even this year's been hard for us," he says. "This year, we had no rain for nearly six months, and then, come Australia Day, it started to rain. For the four weeks after Australia Day, we had 38 inches."

"With these weather patterns as they are now, it's either really, really dry or really, really wet. We don't seem to have much of in-between," he says.

Despite having faced significant challenges over the years, Bruce says he could not imagine himself doing anything else with his life.

"I really love being outside," he says. "I'm not one for being in the shed. It's nice work and nice country to work in."

"It's fun to be challenged - gives you something to do," he says. "You put your whole heart into it, because when you're a farmer, you're not really in there just to make money. It's more of a lifestyle."

"It's hard to grow a crop and just walk away from it," he says. "It gives you hard times, but you get a lot of good times too."

Bruce says that he finds his role at Wickham Farms to be



Photographs by Callum Harris.

rewarding. In their packing and processing shed, Wickham Farms employs a lot of people from their small township.

"It's good...to help people out where you can and try to create employment," he says. "That's always handy because our small town has lost our soil mill [and] we've lost our abattoirs, so it's been pretty hard around here lately."

Bruce says that in five years' time, he hopes Wickham Farms will concentrate more heavily on the processing function of their business.

"I just believe that everybody wants to put it in the microwave and press the button," he says. "Everyone's time-poor these days."

Naturally, he is apprehensive about this move, however, in light of the recent closures of several key vegetable processing plants in Australia. He says that some of the "big growers" in the country have recently

been contacting him to sell their product.

"They say that the Chinese are coming to buy us out and take all the food back to China, but I think it's the other way round. I think the Chinese are feeding us," he says. "There seem to be more imports than what we're sending out."

"It's hard to tell the country to buy all Australian gear when they can get it so cheap from somewhere else," he says. "It's hard to compete with overseas markets when our labour's so high and our costs of production are so high. Everyone wants to make money for the shareholders. If they don't make money, then the shareholders will walk away and the business doesn't exist. So it's a bit of a catch-22."

Bruce says that cheap imports and high costs associated with production count amongst the biggest challenges for the Australian potato industry.





"You know, the price you sell your product for has been the same for 20 years, and everyone will tell you the same, whether they're in the grain industry or fruit and veggies. For a bag of potatoes, it was 25 dollars, 20 years ago, and we still sell a bag for 25 dollars," he says. "They all say, 'farm smarter, farm smarter,' but if I get much smarter I could just go and be a rocket scientist."

At this stage, Bruce is unsure about his industry's future.

"For the brushed potato industry, I see it probably falling a lot," he says. "The washed guys are doing a better, more professional job. It looks good on the shelf...The shopper likes to buy white, clean potatoes."

"Brushed was very big in Queensland for a lot of years, because the South Australian production couldn't get here looking fresh and good, whereas now it can, using hydro-coolers, refrigerated transport. They come up to Brisbane and they

look beautiful," he says.

Bruce also laments the dwindling numbers of young people entering the Australian potato industry. He says that today, a lot of Generation Y growers end up leaving the family farm to pursue work in the mining sector.

"There are a few guys that grow for me and they are 70 years old and on the farm still, and the boys are in the mines because they can't make enough money staying home with dad," he says. "We're losing a lot of our really good, experienced young people to the mining in Queensland, just because of what they pay, and probably because farm boys have really good experience with machinery and getting things done, so the mines definitely like them. They're already used to living in the country."

Bruce recognises that luring young people back to potatoes is not an easy task.

"I don't think anyone's got

a quick, easy answer for it to encourage them in," he says. "I try to start young people here, as many as I can, to get on the farm and help."

"It's pretty hard work [compared] to what people are used to doing these days," he says. "You're in the dirt, in the mud, you're working hard to do what you do, and there are a lot of jobs out there where you don't have to work as hard."

One thing Bruce does know is that he will not be leaving the state he has called home any time soon, nor will he leave the industry, despite the hardships it has presented him.

"That's what it's like, being a farmer," he says. "You'll never make a big fortune out of it. It's a good lifestyle, and you've got to be passionate about doing it. To watch something grow that you've planted yourself is a pretty good experience."



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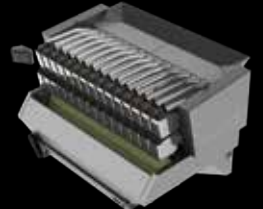
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# Q&A Young grower profile



**Names:** Sam and Ben Humphries

**Age:** 26 & 31

**Location:** Manya North (Murrayville), VIC

**Works:** KR & JM Humphries

**Grows:** Fresh washed potatoes



L-R: Sam and Ben Humphries.

How did you both become involved in the potato industry?

Sam: Mum and dad bought the farm that we're at in 1996. Grandpa was in the industry before that. He started in 1954. Our uncle still grows potatoes on the land that Grandpa started on, so our family's been in potatoes for years and years. Ben and I went to school in Adelaide, and then I did a Bachelor of Agriculture at the University of Adelaide while Ben came back to the farm.

What are your roles in the business?

Sam: I look after the consulting with the wash shed when we are harvesting, and Ben looks after more of the day-to-day operations. I also do a fair bit of the agronomy work with Ben - tractor work and everything else whenever I get time - because I work off the farm. Basically, everyone does a bit of everything in the family.

Ben: We try to limit the number of people we have involved in the farm to keep the costs down, so we do almost everything you can think of, from planting to harvest and everything in between.

Can you describe your average day at work?

Ben: If we're harvesting, we're going flat out - repairing bins, loading and unloading the bins, maintaining the equipment, that sort of thing. Quite often, we'll have crops growing at the same time that we have to irrigate and manage while still harvesting. We also run some merino sheep. They're good for keeping us busy too.

What do you most enjoy about working in the potato industry?

Ben: Probably when you receive good feedback and it's better than expectations. So when the shed rings up and says, "The skin quality's really good, the colour's fantastic", or the supermarkets really like them, or if they tell you they've used your particular potatoes in a photo for an advertising campaign, that type of thing - just validation that we're on the right path.

Sam: We enjoy doing absolutely everything. When the

crop goes off to the wash shed as Ben was saying and you get good feedback saying the potatoes were good quality, that really makes you happy.

## What are the biggest challenges you face as growers?

Sam: A big one at the moment is the cost of inputs, with the prices staying sort of stagnant over the last 10 years, and the costs of inputs going up significantly. One thing we've got the advantage of is we don't face the challenge of labour at the moment. We're very thankful that we don't have that issue.

Ben: We're challenged in terms of our physical isolation. We're actually completely isolated by scrub. We don't have any neighbours. We can't look over the fence to see what somebody else is doing and say "Hey this works or that works", and chat with them about it. The nearest potato farm is about 10 kilometres away through

scrub. It's also a marginal area for potato production, in terms of climate and soil, and the water itself is not of optimum quality. We face a lot of challenges because we suffer extreme heat during summer up here. We get heatwaves right into March, and we get pretty severe frost weather as well going into winter, like we're experiencing right now. It can be very challenging to grow at any time out here.

## What do you see as the biggest threats to the Australian potato industry?

Ben: We've seen a diminishing demand for fresh potatoes. The industry needs to grow demand for potatoes. Also, having to grow varieties that aren't agronomically robust but look pretty on the shelf can be challenging. It can be difficult to achieve good yields, but they pack out and they look fantastic,

but you might only be packing out small tonnages.

Sam: Potatoes have been marketed for a long time now as just a washed potato - a white potato or a red potato - and we see that as being a bit of an issue. They need to be marketed by their variety so that the consumers can select the right potato for the meal they're preparing. There are varieties out there that aren't designed to be a multi-purpose variety. They're designed just to be boiled, mashed, or roasted.

## How do you think more young people could be encouraged to take up jobs in horticulture and the potato industry in particular?

Sam: That's a challenging issue. I think because the costs of labour are increasing, how much further can we go in terms of using money as an attractant? I think we need to find other ways to make farming more interesting, maybe mixing up roles. A lot of young people don't like just doing one job. They don't like going out and sitting on a harvester all day. Also career progression is a big thing. To encourage young people in the industry, they need to be able to see a career path. Like all farming, there's not really a career path, whereas other industries like mining have got a strong path that people can follow. That is a big challenge.

## If you weren't working in the potato industry, what would you be doing?

Ben: We'd probably pursue other farming activities. We're interested in sheep production. We've got a passion for merinos. Sam's got a degree, so he'd probably still be working in agriculture somewhere or in the banking industry perhaps. I've got half a law degree. I might go back and finish that. But I can't see anything but potato production in our near future. We're fairly committed to it.

## Where do you see yourselves in five years?

Ben: I see us growing more potatoes more than we probably have to just to keep ahead of the game, because if we were to



Photographs by Andrew Beveridge.

upscale our equipment, it would require almost a doubling in our capital investment on the farm. We've still got some development to do. We'll just continue down the path we're already going down. But we would have to grow more potatoes to remain viable. That's just the way things are in most industries now. You either have to get bigger or get out.

Sam: Probably doing something in agriculture. I work off-farm, so I'd probably continue that to bring in a reliable income. Depending on where things go will depend on where I'm working. But also if we were able to expand our operation, I would think about moving back to the farm full-time.

# The Potato Industry Extension Program: On the road

OVER THREE DAYS IN JUNE, POTATO LEVY PAYERS AND OTHER INDUSTRY MEMBERS ATTENDED THREE R&D WORKSHOPS, ORGANISED BY THE POTATO INDUSTRY EXTENSION PROGRAM AND HELD IN KEY GROWING REGIONS OF VICTORIA, TASMANIA AND SOUTH AUSTRALIA.



Impact Fertilisers' Witold Petruszewicz.

A “road-show” of Potato Industry Extension Program workshops hosted highly-reputed research specialists in June and provided members of the Australian potato industry with a valuable opportunity to enrich their understanding of potato research activities, as well as to discuss some of the industry’s key challenges.

The first workshop took place on the evening of Tuesday 18 June at the American Hotel in Creswick, Victoria. The meeting was chaired by Kinglake potato grower and Chair of Seed Potatoes Victoria, Charles Exton, who welcomed guests and introduced the evening’s speakers.

Ben Callaghan, Plant Health Portfolio Manager at Horticulture Australia Limited, discussed the outcomes produced by the five sub-projects within the Australian Potato Research Program Phase 2 (APRP2), and outlined the process for potato levy funds being invested into beneficial research and

development projects.

Thorpdale potato grower, Stuart Jennings, recipient of the Coles Rising Star of the Year Award at the 2013 AUSVEG National Awards for Excellence, then discussed the Young Potato People (YPP) Facebook group and website that he has developed to connect growers and allow them to build networks and share experiences. Mr Jennings encouraged attendees to subscribe to the group, and his presentation was very well received.

Dr Tonya Wiechel from the Victorian Department of Environment and Primary Industries, delivered the latest findings from project PT09026 (part of APRP2), encompassing soil health and disease reduction, including the manipulation of nutrients to manage diseases such as Powdery scab. She said that APRP2’s primary aims included: the development of thresholds for soil nutrients to manage

soil-borne diseases in potatoes; enhancing the interpretation of disease risk as determined by DNA diagnostic tests; and the identification of biological factors that influence disease.

The following day, the road-show visited potato growers in Tasmania to continue the workshops. Devonport’s Quality Hotel Gateway hosted the second day’s proceedings, chaired by Scottsdale potato grower and Chair of TFGA’s Simplot Potato Growers Committee, Trevor Hall. Speakers at the Devonport workshop included Thirstane potato grower, Matt Ryan, who discussed on-farm innovations and business development strategies, and Gawler potato grower, John McKenna, who discussed his success in implementing controlled traffic farming on his property.

Dr Calum Wilson from the Tasmanian Institute of Agriculture (TIA) delivered an informative talk on a range of potato pest and disease

issues. He outlined several projects that the TIA is currently working on, including improving seed potato health, developing disease-resistant potatoes, and undertaking potato virus studies. He also said that the TIA is continuing its efforts to prevent Zebra chip disease establishing in Australia, through the monitoring of native psyllid populations, for the presence of the Tomato-potato psyllid (TPP). TPP has devastated the New Zealand industry but currently doesn’t exist here.

Following his presentation, Dr Wilson engaged attendees in an extensive Q&A session, where growers were given the valuable opportunity to ask him questions specific to their businesses and benefit from his expertise.

The last stop of the Potato Industry Extension Program’s R&D road-show was Coonawarra, South Australia (near Penola). Held at The Chardonnay Lodge, the South Australian workshop was chaired by Kalangadoo potato grower and Chair of the



AUSVEG CEO Richard Mulcahy.

South East Potato Growers' Association, Andrew Widdison. At the workshop, Impact Fertilisers' Witold Petruszewicz delivered a presentation about controlled release fertilisers, including results from recent crop trials and a comparison of competing technologies. AUSVEG CEO, Richard Mulcahy, discussed investments being made into the potato research and development program; the 2013 Potato Growers' Study Tour to the United States and Canada; and the proposed regional Potato Levy Payers' meetings.

AUSVEG also provided an update on the Potato Extension Program, and

outlined recent developments in precision agriculture, research demonstrating the nutritional benefits of potassium in potatoes, and genetically modified varieties. The presentation also identified high production, labour and input costs, and a shortage of skilled and unskilled labour, as some of the biggest challenges facing the industry.

It was noted that these difficulties were exacerbated by stagnant low prices received for product, and the low percentage of potatoes that are being exported overseas. Of course, international competition in the form of rising imports is another significant challenge that could not be ignored in the discussions.

AUSVEG highlighted the importance of industry research and development activities and the benefits that their outcomes can have for growers if adopted. It was said that current R&D is working to strengthen on-farm efficiency, and to help growers enhance their crop management practices, amongst others.

The R&D road-show proved a great success, with record numbers of growers attending each of the events. The Potato Extension Program encourages members of the Australian potato industry to continue to be involved with the program wherever possible. These kinds of educational activities aim to equip growers with the tools and knowledge necessary to maximise the efficiency, sustainability and profitability of their operation, both now and in the year ahead.



AUSVEG Deputy Chairman Mr Geoff Moar meets with growers from South Australia.



Attendees of the Potato Extension Program "road-show".



Mr Andrew Widdison, Chairman of the South East Potato Growers' Association conducts a Q&A session with growers.



For further information on upcoming Potato Extension events, please contact AUSVEG. Phone: (03) 9882 0277 Email: info@ausveg.com.au Project: PT11004

If you attended one of the recent potato R&D workshops, AUSVEG would like your feedback on how valuable you found the information shared at this event and the opportunity to attend. To complete a short online feedback survey, please go to the following website: [www.surveymonkey.com/s/CR3KSLB](http://www.surveymonkey.com/s/CR3KSLB)

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with Andrew Olley

# Nitrogen leaching in horticulture

IMPACT FERTILISERS' NATIONAL AGRONOMY SERVICES MANAGER, ANDREW OLLEY, DISCUSSES NITROGEN LEACHING IN HORTICULTURE.

Nitrogen (N) requirements for horticultural crops are high. With a large range of products and forms available to growers, making effective product choices can be daunting. Leaching of N, where water moves N out of the root zone, dramatically increases grower inputs of N, which thereby increases fertiliser costs.

Horticultural crops absorb the majority of N through their root systems from sources including Ammonium ( $\text{NH}_4^+$ ) and Nitrate ( $\text{NO}_3^-$ ). The aim of all N fertiliser application, whether via organic or manufactured products, is to have N that is available to plants for uptake as the crop requires it.

In the soil, an N cycle exists that is driven by microbial activities, which results in the formation of plant-available N. Depending on the type of N fertiliser used, the efficiency of crop tissue in converting N can be poor, especially due to soil-leaching, which can lead to N loss.

Urea, which is the most common form of manufactured N, requires conversion to Ammonium by enzymes in the soil and then to Nitrate for plant uptake.

Ammonium fertilisers, such as MAP, DAP, and Sulphate Ammonia provide water-soluble Ammonium, of which the crop can directly adsorb small quantities. The bulk of the Ammonium is converted to Nitrate for uptake.

Nitrate fertilisers, such as Calcium and Potassium Nitrate, do not require conversion in the soil and supply N as water-soluble Nitrate.

Organic fertilisers, such as manures, litters and composts, are also converted through the Nitrogen cycle to produce Ammonium and Nitrate.

Ammonium N and Nitrate N are both

charged particles in the soil and hence behave differently in their ability to bind to the soil, which is negatively charged. Ammonium N is positively charged and hence is able to resist N leaching out of the root zone, as it is held by the soil. Nitrate N is negatively charged and has limited soil-binding abilities, resulting in it readily moving with water out of the root zone.

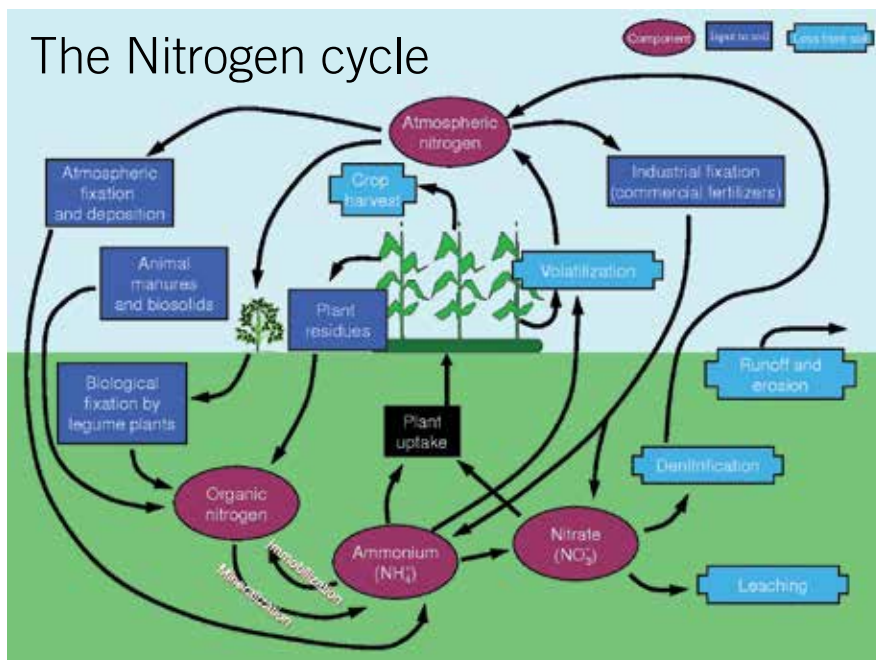
With these factors in mind, the choice of N fertiliser must be carefully considered, considering that although Nitrate N forms are readily taken up by the plant, they are also readily leached into deeper soil layers. Ammonium fertilisers are held on the soil, however, the soil bacteria in the Nitrogen cycle quickly convert it through the Nitrate, which readily leaches (as discussed).

Technologies have evolved to combat issues related to Nitrate loss. One such technology includes Nitrification Inhibitors, which greatly slow the microbe conversion of Ammonium to Nitrate. Another is the introduction of controlled release fertilisers, which bleed small doses of N on a daily basis.

Nitrification inhibitor treatments can be very useful in reducing Nitrate leaching, but a number of factors such as soil temperature and microbial load need to be taken into account. When these two variables are high, the inhibitor process has limited effectiveness, and when they are low, insufficient Nitrate may be available to the crop.

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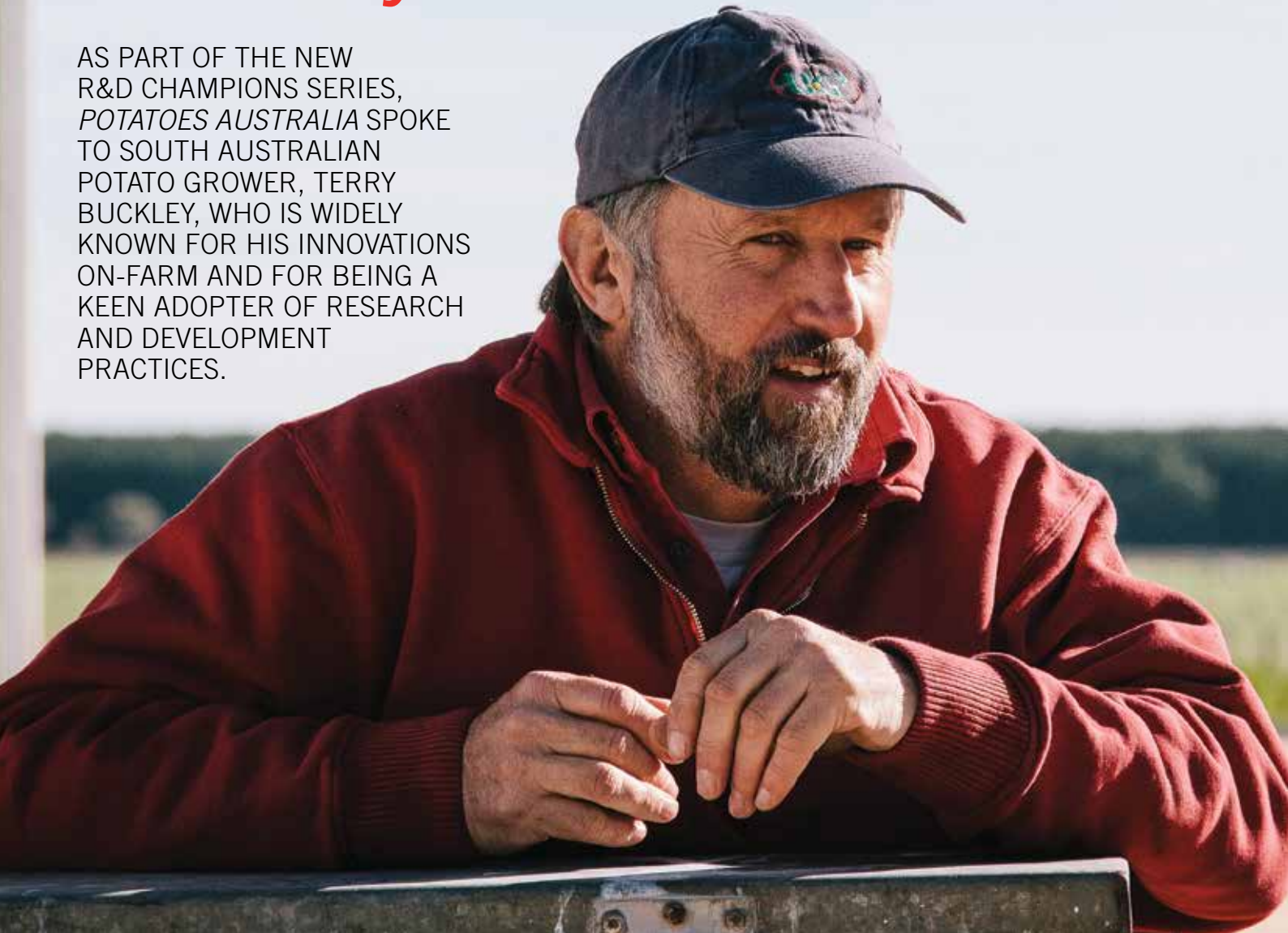
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## Potato Extension Program

R&amp;D Champion Series

# Buckley's chance

AS PART OF THE NEW R&D CHAMPIONS SERIES, *POTATOES AUSTRALIA* SPOKE TO SOUTH AUSTRALIAN POTATO GROWER, TERRY BUCKLEY, WHO IS WIDELY KNOWN FOR HIS INNOVATIONS ON-FARM AND FOR BEING A KEEN ADOPTER OF RESEARCH AND DEVELOPMENT PRACTICES.



In 1966, Terry Buckley and his family made the decision to shift their farming operation from the Adelaide Hills in South Australia to a property north-east of Mt Gambier, against the Victorian border. Farewelling 114 acres of land that had been worked by four generations of Buckleys before them, the family had outgrown the property due to their transition from dairy farming to potato production.

The 670 acres of land at their new property was a good

fit for the family's expanding enterprise. Four and a half decades on, and Terry Buckley and Co. - which includes his partner Jackie as resident agronomist, his brother and his parents - has established a successful potato producing business that has gone from strength to strength. It is an operation whose triumphs can be attributed to ingenuity and innovation, as well as the careful effort to get the fundamentals right.

Supplying for the processing

sector, Terry grows almost 20,000 tonnes of potatoes per year, all of which come from the one crop. Planting at the Buckleys' property occurs throughout October, with harvesting carried out from February through May.

"She's all pretty hard-charge here when it's planting time," says Terry.

Much of the winter months are spent in the workshop, where Terry's father and a team of employees go about rebuilding used trucks,

machinery and other farming equipment. Fittingly, the workshop itself is partly a rebuilt relic, the frame of which once housed a Woolworths supermarket.

"[The workshop] keeps our employees busy all through the winter time, so that we're not trying to hire a crew just for harvesting or just for planting," says Terry. "That gives us much better utilisation of our labour force, and then, when we do wish to harvest and so on, we've got highly skilled, competent



people working those machines in key areas.”

Terry describes his father (the chief machine builder) as a pioneer. He has built several harvesters over the decades, including a bulk harvester in the late 1950s and a couple of self-propelled harvesters, which, Terry explains proudly, could be the oldest of their kind in the world.

Building their own equipment has certainly saved the family money over the years. And by tailoring their equipment to their needs, it has also allowed their business to operate efficiently and assume the competitive position it now enjoys.

“We’ve never had an abundance of money in all of our career really, so we’ve always been trying to progress as quickly as we could,” says Terry. “In those [early] times, even if you had a fistful of money, there wasn’t machinery to buy.”

While Terry has played a role in building some of this machinery, particularly grading and sorting equipment, his big interest for more than 15 years has been soil health.

After experiencing problems early on with potato diseases such as nematodes, Pink rot, Verticillium and Powdery scab, Terry recognised that he would need to radically rethink his approach to soil health issues in order for the business to remain sustainable. “We were one of the early ones to mess our soils up,” Terry says. “We were growing on a four-year rotation with just Nitrogen, Phosphorous and Potash (NPK), like everyone did, and round and round you go, putting three elements in and taking about 15 out and... You can imagine that the sums aren’t going to work on that [basis] forever.”

The ensuing passion that Terry developed for improving the health of his soil has seen him play an active role in the industry-funded research that has been carried out in this area. He has been a strong advocate for the Australian potato industry investing in soil health-related R&D projects. About a decade ago, he took part in a think-tank session, held in Melbourne, which aimed to identify and develop new industry research priority areas. Ultimately, the ideas floated at



Photographs by Brandon Rooney.

this session were the catalyst for the implementation of the Australian Potato Research Program (Phases 1 and 2).

“My belief then was that soils and soil health and so on was the way to go, and that seems to have swayed a lot of the research in that direction,” he says. “I’m still absolutely of the belief that you’ve got to get [soil health] right or you’re just not a sustainable industry.”

Researchers conducting industry-funded work on soil health issues, including the collaborative project headed by the South Australian Research and Development Institute (SARDI) on soil-borne

pathogens (PT09023 - part of APRP2), have routinely visited Terry’s property in recent years as part of their work. This project has developed a DNA soil testing service called Predicta Pt, which became commercially available to processing potato growers earlier this month (see page 32 for more information).

Having been involved in the research component of this project, Terry recommends that other potato growers get involved and utilise the testing service, but hopes this kind of research will evolve even further as it goes along. He also concedes that his long-running

interest in soil health means that his own management practices are now at a more advanced stage than the service is perhaps targeting.

“We’ve really gone down the soil health thing with nutrient balances and so on as well as we can, and we intend to perhaps improve on that again if we can do so,” he says. “So there’ll be some of that new technology [i.e. the SARDI testing service] that I will be using, but quite a bit of the time we’ll be having faith in our own conviction as to what we’re doing.”

Terry’s commitment to soil health research, which he describes as “the last big exciting

*continued over page* ▶



frontier in many respects," has paid dividends. He continues to fine-tune his own practices in this area and says that he is now "getting a bit of a gain" on his yields every season as a result.

"We keep pretty good records of what we've done all the time and then often we'll look at what our yields and things have turned out like, and anything that stands out tends to be the basis of the next projects. So apart from adopting the industry-funded research, we really do quite a lot of it

ourselves here," says Terry.

While he is pleased that soil health has become more of a "mainstream" issue for the industry in recent years, with more resources and money being invested in this area, he is realistic about the speed at which growers are adopting new approaches to soil health management.

"It's like trying to give up smoking. Until you can really see a reason to change, you perhaps don't, and then when you do sort of change direction,

it's kind of a slow process," he says.

Innovation for the Buckley family extends beyond the farm gate. They have added value to their business by also diversifying the supply of their product. While two thirds of their potatoes are supplied to processing companies McCain and Frito-Lay Australia (owned by PepsiCo Inc.) for the domestic market, around 30 per cent is also exported (through the Frito-Lay system) to Asia, including Indonesia and Thailand. This is a proud achievement for Terry, who attributes their success in the export market to providing high-quality potatoes on a consistent and reliable basis.

"We've been doing it for a few years, and you know, without sort of meaning to show off, I think we've been sending them some very good spuds," he says.

Terry explains that there has been a marked increase in the Asian potato sectors in recent years, but producing potatoes in this part of the world has proven challenging for the local growers, thus prompting Australian producers to enter these markets.

"The local people have tried to grow their own spuds, and I'd be fully supporting them doing so, but you can imagine how difficult it would be in those tropical countries, with the humidity, especially at planting times, and with seed-piece breakdown and all the issues

that would come from that. The yields [there] are very low," he says.

Asked about future potato R&D initiatives in Australia, Terry says that the industry needs to investigate and maximise the efficiency of Australian potato growing operations.

"We need to do some proper benchmarking, which doesn't involve dollars and cents, but involves actual physical quantities of stuff," he says. "So you find out whether we've got too many tractors per acre or per tonne of spuds, or whether we're using too much water or too much fertiliser."

"[We need to determine] whether the issues are inside our farm gate or outside our farm gate; whether we're quite efficient producers but all our inputs are too expensive; or whether we are inefficient producers," he says.

Terry says that Australian growers are producing some of the dearest potatoes in the world, so it will be vital for the industry to capitalise on the unique selling points of our product.

"Unless something drastic changes, price is not going to get us there... So it's going to have to be a better product, a safer product, a more reliable product," he says. "If you look at all those aspects, you kind of get back to soils and good quality spuds, and better yields and that sort of thing. I don't think we can go a long way away from that."

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## Jim Mole: On Impact

JIM MOLE RECENTLY JOINED IMPACT FERTILISERS AS MANAGING DIRECTOR WITH A FOCUS ON TAKING THE BUSINESS TO THE NEXT LEVEL, WHILE MAINTAINING IMPORTANT RELATIONSHIPS WITH IMPACT'S KEY CUSTOMERS: AUSTRALIAN GROWERS. MR MOLE SPOKE TO FELICITY POWELL ABOUT HIS BACKGROUND IN HORTICULTURE, CHANGES IN THE FERTILISER INDUSTRY AND THE INTRODUCTION OF IMPACT FERTILISERS' LATEST CONTROLLED RELEASE FERTILISER PRODUCT.

A new recruit to the role of Managing Director at Impact Fertilisers, Jim Mole joins the fertiliser industry with knowledge and expertise stemming from a background in horticulture. Growing up on a vegetable and beef cattle farm in Mount Cotton, Queensland, Mr Mole is familiar with the importance that growers place on getting both efficiency and value for money from their fertilisers.

On joining the fertiliser industry after being outside of the Australian agricultural context for a number of years, Mr Mole says he took a hands-on approach in finding out more about his customers' wants and needs. He focused on the ways in which the company could improve its internal operations, before looking to foster Impact Fertilisers' important relationships with external stakeholders.

"I came into it pretty much 'eyes wide open'. I wanted to take a good look at firstly, who we were and what our capabilities were, and secondly, I wanted to meet as many customers as possible to find out what we were like to do business with," he says.

Upon joining the team at Impact Fertilisers earlier this year, Mr Mole's initial reaction regarding the fertiliser industry was that it was using the wrong sort of business model - one based on the assumption that fertiliser was a commodity, and therefore, that a fertiliser business should be operated like a logistics business.

"I don't sway with that," Mr Mole says. "At the end of the day, I think a lot of it will come down to the value that can be attributed to either service and quality, rather than this focus on a commodity that everybody's got and therefore goes for price,

price, price, every time."

Reflecting on the trends and issues he sees in the fertiliser industry, which are closely related to those of the horticulture industry in Australia, Mr Mole is thoughtful and direct. He stresses the need for the fertiliser industry to better recognise the difference between the use of fertilisers in broad-acre agriculture, as opposed to horticulture. One size does not fit all, he says.

"I think there's an opportunity for more specific advice around horticulture, given the more specific needs of horticultural crops, rather than the general feeling that 'here's a bucket of commodity fertiliser that we're throwing at broad-acre agriculture', which seems to be the norm," says Mr Mole.

"I also think there's a lot more environmental consciousness on the horticultural side of

things than we see in broad-acre agriculture, even though the scale of broad-acre agriculture is more significant," he says.

Considering the growing trend of environmental consciousness, according to Mr Mole, the need for traceability of food from the paddock to the plate is also going to become more significant.

"As consumers become more conscious of where their food is coming from, if we see any issues in that chain, people are going to want to know where it came from, and the inputs that were required," he says. "You can only do that through a fully-serviced model."

To create a fully-serviced model, Mr Mole says Impact Fertilisers' current goals are focused on taking a long-term look at the industry, with particular focus on the people who use their products - growers.

"The challenge for us is: 'how

do we work out what others further down the chain require? We're starting with the growers. How do we work out what they truly value, and deliver that, and stop doing things that aren't valued?" he asks.

"For a grower, it's really got to translate to cost first, and yield second," he says. "The smarter we can do things, the better off everyone's going to be in the process."

One of Mr Mole's key concerns is re-investing in people within the industry and diverting funding towards their development.

"If the industry's not profitable, it's not going to reinvest in its people for the longer term, and it's not going to

be investing in new products," he says.

"If you're going to offer specialist horticultural advice, and back that up with products that are more specifically targeting horticulture, you need to be able to fund that work either through development in the products or development in people," he says. "For me, right now, that's a bit of a hot-button issue."

Impact Fertilisers recently introduced Agrocote® controlled release fertilisers into the Australian market. When asked to list the benefits to growers of this product, Mr Mole says that in short, it comes down to a matter of efficiency.

"How efficiently can a crop

use fertilisers which, one, aren't cheap, and two, aren't endless in supply? I think that's the underlying benefit of controlled release technology. Agrocote® also allows growers to reduce the number of fertiliser applications, saving labour costs. Growers can get on with managing the business without the worry of exact fertiliser timings."

"I think it's our challenge to say: 'don't just bring things to the market, but bring things to the market that are of value', and if growers see that, well, they're not silly," he says. "You can't fool people. They either

see value or they don't."

In closing, Mr Mole says he and the team at Impact Fertilisers still have a lot more to offer growers.

"We see ourselves as a key contributor from the input side to horticulture. Horticulture is dear to my heart, and I think that we've got a significant contribution to make," he says. "Where in the past our focus might have been on broad-acre agriculture, we see horticulture as a real opportunity."

*Agrocote® is a registered trademark of Everris International BV.*

“ You can't fool people. They either see value or they don't. ”  
- Jim Mole.



Photographs by Simon Linge.



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Email: robf@uniphos.com

**Regional Manager – West (WA)**

**Neil McAlpine**

Mobile: 0437 500 115

Email: neilm@uniphos.com

**Business Development Manager  
Crop Manager – West (WA)**

**Blake O’Meagher**

Mobile: 0408 214 970

Email: blakeom@uniphos.com

**Regional Manager – South (VIC, TAS, SA)**

**Craig Trestrail**

Mobile: 0418 997 889

Email: craigt@uniphos.com

**Regional Manager – North (QLD, NT)**

**Brendan Coan**

Mobile: 0418 786 369

Email: brendanc@uniphos.com



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# A new approach to potato defect analysis

RESEARCHERS IN THE UNITED KINGDOM HAVE DEVELOPED A NEW PROTOTYPE SYSTEM FOR AUTOMATIC IDENTIFICATION OF POTATO DEFECTS TO IMPROVE QUALITY CONTROL TESTING.

## Importance of quality control

Fast and accurate quality control testing has become increasingly significant at the grower, processor and buyer ends of the supply chain, in order to maintain the health and quality of stored potatoes. Quality control testing is an important decision tool. It is used to check that a crop is suitable for storage, and it can help decide which market sector is the most appropriate to target.

For potato buyers, raw material intake quality control decisions are crucial for food safety. These decisions ensure potatoes can meet the pre-defined purchasing criteria, and define the grading required to meet and deliver on pre-defined contract tolerances or specifications. This helps the pack house to generate a

product efficiently, meeting the needs of its consumers.

## New automated technology

The University of Lincoln in the United Kingdom (UK), in conjunction with the team at

Sutton Bridge Crop Storage Research (SBCSR), has used Potato Council UK funding to develop a prototype system for automatic identification and quantification of potato defects to aid potato quality control testing.

The machine vision technology uses artificial

intelligence algorithms that automatically learn visual features including size, colour, texture and shape, and can detect unwanted blemishes and defects of potato tubers in real-time. The technology is adaptable, with the ability to conduct quality control during food packaging or potato





sampling.

“Our prototype system was developed using fairly standard computer hardware, as would be used in a high-end gamer PC for playing computer games,” said Professor Tom Duckett, from the University of Lincoln’s School of Computer Science.

“We adopted a standard low-cost web camera - costing around £60, or \$AU100 - for the image capture, together with a computer equipped with a graphics processing unit (GPU), on which we did a lot of the computationally more demanding image processing. What a GPU does in a games context is turn information into graphics or images, whereas we’re using it in a reverse way to extract information from images,” he said.

### Gathering valuable information

During testing, the system has

been able to reliably identify diseases on washed samples, such as Black dot, Silver scurf, Common scab and defects like greening. Professor Duckett said the system is different because it learns from samples provided from a human expert.

“With a few button presses the system can be trained to recognise different properties of interest... and then used to analyse potatoes in real-time,” he said.

“Of course, the software is not only limited to potatoes. We are currently exploring other opportunities to extend the approach to many different domains as well.”

### Commercial potential

The UK Technology Strategy Board (TSB) is now funding a project to develop commercial applications of the system. As a low-cost, off-the-shelf system, Dr Glyn Harper, pathologist at Potato Council UK, said

that the technology had good commercial potential.

“At SBCSR, we are excited that TSB funding will enable testing and development to get the equipment into the commercial environment,” he said.

“Traditionally, quality control assessments are done subjectively by hand and eye, but our prototype is a low-cost solution which could provide better consistency and reliability whilst speeding up the whole quality control process.”

### Future developments

Dr Harper said he would be working on evaluating the system for use in production line scanning in the future. Information gained can be fed back to the grower to inform returns plus future grading or growing decisions. The results would be automatically recorded to a database for record-keeping. The team working on

the system will also be testing different image types and other sensor data including colour images, X-ray and 3D scanning to extend and develop the range and scope of defect and disease identification.

Prof. Duckett said that the technology was “massively significant”, owing to the challenges of feeding a growing population which is expected to rise from 7.2 billion at present to about 9.6 billion by 2050 (according to the United Nations’ latest World Population Prospects report).

“Developments like our trainable vision system will ultimately lead to safer food, less waste, more efficient food production, and better use of natural resources,” said Prof. Duckett.



For further information go to [www.potato.org.uk/crop-storage/about-sutton-bridge-csr](http://www.potato.org.uk/crop-storage/about-sutton-bridge-csr)



Microscopic image of *Spongospora subterranea* (Powdery scab) spores within root hairs of a potato plant.

# Predicting potato pathogens

INNOVATIVE DNA SOIL TESTING TECHNOLOGY THAT ALLOWS POTATO GROWERS TO TEST FOR SOIL-BORNE PATHOGENS THAT CAUSE POWDERY SCAB, BLACK DOT AND ROOT KNOT NEMATODE, WILL HELP GROWERS MAKE MORE INFORMED DECISIONS ABOUT POTENTIAL DISEASE RISK BEFORE PLANTING CROPS, WRITES KAREN SHAW.

Soil-borne diseases such as Powdery scab, Black dot and Root knot nematode currently cause an estimated \$50 million in economic losses annually to the Australian processed potato industry. But if growers understand more about what pathogens are contained in their soil before planting, they can be better informed about where to plant their crops and try to manage the disease risk.

South Australian Research and Development Institute (SARDI) research chief, Dr

Kathy Ophel Keller, believes the newly available testing service, called Predicta Pt, will help growers to do just this.

“The diagnostic tests are really about assessing risk,” she said. “It’s not a prediction of what disease will necessarily develop because other factors such as climate also come into play.”

The test for three pathogens that can lead to Powdery scab, Root knot nematode and Black dot is currently being offered by SARDI at \$180 per soil sample.



Powdery scab symptoms.





Powdery scab symptoms.



SARDI researchers Dr Kathy Ophel Keller and Mike Rettke with the new kit.



An impression of how agronomists, growers and others will be able to use the manual on their laptop or tablet.

prerequisite for using the service involved completing a certificate-based training workshop. As well as soil sampling techniques, participants were instructed on interpreting the results of the DNA tests.

To help with this, each participant received an advisor manual, which includes important information about disease biology and management and has a detailed guide to help interpret the test results and evaluate the disease risk.

Once the soil is tested at SARDI's labs, the resultant analysis provides a reading of whether levels for a certain pathogen are low, medium-high or high. For example, if a diagnostic test result reported a low rating level of Powdery scab, then strategies to manage the risk of it appearing in crops might include planting a variety that's less susceptible to the disease. However, if the test results showed medium-high levels, then the best option for the grower might be to select a different paddock.

"While we can measure the level of each of the target organisms in the soil sample and provide information on whether that constitutes a high or low risk of disease developing, there are other factors such as climate and variety that can also increase or decrease the disease risk," Dr Ophel Keller said. "It's vital that these variables are taken into account, together with the test results when evaluating disease risk in a potato crop."

Kalangadoo potato grower, Andrew Widdison, has participated in the trialing and development of the diagnostic tests. He believes the tests are useful and plans to continue using the service.

"It's reliable and provides a good assessment of what's in the soil. Then we can make the decisions," he said.

But he is keen to see more research undertaken into how farmers can better manage disease.

"What happens when you have a problem? Sometimes the options are limited," he said. "If the soil test results come back reporting a high pathogen level, what exactly can you do except avoid that paddock altogether?"

Simple Research and

Testing for additional pathogens is expected to be introduced over the next two years.

The recent launch of the DNA tests is the result of an eight-year research project, funded by HAL using the National Processed Potato Levy, voluntary contributions from industry and matched funds from the Australian Government. SARDI, the University of Tasmania/Tasmanian Institute of Agriculture and the Department of Environment and Primary Industries Victoria have been the key collaborators in the project.

Part of Predicta Pt's rollout over the past month and a

*continued over page* ▶

Development Manager, Frank Mulcahy, has been using DNA soil analysis for at least four years and says it's an excellent prediction tool.

"It allows growers to measure whether or not a pathogen is present in the soil," he said. "But it won't necessarily tell

farmers the entire risk picture of growing a crop."

"If the disease is present, there is potential for a problem," he said. "But you could also have a low level of disease present and still have a problem or a moderate level and not have a problem at all. Disease

is often related to factors impossible to control such as the weather."

Dr Ophel Keller believes the testing service offers potential to help growers reduce loss associated with disease.

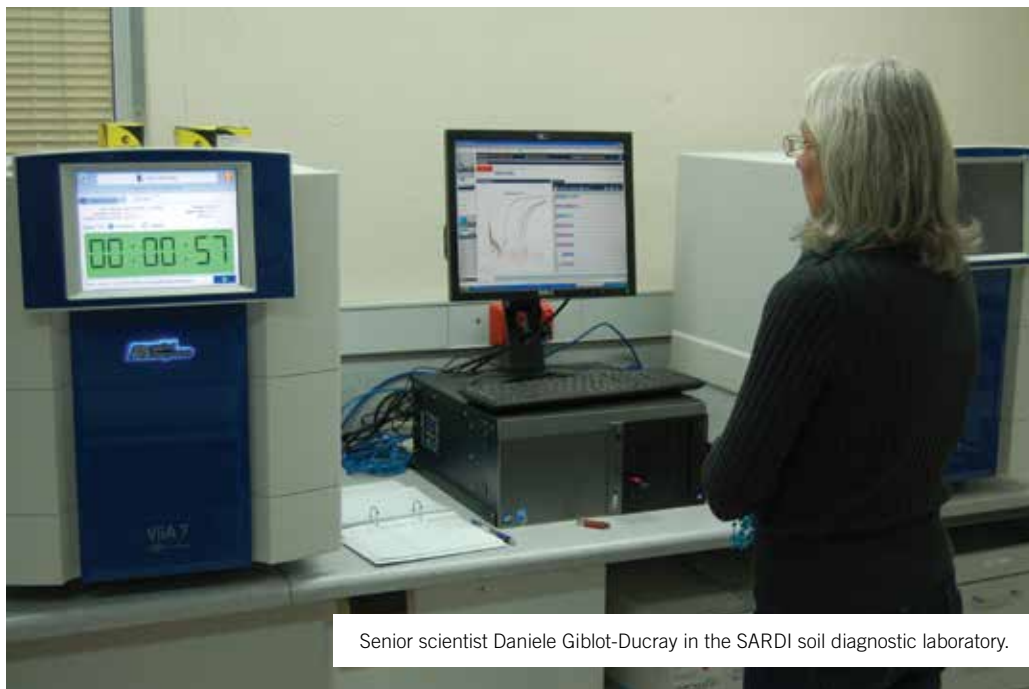
"More training workshops can be organised for those who

may have missed the first round and are interested in using the service," she said.

## THE BOTTOM LINE

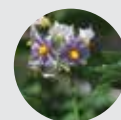
- A new pre-planting soil testing service is available to help potato growers manage the risk of potato diseases associated with soil-borne pathogens including Powdery scab, Black dot and Root knot nematode.
- Tests for other disease-causing pathogens are expected to be available over the next two years.
- Attending a certificate-based training workshop is a prerequisite to accessing the test service.

**i** For further information about the training workshops or to obtain the biosecure soil sampling kits:  
Contact: Michael Rettke  
Phone: (08) 8303 9414  
Email: michael.rettke@sa.gov.au



Senior scientist Daniele Giblot-Ducray in the SARDI soil diagnostic laboratory.

# CALENDAR of events



## September 2013 (date TBC)

### Potato Extension Program - R&D Workshop

**Where:** Pemberton, WA

**Further information:**  
AUSVEG (03) 9882 0277 or  
info@ausveg.com.au

## 10 - 12 September 2013

### Simplot Potato Futures

**Where:** TAS (Ulverstone; Longford; Scottsdale)

**Further information:**  
www.simplot.com.au



## 11 - 12 September 2013

### Potato Europe 2013

**Where:** Emmeloord, The Netherlands

**Further information:**  
www.potatoeurope.com/165.html

## 12 - 16 November 2013

### AGRITECHNICA

**Where:** Hanover, Germany

**Further information:**  
www.agritechnica.com/home-en.html

## 17 - 22 August 2014

### International Horticultural Congress

**Where:** Brisbane, QLD

**Further information:**  
www.ihc2014.org

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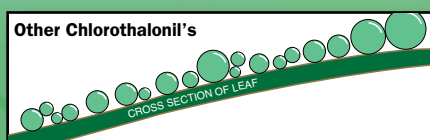
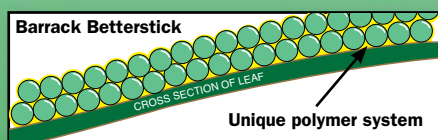
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