$12.95 AUS

WINTER 2018 ISSUE 13

THE AUSTRALIAN AGRONOMIST MAGAZINE

Sexy sterile fruit flies enlisted in fruit fly fight

Australian scientists discover 'hybrid swarm' in global mega-pest

Weed competitive wheat is now one step closer

BAYER

Aviator® Xpro®

Take your yield to new heights

The new benchmark for foliar disease management.

Aviator® Xpro® will deliver class-leading blackleg and sclerotinia disease control in canola setting the crops up for an extended period of clean and healthy growth leading to;

- **Unbeatable yields**
- **High return on investments**

WIN 1 OF 10 POLARIS* RANGER FARM BUGGIES

in our **Year** *of the* **Grower Promotion**

Receive one ticket into the draw for every $100 spent on participating Bayer Crop Science products.

To enter visit www.yearofthegrower.com.au

Now registered for use in;

Cereals (Wheat/barley)
Pulses (Chickpea/Field pea/Faba beans/Lentils)

For more information visit www.aviatorxpro.com.au

*Conditions apply, see www.yearofthegrower.com.au. Must be 18+ and a growing/farming business in AU to enter. Starts: 12/3/18 Ends: 7/3/19. Retain receipt/s. Draws: 18/9/18 and 11/3/19 at 11am at Engage Australia, L8, 56 Clarence Street Sydney NSW 2000. Winners published at www.yearofthegrower.com.au on 21/9/18 and 14/3/19. Prize: Polaris Ranger 570 HD off-road vehicle valued at $16,490 (1 per region, 5 per draw, 10 in total, see full terms for details). Promoter: Bayer CropScience Pty Ltd (ABN 87 000 226 022) Level 1, 8 Redfern Road, Hawthorn East, VIC 3123. NSW Permit No. LTPS/18/21472, ACT Permit No. TP18/00072, SA Permit No. T18/51

CONTENTS

THE AUSTRALIAN AGRONOMIST

PO BOX 812 Strathfieldsaye VIC Australia 3551 **P:** 03 5441 8166 **E:** info@theaustralianagronomist.com **W:** www.theaustralianagronomist.com

Design & Advertising
Michael Cook
Email: michael@theaustralianagronomist.com
Phone: 03 5441 8166

Publisher
Paul Banks
Email: paul@theaustralianagronomist.com
Phone: 03 5441 8166

NEW INSIGHTS REVEAL WHY CEREALS ARE MORE STRESS TOLERANT THAN OTHER FOOD CROPS

WHETHER BARLEY, WHEAT, MAIZE OR RICE, THE GRASS FAMILY INCLUDES ALL THE MAJOR CEREAL CROPS THAT ARE VITAL FOR FEEDING THE WORLD'S POPULATION. FARMERS PRODUCE 80% OF ALL PLANT-BASED FOODS FROM GRASS CROPS. THIS SUCCESS IS DUE IN PART TO THE PLANTS' ABILITY TO ADJUST MORE QUICKLY TO DRY CONDITIONS AND SUSTAIN LACK OF WATER BETTER THAN OTHER PLANTS.

But why are grasses more tolerant to water scarcity? Can other food crops be bred for this property, too, to assure or boost agricultural yields in the future? This could be important in the face of a growing world population and climate change that will entail more periods of dry and hot weather.

The plant researchers Professor Rainer Hedrich, Professor Dietmar Geiger and Dr. Peter Ache from Julius-Maximilians-Universität Würzburg (JMU) in Bavaria, Germany, are looking into these questions. They studied brewing barley to determine why grasses are more stress-tolerant and are therefore 'better' crop plants than potatoes and the like.

Two amino acids make the difference

The scientists discovered that this difference can be attributed to the protein SLAC1 of the guard cells. Just two amino acids, the building blocks that make up proteins, are responsible for the plant's drought tolerance.

"We now want to find out whether this small difference can be harnessed to make potatoes, tomatoes or rapeseed more tolerant to stress as well," said Rainer.

The new insights have been published in the prestigious journal Current Biology where the three researchers describe how they pinpointed the tiny difference between grasses and other plants.

Ion transport is a key process

The JMU researchers began scrutinising microscopically small leaf pores called stomata. These openings admit carbon dioxide for photosynthesis into the plant. But they also serve as outlets for water.

To prevent losing too much water through evaporation, land plants have learned during evolution to actively open and close their stomata using special guard cells. Membrane proteins such as SLAC1 play a key role in this regulatory process. Acting like channels, they guide ions into and out of the cells.

Rainer is convinced that a basic understanding of the molecular goings-on during ion transport through the plasma membrane of the guard cells is the key to improving the drought tolerance and yields of agricultural crop plants.

Ion shuttles make leaf pores more efficient

The stomata of grasses have a special feature. The pore is bordered by two pairs of cells where other plants only have a single cell pair. Grass cereals boast two dumbbell-shaped guard cells that form and regulate the pore. Additionally, they are flanked by two subsidiary cells.

The JMU researchers have demonstrated that the subsidiary cells absorb and store the potassium and chloride from the guard cells when the pore closes. When the stoma opens, they pass the ions back to the guard cells.

“Our cereals use the subsidiary cells as a dynamic reservoir for osmotically active ions. This ion shuttle service between guard cell and subsidiary cell allows the plant to regulate the pores particularly efficiently and quickly,” Dietmar explained.

Two measuring systems for more drought resistance

There is a second mechanism that makes grasses more tolerant to dry conditions. When water is scarce, plants produce the stress hormone ABA (abscisic acid). Inside the guard cells, it activates the ion channels of the SLAC1 family, thereby initiating the closing of the stomata to prevent the plant from withering within a matter of minutes.

“Interestingly, we found that nitrate must be present in brewing barley and other grass cereals in addition to ABA to enable the pore to close,” Peter said.

The nitrate concentration allows the barley to measure the shape the photosynthesis is in. If it works smoothly, nitrate levels are low.

Barley hence relies on two measuring systems. It uses ABA to register water availability and nitrate to assess photosynthesis performance.

“By combining the two, the barley is better able than other plants to negotiate between the extremes of ‘dying of hunger’ and ‘dying of thirst’ when facing water scarcity,” Rainer explained.

Testing the nitrate sensor in other plants

Which mechanism is responsible for the difference in stoma regulation at the molecular level? To answer this, the researchers analysed SLAC1 channels of various herbaceous plants compared to grasses. This allowed them to identify the ‘nitrate sensor’ of the grasses. It is comprised of a motif of two amino acids which first occurred in moss during evolution and was subsequently further optimised to give the guard cells their unique properties.

In a next step, the team of researchers wants to establish whether herbaceous agricultural crops also benefit from having a nitrate sensor. To achieve this, the scientists want to fit arabidopsis plants that lack the SLAC1 channel with the SLAC1 channel of barley.

“If this step increases their stress tolerance, we can consider breeding optimised potatoes, tomatoes or rapeseed,” Rainer said in conclusion.

“We now want to find out whether this small difference can be harnessed to make potatoes, tomatoes or rapeseed more tolerant to stress as well.”

Professor Rainer Hedrich

IRRIGATED WHEAT STUDY YIELDS VALUABLE TIPS FOR NORTHERN GROWERS

NORTHERN GROWERS LOOKING TO IRRIGATE WHEAT HAVE BEEN ADVISED THAT THE MOST PROFITABLE IRRIGATION STRATEGY DEPENDS ON HOW MUCH EXTRA WATER IS AVAILABLE TO THE CROP AS STORED SOIL WATER, AND HOW MUCH RAINFALL THE CROP RECEIVES.

The finding is one of several conclusions from the Grains Research and Development Corporation investment into 'Better Irrigated Wheat Agronomy', a project led by CSIRO in response to the widespread failure of large areas of fully irrigated wheat in the northern region in 2008.

CSIRO Project Team Leader Allan Peake said that the most important decision for irrigated wheat growers was whether the crop needed to be fully irrigated.

The five year research project assessed a range of factors to determine their impact on irrigated wheat in vertosol soils in Queensland and northern New South Wales, including the risk of lodging, applying nitrogen (N) for improved protein and yields, the use of plant growth regulators (PGRs) and the selection of lodging resistant wheat varieties.

Allan said that the most important decision for irrigated wheat growers was whether the crop needed to be fully irrigated, particularly when they have several paddocks available for irrigated wheat but not enough water to fully irrigate them all.

He said deficit irrigation, a strategy where a larger area of crop is grown and less irrigation water is applied per hectare, is comparatively less likely to cause lodging and can be more profitable in regions or years where in-crop rainfall is more than 150mm, and when significant amounts of stored water are available in the soil profile before sowing. In drier conditions, they found that applying more irrigation to a smaller area was likely to be the better option.

However, he warned that both deficit and fully irrigated paddocks can be susceptible to lodging, and growers should use a range of agronomic tools to reduce lodging risk including variety choice, irrigation strategy, N application strategy, plant population, and PGRs.

The two most lodging resistant varieties available and tested as part of this research for Queensland and northern New South Wales are LRPB Cobra and Dart, but these can still lodge under extreme conditions.

Researchers also found:

- Varieties respond differently to in-crop N application. Suntop, Wallup, Kennedy and LRPB Cobra often had higher yields when N was applied in-crop but Mitch and LRPB Lancer did not. In-crop N application was found to increase grain protein by 0.4% for most varieties and locations.
- The response to PGRs was influenced by N and irrigation strategy. When lodging was severe, PGRs gave the biggest yield response (0.6 t/ha) on well irrigated paddocks with more than 120 kg/ha of N available at sowing. Even when there was little or no lodging, PGRs improved yield by 0.32 t/ha on average in paddocks with more than 120 kg/ha of N at sowing. However, PGRs had a negative effect on yield for some varieties in an experiment that was only partially irrigated and experienced lower yields in the region of 5.5 t/ha.
- Growers may achieve improved yield by using row spacings as narrow as 19cm compared to 28cm or 38cm, but the results were not consistent across varieties and locations. Achieving a yield benefit from narrow row spacing was more likely when lodging was avoided.

“The study used the concept of ‘risk efficiency’ ie: the balance between risk and potential profit, to determine the best strategy, rather than using a long-term average gross margin.”

A study published by CSIRO in 2016 investigated whether full irrigation or deficit irrigation was more profitable for northern region growers.

Using the APSIM crop model, a range of whole-farm irrigation scenarios were investigated, with access to the same amount of irrigation water – 1300 megalitres (ML) – that was assumed to be in storage at sowing, and 1000 hectares of land were available to be irrigated.

The water was used to fully irrigate a smaller area, or partially irrigate increasingly larger areas.

A long-term climate data set was used to see if a particular strategy worked for different seasons (i.e. wet, dry or average), for three locations: Emerald, Goondiwindi and Gunnedah. A wheat price of $250 per tonne at the farm gate was assumed and two different water cost scenarios compared, where low cost water was $40/ML and expensive water was $120/ML.

The simulations were also conducted for two different amounts of stored soil water at sowing, either zero or 100mm. The average growing season rainfall was 100mm at Emerald, 174mm at Goondiwindi, and 212mm at Gunnedah.

The study used the concept of ‘risk efficiency’ ie: the balance between risk and potential profit, to determine the best strategy, rather than using a long-term average gross margin.

Generally, it showed that in a dry, warm environment (Emerald), the most risk-efficient strategy was to apply more irrigation water to a smaller area of land.

At Gunnedah, a cooler environment with higher and more reliable winter rainfall, the most risk-efficient strategy was to deficit irrigate, spreading water over a wider area. When water became more expensive, risk-efficiency was improved by applying more water to a smaller crop area.

Allan explained it could seem counter-intuitive to apply more irrigations per hectare to a smaller crop area to produce better profits when the price of water is more expensive.

“Full irrigation is more likely to be the most risk-efficient option when rainfall and stored soil water are limited and the cost of water is high, because larger areas of partially irrigated wheat have greater amounts of ‘wasted’ water through evaporation,” he said.

“Smaller areas of fully irrigated wheat are also more likely to conserve water in the soil which is then available for the next crop, and we valued this remaining stored water at the same price as irrigation water in the study. But at the end of the day, the price of water was less important than the amount of in-crop rainfall and stored water at sowing when it comes to deciding on the best irrigation strategy,” he went on to explain.

Allan said it was important for irrigated wheat growers and agronomists to read the full project results booklet, and to test new techniques and varieties on a small scale first.

“Unfortunately there are no risk-free options in farming, so it is important for growers and agronomists to familiarise themselves with all of the issues before they grow an irrigated wheat crop,” he said in conclusion.

PHENOLOGY RESEARCH OFFERS GROWERS VALUABLE YIELD INSIGHTS

Maximising wheat yields in the southern New South Wales cropping belt starts with one key discipline - knowing your variety.

An understanding of a variety's genetic make-up can help growers assess the potential impact of environmental influences such as vernalisation and photoperiod which affect early development phases and flowering, and match a sowing date accordingly.

A collaborative research investment between the Grains Research and Development Corporation (GRDC) and New South Wales Department of Primary Industries (NSW DPI) has been investigating the phenology and yield responses to sowing date for a core set of wheat genotypes in southern New South Wales.

The research is part of a broader GRDC investment aimed at optimising grain yield potential in the northern grains region through better matching sowing management with likely varietal responses to environmental conditions. Last year's trial work involved field experiments at eight sites stretching from southern New South Wales to northern New South Wales, as well as central and southern Queensland.

NSW DPI crop physiologist Dr Felicity Harris said a diversity of geographic sites was chosen to give researchers critical data about how different varieties perform in different regions, with a focus on time of sowing, flowering and yield responses.

"The geographic diversity of trial locations is a key element of this project and will allow us to provide growers with data that helps inform on-farm decision making in terms of varietal selection and time of sowing," Felicity said.

While 2017 trial results from some sites are still being assessed, Felicity presented the results from three southern New South Wales sites, Wagga Wagga, Cudal and Condobolin, at a recent GRDC Grains Research Update.

At each of the sites, a range of genotypes with varied development and with different combinations of vernalisation and photoperiod genes were sown on three dates, April 20, May 5 and May 18, with an additional early sowing at the Wagga Wagga site on April 10.

Felicity said the trial work showed differences in grain yield responses to sowing time of wheat genotypes across growing environments in southern New South Wales, suggesting that particular varieties could be exploited by grain growers.

"Genotypes vary in their response to vernalisation and photoperiod which influences early development phases as well as flowering time," Felicity said.

"The extreme frost conditions experienced in 2017 had a significant effect on grain yields at the three experimental sites and highlighted the importance of the timing and length of pre-flowering development phases. Matching variety and sowing time to achieve flowering at an appropriate time for each growing environment is currently the most effective management strategy in optimising grain yields," she went on to explain.

"That said, future research will investigate the contribution of pre-flowering phases to yield development which will give growers an even wider spectrum of information on which to base variety management decisions," Felicity added.

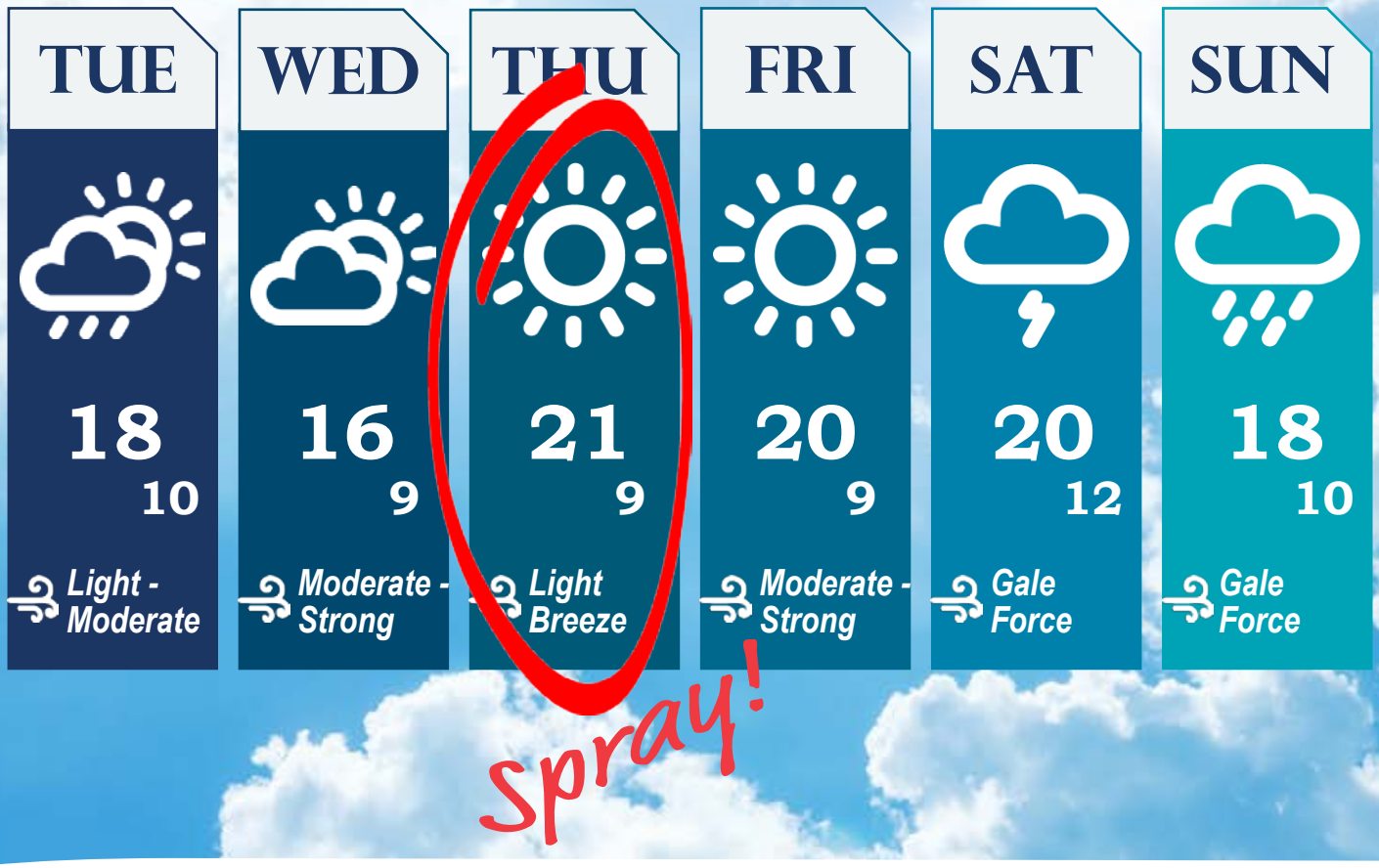
Genotypes responsive to vernalisation require a period of cold temperatures (accumulated most rapidly in the range 3°C to 10°C) to progress from vegetative to reproductive development, whilst time to flowering is accelerated during long days in photoperiod sensitive genotypes.

The range in development patterns in Australian wheat varieties, due to responses to vernalisation and photoperiod, provides growers with flexibility in their sowing window according to Felicity.

"Grain yield is maximised when genotype and sowing date are matched so that flowering occurs when the risk of early frost damage and later, heat and moisture damage, is low," she said.

"Generally, in southern New South Wales, winter wheat can be sown from early March through to April, slow developing spring wheat from late April to early May and mid-fast developing wheat from early May onwards and all flower within an optimal window," concluded Felicity.

WHEN YOU'VE ONLY GOT ONE CHANCE



Rexade™ herbicide with Arylex™ active, the ONE herbicide for wheat that:

- Controls Wild Oats, Brome grass and Phalaris
- Suppresses 3 other grass weeds
- Controls more than 24 broadleaf weeds
- Compatible with many broadleaf herbicides
- Allows freedom in winter crop rotations
- Comes in a user friendly GoDRI™ formulation

Giving you the opportunity to spray once and have the job done.

Registered for use on triticale and wheat, except durum varieties.

Rexade™
HERBICIDE
ARYLEX™ ACTIVE

DOW®
Dow AgroSciences

Solutions for the Growing World

AUSTRALIAN SCIENTISTS DISCOVER 'HYBRID SWARM' IN GLOBAL MEGA-PEST

ONE OF THE PESTS, THE COTTON BOLLWORM, IS WIDESPREAD IN AFRICA, ASIA AND EUROPE AND CAUSES DAMAGE TO OVER 100 CROPS, INCLUDING CORN, COTTON, TOMATO AND SOYBEAN.

The damage and controlling the pest costs billions of dollars a year. It is extremely mobile and has developed resistance to all pesticides used against it.

The other pest, the corn earworm, is a native of the Americas and has comparatively limited resistance and host range.

However, the combination of the two, in a novel hybrid with unlimited geographical boundaries is cause for major concern.

The CSIRO researchers in a paper published in the Proceedings of the National Academy of Sciences of the USA provides clear evidence of the hybridisation of the two moths in Brazil.

"A hybrid such as this could go completely undetected should it invade another country. It is critical that we look beyond our own backyard to help fortify Australia's defense and response to biosecurity threats," Research Director leading CSIRO's Biosecurity Risk Evaluation and Preparedness Program Dr Paul De Barro said.

"As Australia's national science agency, we are constantly looking for new ways to protect the nation and technology like genome sequencing, is helping to tip the scales in our favour."

While a combination of insecticides currently controls these pests well in Australia, it is important to study the pests themselves for sustainable long-term management world-wide.

The scientists confirmed that among the group of caterpillars studied, every individual was a hybrid.

"No two hybrids were the same suggesting a 'hybrid swarm' where multiple versions of different hybrids can be present within one population," fellow CSIRO Scientist Dr Tom Walsh said.

The bollworm, commonly found in Australia, attacks more crops and develops much more resistance to pesticides than the earworm. A concerning finding among the Brazilian hybrids was that one was 51 per cent earworm but included a known resistance gene from the bollworm.

“No two hybrids were the same suggesting a ‘hybrid swarm’ where multiple versions of different hybrids can be present within one population.”

Dr Tom Walsh

Lead author of the paper Dr Craig Anderson, a former CSIRO scientist now based at The University of Edinburgh, believes the hybrid study has wide-ranging implications for the agricultural community across the Americas.

“On top of the impact already felt in South America, recent estimates that 65 per cent of the USA’s agricultural output is at risk of being affected by the bollworm demonstrates that this work has the potential to instigate changes to research priorities that will have direct ramifications for the people of America, through the food on their tables and the clothes on their backs,” Dr Anderson said.

LONG TERM TRIAL HIGHLIGHTS TAKING A SYSTEMS APPROACH TO CROP NUTRITION

NEW RESULTS FROM A BARLEY CROP IN THE LONG-RUNNING FERTILISER EXPERIMENT AT 'COLONSAY' ON THE DARLING DOWNS IN QUEENSLAND ARE HIGHLIGHTING THE VALUE OF TAKING A SYSTEMS APPROACH TO CROP NUTRITION.

Barley was grown in Incitec Pivot Fertilisers' long-term nutrition trial last year, and while it was limited by moisture, the results showed the benefits of maintaining adequate nutrition for good yields and the health of the cropping system longer term.

Bede O'Mara, subtropical systems agronomist for Incitec Pivot Fertilisers, said a review of the results showed the pros and cons of different strategies in a dry winter.

"It's the dirt, not the fert, which is making a difference at this site. It's the cumulative effect of running the cropping system in balance," Bede said.

He identified the nutrition combination closest to balance after more than 30 years of summer and winter crops in this experiment as 80 kg/ha of nitrogen and 10 kg/ha of phosphorus.

"But every year is different, and we are never going to know what the season has in store for us," Bede said.

"In the long run at this site, the highest yielding results from 13 winter cereal crops under all fallow lengths have been achieved when using 120 kg/ha of nitrogen and 20 kg/ha of phosphorus," he added.

In 2017, coming after a mungbean crop, with low starting soil moisture and only 153 mm of growing season rainfall, this combination still provided the best yields in the Scope CL barley trial at 1.9 t/ha.

However, it produced only slightly more grain than the crop grown with the least inputs, 40 kg/ha of nitrogen and 5 kg/ha of phosphorus, which yielded 1.8 t/ha.

Bede said the barley yields were limited by moisture, not nutrition in 2017.

"If we had received more rain, even just an average season, crops grown with many of the higher fertiliser rates and where there was better soil fertility would have had the potential to yield much higher," he explained.

Historically, barley has produced up to 3.6 t/ha at the site.

He said gross returns net of fertiliser cost for the 120 kg/ha of nitrogen and 20 kg/ha of phosphorus treatment in last year's barley were solid at $379/ha.

Bede calculated net returns from the trial based on fertiliser prices at the time of planting in June last year ($2.71/kg of phosphorus and $1.02/kg of nitrogen) and $290/t on-farm for F2 barley.

Growing the crop with less inputs (40 kg/ha of nitrogen and 5 kg/ha of phosphorus) improved gross returns net of fertiliser cost to $466/ha.

"You could say reducing rates last year would have worked well, but we only know that in hindsight," Bede said.

"To make that call at the start of the season means limiting yields and returns in average or above average seasons. Using 40 kg/ha of nitrogen would also have left little to no nitrogen in the soil tank for the following season," he added.

By comparison, he said the 80 kg/ha of nitrogen and 120 kg/ha of nitrogen treatments left positive nutrient balances of 40 and 80 kg/ha of nitrogen respectively, given the lower yielding, dry season.

This 'left over' nitrogen will contribute to the 2018 crop, which is likely to be chickpeas.

“In the long run at this site, the highest yielding results from 13 winter cereal crops under all fallow lengths have been achieved when using 120 kg/ha of nitrogen and 20 kg/ha of phosphorus.”

Bede O’Mara

Incitec Pivot Fertilisers’ long-term nutrition trial was established in 1985 at ‘Colonsay’. More than 30 crops have been grown in the experiment, including five barley crops and six wheat crops, a range of summer crops, pulses and cotton.

In each crop, four nitrogen rates (0, 40, 80 and 120 kg/ha) and four phosphorus rates (0, 5, 10 and 20 kg/ha) are used, with Bede measuring the responses for each rate of nitrogen and phosphorus alone and in combination.

“All the better barley yields last year were achieved where nitrogen was used in combination with phosphorus. This is something we’ve seen consistently in this long-term experiment,” he said.

But it’s more than just each crop’s fertiliser application being compared.

After more than 30 years with the same treatments in the same plots there are stark differences in cumulative soil fertility between plots.

For example, in deep N soil tests conducted in March this year, there was 76 kg/ha of nitrate nitrogen in the 0-90 cm soil profile at the nil nitrogen rate and 646 kg/ha of nitrate nitrogen where 120 kg/ha of nitrogen had been used in every crop.

While this is a very high level of nutrient, the bulk of it is at the 30-60 cm depth where it will be available to the coming crops.

“This is not something you see on-farm because using a very high fertiliser rate like this, higher than district practice, in every crop consistently for 33 years is not something growers would do,” Bede said.

He said responses to different tillage operations were also beginning to be seen in the long-term nutrition experiment.

Bede singled out the deep phosphorus (deep P) treatment, where 20 kg/ha of phosphorus was applied at 22 cm depth in December 2013 and June 2015 and compared with deep ripping and zero till treatments.

“Deep P is starting to show its value in improving fertiliser responses,” he said.

“Last year, the deep P treatment showed significantly higher grain yields at all nitrogen rates compared with deep ripping and zero till treatments. This is consistent with findings from the Central Downs Grower Group which has seen better responses to deep P in drier seasons,” Bede explained.

“There also appears to be some multi-nutrient interactions with the different tillage treatments which we will be concentrating on in coming crops, along with an ENTEC comparison to assess its suitability for protecting applied nitrogen and improving nitrogen use efficiency in broadacre cropping systems,” he added.

For growers ready to sow this year’s cereals, he said it was important to ensure enough fertiliser was applied to cover the expected crop removal based on a realistic yield expectation.

Bede encouraged growers to monitor responses from a systems perspective.

“Consider putting in some high nitrogen or even nil nitrogen strips in your upcoming crops to test whether your overall nitrogen rate is adequate, as well as using grain tests to measure nutrient removal and regular soil testing,” he said in conclusion.

DATA GIVES YOU A WHOLE NEW PERSPECTIVE.

Ag Leader precision farming technology provides the data and insights you need to get the big picture view of your farming operation. Compatible with all makes and models, Ag Leader also provides unrivalled local technical service and support. Ag Leader's AgFiniti® cloud platform allows you to connect your operation from the cab to the office and everywhere in between, putting real time and historical data at your fingertips.

Visit our website to find out how Ag Leader can help improve the sustainability and profitability of your farming operation.

www.agleader.com.au Ph: +61 8 8260 9800

Ag Leader®

LOCKYER VALLEY FARM ENSURES SOIL HEALTH IS A TOP PRIORITY

For over 60 years the Sutton family has been proudly producing vegetables in Queensland's Lockyer Valley.

Third generation farmer, Brock Sutton said one of the challenges of growing in the Lockyer Valley is keeping soil health available to the plants.

"Soil health and plant nutrition are number one in our game because if you don't have a healthy soil or a healthy plant, you don't get the yield and you don't get the quality of the product that you want to grow," Brock said.

Amongst the best practices utilised by Sutton Farms is a program to look after soil health by minimising soil compaction on their Lockyer Valley properties.

"Soil compaction is a big problem with small crops. The development of GPS has helped minimise this problem," Brock said.

"We've also taken an approach of extending our implements out to six metres, which means that we cover three times as much ground with every pass. The biggest identifier of that is yield and plant health. With going over the ground less often and having less of the compaction there, the plant is healthier and you get better yields," Brock said.

He also explained that the business has a big focus on water management. If done well, this improves efficiencies while also being good for plant growth.

"Efficient water use is critical to soil health and plant health. If you're overwatering or under watering it's going to affect both the soil and the plant," Brock said.

"Overwatering can create an anaerobic environment in the soil, which is detrimental to both the soil and the plant. To combat that we're using water logging diaries and looking into new technologies that will affect the water usage," he went on to add.

When considering all techniques put in place by Sutton Farms to improve soil and water health, including soil testing, green manuring, rotations and minimising soil compaction, Brock believes they are making a difference on the property.

"I think there are drastic improvements that have been made in soil health, not only by us but industry-wide," Brock said.

"Best practices are always evolving and the new technologies that are available to us have helped the whole industry improve on our soil and plant health. There's too much to know for any one farmer to know it all, so I use peak industry bodies like Growcom and the Hort360 program," Brock said in conclusion.

Growcom's Hort360 program, the best management practice program for horticulture, is designed to give growers a 360 degree view of their farm business operations, identifying potential risks, capitalising on business opportunities and highlighting unnecessary farm expenses.

The soil management and water quality modules are currently being delivered in south east Queensland and all horticultural growers in the Lockyer, Bremer, mid- Brisbane or Pumicestone sub-catchments are invited to take part in identifying areas of high risk in soil and water quality management. As part of this process a free property map will be provided.

USING FLOWERING PLANTS TO PROTECT AUSTRALIAN VEGGIE CROPS FROM PESTS

New research by the Graham Centre for Agricultural Innovation will explore if vegetation management, like preserving native vegetation or flowering strips in the margins of Australian vegetable crops, will help keep pests at bay.

The three-year $1.6 million research project, funded by Hort Innovation and Charles Sturt University (CSU) aims to develop sustainable, cost-effective biological control strategies.

Led by CSU Professor Geoff Gurr, the research team had begun initial field surveys working with farmers from across Australia.

"The project will gather information to help formulate practical vegetation management strategies to suppress pests in brassicas, sweetcorn, lettuce, carrots and beans," Geoff said.

The project builds on Professor Gurr's research into biological control of pests in rice crops in parts of Asia.

"In Asia, growing flowering crops in the margins of rice fields provides nectar to beneficial insects and spiders," Geoff said.

This simple method kills pests so effectively that farmers reduced insecticide use by two-thirds, had a 5% boost in grain yield and 7.5% profit advantage.

"This is now used by thousands of farmers in China, Vietnam and Thailand and is gaining interest in other countries and crop systems. In China, the use of sesame in the margins of rice crops is now nationally recommended practice as a way to check pests and provide a dual income," Geoff explained.

Project partners include CSU, the NSW Department of Primary Industries, (DPI), the University of Queensland and IPM Technologies in Victoria, with field sites hosted by vegetable growers from New South Wales, Queensland, Victoria, South Australia, Western Australia and Tasmania.

Graham Centre scientists Dr Syed Rizvi and Dr Ahsanul Haque carrying out field samples as part of the research.

BARLEY GRASS EVOLVES INTO AN EVEN GREATER CEREAL PEST

A population of the widespread winter annual grass weed, northern barley grass (Hordeum glaucum), has been confirmed resistant to the key herbicide glyphosate in Australia.

Dr Chris Preston, Associate Professor of weed management at the University of Adelaide and chair of the Australian Glyphosate Sustainability Working Group (AGSWG), says the resistance has been confirmed in a northern barley grass population which is located along fences and around buildings on the Yorke Peninsula, South Australia.

"Northern barley grass is showing us it will adapt to herbicide control if we continue to use simple weed management strategies," said Chris, whose work is supported by the Grains Research and Development Corporation (GRDC).

"Barley grass across Australia has been adapting to changing farming practices, and we can now add glyphosate resistance to that list of adaptations," he added.

Australian populations of northern barley grass are already resistant to the herbicide groups A, B and L.

Northern barley grass is an important plant in winter-dominant rainfall zones, being a major component of many annual pastures. It can provide early green feed for livestock, but produces damaging sharp seeds that penetrate the eyes and bodies of sheep in the spring.

It is a major competitor of cereal crops and acts as a host for cereal diseases, such as barley leaf scald and the root disease take-all.

Chris said that having adapted to continuous cropping, populations of northern barley grass have increased dormancy, enabling it to germinate post-sowing and thus avoid pre-sowing control treatments. A lack of selective herbicides in cereals compounds the problems posed by barley grass.

"The actual level of glyphosate resistance is quite low, with resistant plants requiring eight times the rate of glyphosate for control when compared with a susceptible plant. However, as has been demonstrated with other species, active management is required to control even low levels of resistance," he went on to explain.

Several weed species have now evolved resistance to glyphosate in crop margins or fence line areas, including annual ryegrass (Lolium rigidum), brome grass (Bromus diandrus and B. rigidus) and now barley grass. This demonstrates the importance of effective weed management in these areas, and not relying just on glyphosate.

"Annual ryegrass has shown that glyphosate resistance often develops along fences and moves into the cropping paddock, and we don't want to repeat this mistake with barley grass," Chris said.

Management strategies to reduce the risk of glyphosate resistant barley grass on fence lines include:

- Double knocking with another herbicide mode of action or cultivation
- Using robust rates of glyphosate
- Improving spray coverage
- Using tank mixes at robust rates of both herbicides that are effective on the target species.

Fortunately, most of the strategies developed for glyphosate-resistant annual ryegrass on fence lines will work for barley grass.

The AGSWG is supported by GRDC and key R&D-based crop protection companies with an interest in the sustainability of glyphosate. The group's website has a range of information about glyphosate resistance, including a register of glyphosate-resistant weed populations and guides and links for management of glyphosate resistance in different crops and management situations.

WEED COMPETITIVE WHEAT IS NOW ONE STEP CLOSER

Growers are one step closer to accessing wheat varieties that can compete better against weeds, particularly herbicide resistant ryegrass.

The first weed competitive wheat lines were delivered to commercial breeders in April 2018 for preliminary yield and quality testing and, if successful, varieties may be available to growers within five years.

These have been developed as a part of Grains Research and Development Corporation (GRDC) investments to help growers protect wheat yields and reduce herbicide costs.

The cost to Australian grain growers from weeds is estimated at $4 billion in crop yield losses and seed contamination alone.

CSIRO research geneticist Dr Greg Rebetzke said new genetics and an improved ability to predict plant traits had enhanced the development of genetics that were used as parents in the development of the new lines.

“Increasing herbicide resistance, together with no new modes of herbicide action, are contributing to a ‘perfect storm’ in grain growers’ ongoing battle against weeds,” Greg said.

“Wheat is particularly vulnerable, with the commonplace use of glyphosate as a chemical control of annual ryegrass. It is poor control of ryegrass that makes wheat the weakest link in weed management in Australian cereal rotations,” he added.

Greg said the aim of this research is to assist the development of weed competitive wheats that can be used as part of integrated weed management strategies, adding another option to the grower’s weed control toolbox.

“Currently there are few new herbicide technologies that will assist in managing weeds in wheat and dealing with herbicide resistance issues. However, along with the use of appropriate agronomic management practices, the adoption of harvest weed seed collection and destruction technologies, and the careful management of any future new chemistries to prolong their effective life, competitive wheats have the potential to help control weeds and reduce costs to growers,” he went on to explain.

Researchers engaged closely with commercial breeders throughout the process to ensure the project delivered varieties that were the most commercially relevant to growers.

“Since 2005, new weed competitive breeding lines have been developed using the unique genetics from more than 30 overseas wheat varieties,” Greg said.

He added that the collaboration between researchers and commercial breeders resulted in more than 7000 lines being sown in 2017 at the research facility at Yanco, New South Wales, with the first yield assessments of selected lines to commence in 2018 by commercial breeders.

Greater early vigour and larger upper canopies have been reported both overseas and in Australia as characteristics important in crop competitiveness. These breeding lines have approximately double the leaf area of today’s commercial wheat varieties. A noticeable feature of recent lines developed is larger flag and penultimate flag leaves (the leaves just below the ear of the plant),” Greg further explained.

While the focus has been on increasing competitiveness through greater shoot growth, the project also aims to explore other below ground opportunities, including a modified and more competitive root system.

The research has been conducted in collaboration with Dr Gurjeet Gill, of The University of Adelaide (UA), Dr Bob French of the Department of Primary Industries and Regional Development (DPIRD) in Western Australia and the weed ecology group led by Professor Leslie Weston at Charles Sturt University (CSU).

FARMERS WARNED TO BE CAUTIOUS WHEN USING DRONES

Farmers should be cautious of drone imagery being offered by rogue operators, researchers have warned.

The University of Queensland (UQ) and University of New England collaborative study has shown that 'off-the-shelf' drone imagery products, sold to growers for up to $4000 per farm in some cases, are unlikely to provide accurate information about the health of crops.

Researcher Yu-Hsuan Tu, from the Joint Remote Sensing Research Program at UQ's Remote Sensing Research Centre, said he could understand why farmers would be tempted to use drone technology for farm management.

"Drones can be deployed quickly to generate high resolution images attractive to growers seeking leaf-scale monitoring of their farms," Yu-Hsuan said.

"However our research has shown that the high-tech, multi-spectral sensors used to collect images from the drone must be processed in a certain way to obtain correct information for horticultural farming applications," he explained.

He said one of the biggest problems in the use of drones was related to inconsistencies in the way light is reflected off the surface of vegetation, depending on the height at which a drone is flown and its angle to the sun.

Such inconsistencies could result in farmers being given the wrong information about their crops if the data isn't processed in the right way by experienced operators with remote sensing expertise.

"To compare reflectance across tree canopies, we flew a drone at different heights and angles to the sun above an avocado orchard, and found huge variations in the images collected," Yu-Hsuan said.

"This means while differences in tree health might be determined from tree to tree in imagery from one flyover, subsequent flyovers will show the vegetation very differently unless the drone is exactly the same height and angle to the sun - something almost impossible to achieve," he went on to add.

He said that in practice, this inconsistent imagery makes it impossible for farmers to compare vegetation conditions over time because the light variations are not corrected for height or angle and the product will be distorted.

"This could lead them to draw conclusions about the decline or improvement of their crops that may be incorrect - assumptions that could prove expensive to farmers already under pressure from recent weather events," he said.

Yu-Hsuan has created an algorithm that corrects these variations in reflectance to ensure the delivery of consistent data for farmers.

He is now working to establish standardised protocols for the acquisition and processing of drone imagery for tree crops to assist commercial suppliers and growers.

Until then, he said farmers should undertake appropriate due diligence before spending substantial money on drone imagery for horticultural applications.

"While the science behind our work is complex, the message to farmers is simple: use drone technology at your risk. More work needs to be done before drone technology can accurately determine the health of crops," he said.

This PhD study is being supported by Hort Innovation through funding from the Australian Government Department of Agriculture and Water Resources as part of its Rural Research and Development for Profit project, 'Multi-scale monitoring tools for managing Australian Tree Crops: Industry meets innovation'.

FMC

FMC Australasia
Phone: 1800 901 939
www.fmccrop.com.au

FMC Agricultural Solutions is pleased to announce the successful completion of the acquisition of a significant portion of DuPont's global crop protection business, transforming FMC into a tier-one agricultural technology leader, combining the substantial resources and talent from DuPont with FMC's own product portfolio, pipeline and formulation expertise.

The new FMC has a broader portfolio of leading brands, a deeper pipeline of new technologies, greater global scale, and a world-class R&D organisation. The acquisition includes industry-leading insecticides; sulfonylurea herbicides and a world-class discovery and development organisation.

FMC welcomes twelve new team members alongside the following DuPont products to our portfolio:

Altacor®
Coragen®
Exirel®
Benevia®
Steward®
Avatar®
Express®
Gulliver®

$3.8B
IN TOTAL REVENUE

TIER-ONE AGRICULTURAL TECHNOLOGY LEADER

5,400 EMPLOYEES WORLDWIDE

23 R&D SITES

26 MANUFACTURING SITES

5th LARGEST GLOBAL CROP PROTECTION COMPANY

SEXY STERILE FRUIT FLIES ENLISTED IN FRUIT FLY FIGHT

Millions of 'attractive' sterile fruit flies have recently been dropped from the sky over Adelaide as the $45 million fruit fly fight continues.

This is the first time Queensland fruit flies (Qfly) sourced only from the new National Sterile Insect Technology (SIT) Facility in Port Augusta have been used SIT to assist with incursion eradication.

Queensland fruit fly costs the horticultural sector $300 million in lost markets and damaged produce.

Minister for Agriculture and Water Resources, David Littleproud, recently watched the flies descend from the Adelaide sky.

"Australia is at the cutting edge, using new technology to manage farm pests. We have developed the unique SITplus program based on SIT programs that have been effective in California and Guatemala," the Minister said.

"SIT introduces large numbers of sterilised fruit flies in key areas to stop wild flies breeding. Our SITplus program includes work to develop the most attractive fruit fly for native flies. These sterile fruit flies, 50% male and 50% female, have been raised to be more attractive to the wild population, showing that beauty is truly in the eye of the beholder," he went on to add.

He explained that these flies are the best 'singers', have great endurance, fitness, agility and looks that are irresistible to wild flies looking to breed.

Among the other SITplus developments is a gel diet to help raise more sterile flies more consistently, work to build up male-only offspring and piloting the National Sterile Insect Facility in Port Augusta, which will produce up to 50 million sterile male Qfly each week when fully operational.

"This full-scale launch follows a successful trial of an aerial release of sterile flies in March. There will be continued releases and further development of the technology. SIT is a game changer for Australian horticulture, enabling farmers to reduce their pesticide use, expand their production of high quality crops that are free of Qfly and capitalise on our trade wins," the Minister said.

John Lloyd, chief executive of the grower-owned research and development corporation that initiated the SITPlus initiative, Hort Innovation, said today was a momentous day.

"We have had some of Australia's leading Queensland fruit fly specialists working on the development of the sterile Qfly and preparations for releases for the past four years," John said.

John also said fruit and vegetable industries have also played a key part in making today happen, with this initiative being backed by citrus, cherries, apple and pear, summer fruit, table grapes, strawberries, and vegetable levies from the start.

"Late last year we saw the creation of the nation's state-of-the-art production facility, and now to be releasing the first 'super' flies from the factory today to respond to an incursion for the first time is a big achievement", he said in conclusion.

SITPlus is a $45 million research and development partnership, with nine separate projects targeting Qfly. Funding partners include Hort Innovation through levies and matching Australian Government funding, Macquarie University, the South Australian, Victorian and New South Wales Governments, the CSIRO, the New Zealand Institute for Plant and Food Research, and a range of levy paying industries.

The Government also invested $2.35 million through the Rural R&D for Profit program to develop guidelines for the release of SIT flies through an area-wide integrated pest management program, to create the optimal conditions for SIT fly releases to be successful.

NEW GUIDE TO BOOST BEE POLLINATION NOW AVAILABLE

Preparing and maintaining bees for the vital task of pollination is the focus of the new AgGuide Pollination using honey bees, recently released by the New South Wales Department of Primary Industries (NSW DPI).

Beekeepers and growers of horticultural crops, broadacre crops and pastures all benefit from bees visiting flowers.

Lead author and NSW DPI Honey Bees Technical Specialist, Dr Doug Somerville said the new guide provides information for beekeepers to ensure their bees are fit for pollination and informs crop growers on creating an environment that will provide the best results.

"Honey bees are the major insect pollinator of a significant number of flowering crops. Without them it is unlikely that many important crops would be economically viable," Doug said.

"Recent estimates value honey bee pollinations at 3-4 billion dollars to the Australian economy," he added.

Doug said Australia has approximately 10,000 beekeepers managing over half a million honey bee hives which are potentially available for contract pollination.

"The guide was developed following the success of the course, 'Using Bees for Pollination', delivered at Tocal College last year", Doug said.

Doug said various topics are covered in the guide including honey bee colonies nutrition for bees, health problems, hive strength, and size of the operation.

"Beekeepers can learn about orchard design and management, managing hives on the crop, netting and glass houses and post pollination hive management," Doug explained.

"Also, the important topic on how to make a business agreement between grower and beekeeper is covered in the guide," he added.

The AgGuide Pollination using honey bees is available for purchase from Tocal College in printed and eBook formats online www.tocal.nsw.edu.au or phone 1800 025 520.

To register your interest in the nationally accredited course "Using bees for pollination" delivered around NSW, please email: paterson.tocal@dpi.nsw.gov.au

TEN AUSSIE GROWERS SHORTLISTED FOR TOP HONOUR

Olivia Ryan

Ten nominees have been announced for the 2018 Hort Connections Young Grower of the Year Award.

The ten candidates, based in Victoria, Northern Territory, South Australia and Western Australia, are involved in the production of a wide range of quality produce including: baby leaf; baby broccoli; potatoes; kale; apples and pears and mushrooms.

The Young Grower of the Year Award will be presented as part of the 2018 National Awards for Excellence Gala Dinner on Wednesday 20 June, during the Hort Connections convention at the Brisbane Convention Centre.

The national award, proudly sponsored by Corteva Agriscience, honours young growers (aged 35 and under) in the Australian horticulture industry who demonstrate a high level of commitment to innovation, and who are dedicated to enriching their local communities and enhancing the agriculture profession.

The Ten nominees of the 2018 Hort Connections Young Grower of the Year Award, sponsored by Corteva Agriscience are:

- Andres Cruz - Butler Market Gardens - VIC
- Chris McLoghlin - Wattle Organic Farms Pty Ltd - VIC
- Chris Pham - Thanh Nha Vegetables - NT
- Daniel Hammond - Bulmer Farms - VIC
- Daniel Quattrochi - Monika's Organics - SA
- Jake Shadbolt - Scotties Point Farm - VIC
- Mitch East - Willarra Gold - WA
- Nathan Barolli - Barolli Orchards - VIC
- Olivia Ryan - McCain's - VIC
- Steph Corrigan - Corrigans Produce Farms - VIC

Award nominee, Mitchell East, a 25-year-old tropical fruit and vegetable grower from Manjimup in Western Australia said he is pleased to be in the running for this year's award.

'I'm happy to be one of the ten nominees for 2018. It's an unexpected surprise to be recognised in this way. The award is important as it showcases the prospects and leadership opportunities in the horticulture sector for the younger generation,' he said.

Ms Oliva Ryan, an agronomist from Victoria and fellow award nominee, echoed Mr East's sentiments. 'I'm delighted to be nominated. The next generation of Australian growers needs to come through and the Young Grower of the Year award helps recognise the contributions we make to keep the industry going forward,' she said.

AUSVEG, the industry representative body for the Australian vegetable and potato industries, manages the 2018 National Awards for Excellence, including the Young Grower of the Year Award.

James Whiteside, AUSVEG CEO, said, "The Australian horticulture industry needs more young people involved and it's important that we continue to recognise the achievements of young growers, such as our ten 2018 nominees, to ensure we foster the next generation of leaders".

Nick Koch, Marketing Manager for Horticulture & Insecticides for Corteva Agriscience explained. "We are proud to continue our support for the Young Grower of the Year Award. It's vital that our industry recognises and celebrates the achievements of outstanding young growers."

AGRONOMY SOLUTIONS USING HYPERSPECTRAL IMAGING

SUCCESSFUL AGRICULTURAL OPERATIONS DEPEND ON CROP MONITORING FOR NUTRIENTS, IRRIGATION, DISEASES, AND OVERALL PLANT HEALTH. TRADITIONALLY, THIS HAS BEEN CARRIED OUT BY VISUAL EXAMINATION OF CROPS ON THE GROUND. HOWEVER, THESE METHODS ARE LIMITED AND ONLY FIGHTING THE SYMPTOMS INSTEAD OF PROACTIVELY PREVENTING THEM.

Fortunately, precision agriculture provides solutions using artificial intelligence and hyperspectral imaging for optimised crop yield and fertilisation while reducing the environmental impact. The key is targeted application rather than whole paddock treatment. But let's not put the cart before the horse and define the underlying concepts before we dive deeper into the matter.

What is hyperspectral imaging?

Hyperspectral imaging collects and processes information based on the amount of reflected light from a surface to accurately identify agronomic variables like water deficiency.

The derived data, coming from a range of wavelengths across the electromagnetic spectrum, is then visualised by software to monitor agricultural characteristics. The benefits are usability, rapid assessment, accuracy and consistent results. Unsurprisingly, it is considered a breakthrough in the proliferation and practical application of precision agriculture.

Crop intelligence serving local farm challenges

Drought is a significant factor in terms of crop yields. Thus, early detection of water related stresses allows farmers to accurately irrigate before the effects result in yield losses.

Hyperspectral imaging detects such changes long before it is visible to the human eye. The practical applicability was inter alia demonstrated in a trial with barley, where the development of water or nutrient stress has been detected four days before it was observable with the naked eye.

In terms of fertilisation and soil characteristics, hyperspectral imaging can measure both deficiencies in nutrients as well as heavy metal contamination of soils. In addition, this technology can map paddocks for much lower costs than traditional direct sampling methods.

Besides investigating contamination, hyperspectral imaging will also determine areas in a crop field that are nutrient poor, even for the ones under vegetation. This dynamic mapping of soil improves precision agriculture and decreases environmental impacts since the application of fertiliser is reduced to its minimum.

Fungal disease and hyperspectral imaging

Fungal pathogens are another threat can equally be tackled with hyperspectral imaging. Fungal diseases are responsible for losses up to 40% of global agricultural productivity. Moreover, those consequences can have long-term effects on consumers, public health, societies, environments and farmers. Hence, the losses itself inadequately reflect the overall repercussions.

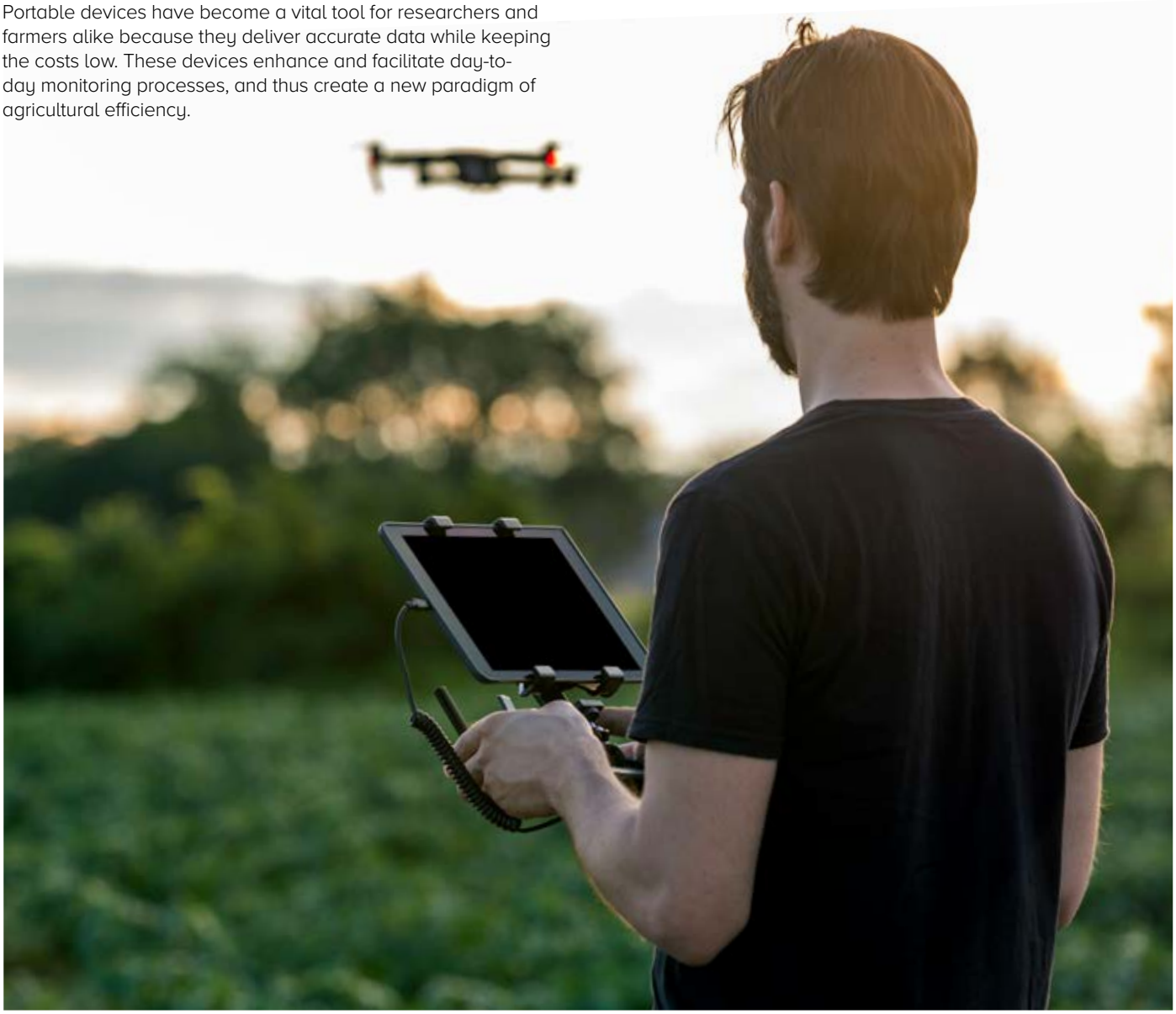
The early detection of plant disease in the paddock allows producers to rapidly treat affected areas before the optimum time for counteractive measures has passed. Apart from mitigating individual yield losses, this method prevents diseases from spreading to neighbouring paddocks or crops.

The possibilities for precision agriculture are numerous and will keep on growing as indexes for each plant species, nutrient or soil property are continuously developed and improved.

The future of hyperspectral imaging

Currently, many other applications of hyperspectral imaging are being tested in post-harvest quality control, food safety of agricultural products or insect and contaminant detection. Portable devices have become a vital tool for researchers and farmers alike because they deliver accurate data while keeping the costs low. These devices enhance and facilitate day-to-day monitoring processes, and thus create a new paradigm of agricultural efficiency.

“Hyperspectral imaging collects and processes information based on the amount of reflected light from a surface to accurately identify agronomic variables like water deficiency.”



PROTECTING CROPS BY AMENDING SOILS WITH SILICON

BY JOSEPH HECKMAN - EXTENSION SPECIALIST IN SOIL FERTILITY, RUTGERS UNIVERSITY, USA

We are all well aware of the important role soil fertility plays in supplying the essential nutrients needed for crop production. But you may be new to the agronomic use of silicon (Si). Based on years of field and greenhouse research conducted at Rutgers New Jersey Agriculture Experiment Station, in the United States, we can now offer guidelines on the beneficial use of this element.

Unlike nitrogen, phosphorus, and potassium, and a long list of micronutrients recognised as essential for plants to grow and complete their life cycle, Si is regarded as a quasi-essential or beneficial element. In fact, it's now officially designated as a 'plant beneficial substance' by the Association of American Plant Food Control Officials. In the United States suppliers/producers are now permitted to list the content of plant-available silicon on fertiliser product labels.

It may seem surprising that silicon nutrition could ever be a limiting factor for crop production. Most mineral soils already contain as much as 28% silicon. But that silicon is mostly locked in the structure of soil minerals, where very little of it is available for crop uptake. Thus, supplying Si from a soluble fertiliser source can benefit many crops.

It suppresses powdery mildew

The benefits of enhanced silicon nutrition include resistance to pathogens and better tolerance of environmental stress.

One of the most remarkable benefits is its ability to suppress powdery mildew disease. Crops susceptible to this disease include pumpkin, cucumber, wheat, Kentucky bluegrass, and dogwood.

Fungicides often are used to control powdery mildew, but this approach to disease management is unsustainable over the long term since diseases tend to develop resistance to chemical sprays. In the case of certified organic production, growers need alternatives to prohibited pesticides.

Wollastonite: A good choice for delivering silicon

Research conducted on New Jersey soils compared various fertiliser sources for plant-available silicon and powdery mildew suppression using pumpkin as a test crop.

The most effective material for supplying plant available Si and for disease suppression was found to be wollastonite, a calcium silicate mineral mined from the earth.

These naturally occurring minerals generally are approved for use in organic farming. However, organic growers should check inputs with their certifier to be sure about a particular substance. Some wollastonite products already are Organic Materials Review Institute-approved. Amending soil with wollastonite is a means for suppressing powdery mildew on certified organic farms.

Besides supplying calcium and silicon for plant nutrition and disease suppression, wollastonite also can neutralise soil acidity. When wollastonite is applied at rates equivalent to recommended rates of liming, it can replace the need for calcium carbonate limestone.

As a result, wollastonite is a multipurpose soil amendment that helps crops resist powdery mildew disease, supplies plant available calcium and silicon, and serves as a substitute for agricultural limestone.

ERADICATE™

snails and slugs the safe and effective way.

Developed by Australian scientists to effectively kill snails and slugs with low toxicity for animals and the environment.

- Environmentally friendly
- Pet and native fauna friendly
- Can be used near waterways
- Highly effective, non-toxic formulation
- Does not contain poison
- No withholding period for crops or livestock
- Rainfast

BARMAC
a division of Amgrow

www.barmac.com.au

CHOOSE CHICKPEA AND WHEAT VARIETIES CAREFULLY TO LIMIT ROOT-LESION NEMATODES

GRAIN GROWERS LOOKING TO LIMIT THE EFFECT OF THE ROOT-LESION NEMATODE, PRATYLENCHUS THORNEI, ARE ADVISED TO CONSIDER THE IMPACT OF INCLUDING SUSCEPTIBLE CHICKPEAS AND WHEAT VARIETIES IN THEIR ROTATIONS.

In a study of chickpeas, researchers found that while chickpea varieties may not suffer severe yield loss, the crop's susceptibility may lead to a build-up of nematodes that affects the following crop.

The root-lesion nematode, P. thornei is found in two thirds of paddocks in Queensland and New South Wales, reproducing in the roots of plants and reducing their ability to take up water and nutrients. It is able to survive fallow periods and there are no registered chemical controls to reduce it.

The University of Southern Queensland (USQ) ran two year experiments at Formartin in 2014-15 and 2015-16, to determine the tolerance and resistance of chickpea varieties to P. thornei and separate experiments with wheat varieties ranging from tolerant to intolerant grown across a range of P. thornei populations from very low to very damaging.

Trials showed that:

- Chickpeas generally have a good level of tolerance to P. thornei but because most varieties are susceptible, populations of the nematode will increase to attack future crops.
- The tolerance of a wheat variety and the populations of P. thornei at the time of planting will determine the degree of yield loss at the end of the season.
- Intolerant wheat varieties should be avoided when P. thornei populations are at damaging levels, but even moderately tolerant varieties may suffer yield loss.

USQ researcher Dr Kirsty Owen says it is important for growers to understand the difference between tolerant, resistant and susceptible varieties.

"Tolerance is the ability of a plant to produce good yields in the presence of P. thornei and its opposite is intolerance, while resistance is the ability of the plant to prevent nematode reproduction. Its opposite is susceptibility," she explained.

"Crop varieties may be tolerant but susceptible, that is, they produce good yields but allow the nematode to increase in population. The ideal combinations for management of P. thornei are varieties that are tolerant AND resistant," she went on to add.

Kirsty said that when P. thornei was present in paddocks at damaging populations (greater than 2/g soil), it could be managed by growing tolerant crop varieties that do not suffer yield loss, and increasing the number of resistant crops in the cropping sequence to reduce populations.

In experiments with chickpeas, the average yield across all chickpea varieties tested was reduced by 6.5% when grown on the high P. thornei populations (14/g soil) compared to the lower populations (5/g soil), but no differences in yield loss were detected between varieties.

Average yield for chickpea varieties on the low P. thornei populations was 2.77 t/ha, and on the high P. thornei populations it was 2.59 t/ha.

However, looking at changes in nematode populations in the soil after growing the chickpea varieties, P. thornei were significantly greater than the moderately resistant wheat control after PBA Seamer, PBA Boundary, and Kyabra, increasing by 1.7 to 4.3 times. PBA HatTrick was the least susceptible chickpea variety with populations increasing 1.2 times compared to the moderately resistant wheat control.

In contrast, for the very susceptible wheat control cv Strzelecki, populations at harvest were 67/g soil, or a 10-fold increase compared to the moderately resistant wheat control.

P. thornei populations at harvest ranged from 8/g soil for cv. PBA HatTrick to 28/g soil for Kyabra, which Kirsty said sends a clear message to growers.

"In the northern grain region growers need to consider the impact of growing susceptible crops such as chickpea and wheat that will increase P. thornei populations and limit crop variety choice for future seasons," Kirsty emphasised.

"Consider the impact of growing chickpeas in your crop sequences if you are trying to reduce P. thornei populations or keep them at low levels," she said in conclusion.

"Tolerance is the ability of a plant to produce good yields in the presence of P. thornei and its opposite is intolerance, while resistance is the ability of the plant to prevent nematode reproduction. Its opposite is susceptibility."

Dr Kirsty Owen

CRITICAL LUPIN ANTHRACNOSE MANAGEMENT

New South Wales Department of Primary Industries (DPI) has reminded farmers that this season is critical in the strategic management of the devastating disease, lupin anthracnose.

DPI plant pathologist, Dr Kurt Lindbeck, said surveys across New South Wales in 2017 found no evidence the disease has spread beyond six Riverina properties identified with the disease in 2016.

"That's good news, but infected seed could remain undetected and this season every New South Wales lupin crop must be managed as a possible disease risk," Kurt said.

"Fungicide seed treatment is crucial in implementing an anthracnose management plan as infected seed is the primary means of pathogen survival and spread. Lupin seed can be cleaned and treated with a fungicide now in preparation for sowing this season. Rhizobia should be applied to seed at sowing, to maximise survival and minimise exposure to fungicide seed dressings, which are toxic to rhizobia," he explained.

New South Wales DPI advises producers follow the five point lupin anthracnose management plan:

- Lupin seed should be treated with a fungicide treatment containing thiram
- 2018 lupin crops should be isolated from last year's lupin stubble
- Control volunteer lupins on your property
- Apply foliar fungicide containing mancozeb, chlorothalonil or azoxystrobin at six to eight weeks post-emergence, with a follow-up treatment at pre-canopy closure

Lupin anthracnose causes this distinctive shepherd's crook stem.

Western Australia research found follow-up foliar fungicide applications in combination with seed applied fungicides were highly effective in reducing the transmission of anthracnose between seasons.

Lupin anthracnose was first detected in New South Wales commercial lupin crops in October 2016.

The infection was isolated and controlled, with the six affected Riverina properties now subject to restrictions under biosecurity legislation, which prevents lupin crop cultivation until eradication is confirmed.

Cootamundra-Gundagai, Coolamon and Junee shires remain in a Biosecurity Zone, which was created to control lupin anthracnose, with specific restrictions placed on properties with boundaries within one kilometre of the affected properties.

Residents of these three shires are not permitted to grow ornamental Russell lupin to help protect commercial lupin crops.

FABA BEAN COVER CROP HALVES ADDED NITROGEN REQUIREMENT

Researchers in the United States of America have shown that farmers raising a nitrogen-hungry crop like sweet corn may save up to half of their nitrogen fertiliser cost. The key? Using a faba bean cover crop.

Faba bean is an ancient crop increasingly used as a cover crop. As cover crops are grown in the months between main crops when the soil would otherwise be bare, they can control erosion, build soil, and suppress weeds. Grasses, legumes, and other non-grassy plants are the most commonly used cover crops.

As faba is a legume, as are peas, beans, and lentils, they are nitrogen fixers and bring an important benefit to agriculture. These plants, working with bacteria in the soil, take nitrogen from the atmosphere. The decomposing plants then add nitrogen to the soil. Faba is known to be one of the most powerful nitrogen fixers.

Farmers who grow sweet corn (and other high nitrogen using crops) typically add nitrogen in the form of commercial fertiliser for best yield.

Masoud Hashemi and colleagues at the University of Massachusetts Amherst in the United States tested faba bean as a cover crop before planting sweet corn.

They wanted to learn if the nitrogen from the faba bean plants would meet the high nitrogen needs of the sweet corn. They also wondered whether tilling the faba residues into the soil or leaving them to decompose in place would provide more nitrogen for the corn.

This study showed the timing of when faba was planted had a dramatic effect on the biomass the plants produced before winter weather stopped growth. More biomass means more nitrogen. Faba beans planted on August 1 had more than twice the biomass of faba beans planted just two weeks later.

Not surprisingly, the sweet corn planted the following spring produced much better yields when it was planted in the earliest sown faba compared to later sown faba. The amount of nitrogen legumes can add to the soil is closely tied to the amount of biomass they produce.

The sweet corn yields were also significantly higher in the plots where the plant residue was left on the surface (no-till). Tilled residues decomposed quicker than the no-till, providing their nitrogen sooner. This proved to be too soon for the sweet corn. The no-till treatment slowed the decomposition of the faba bean residues. A delayed release of nitrogen into the soil better matched the needs of the young sweet corn.

Even so, the faba bean residues alone did not provide enough nitrogen for the best sweet corn yields. Additional nitrogen was needed. However, only about half as much was needed compared to corn grown without a faba bean cover crop.

“Faba bean cover crops can add a large amount of nitrogen to the soil,” Masoud said.

“But to make the most of its potential, especially if harvesting some fresh pods is expected, faba bean has to be planted as early as possible after harvesting the summer crop. Moreover, to contribute best to the nitrogen needs of the spring crop, the residues should not be tilled into the soil and must be left on the soil surface,” he said in conclusion.

While this research focused on faba bean and sweet corn grown in an American context and situation, the use of cover crops are increasingly being used by Australian farmers to gain benefits like the ones outlined here. The research project was supported through grants awarded by Northeast Sustainable Agriculture and Research (SARE) and Massachusetts Department of Agriculture.

NEW RESISTANCE MANAGEMENT STRATEGY FOR HELICOVERPA IN GRAIN CROPS

Grain growers now have a strategy to target one of their most insecticide-resistant pests, Helicoverpa armigera, through a finely tuned combination of beneficial insects, selective insecticides and accurate spray methods.

The Grains Research Development Corporation (GRDC) investment into a National Insecticide Resistance Management working group has launched a new Resistance Management Strategy (RMS) to reduce the development of resistance across consecutive generations of Helicoverpa armigera.

The resistance management strategy for Helicoverpa armigera in Australian grains was recently released this and is now available on the GRDC website.

Helicoverpa armigera (or the heliothis) is a pest of many commodity crops including cotton, pulses, oilseeds, coarse grains and winter cereals, but causes more significant damage in summer and winter pulses, maize, sorghum, canola, linseed, safflower and sunflowers.

Lead researcher Dr Lisa Bird from the New South Wales Department of Primary Industries (NSW DPI) said the RMS developed was centred on management of Helicoverpa armigera in the key pulse crops, chickpeas and mungbeans, in the northern grains region.

“Insecticide use in these crops is likely to have the greatest impact on the selection for resistance in Helicoverpa armigera populations in the foreseeable future, but the principles of the RMS can be applied to other grain crops,” Lisa said.

“There is an urgent need to strategically manage the threat of resistance to maintain the efficacy of available insecticides. In the past we’ve seen devastating consequences from resistance due to overuse of broad-spectrum insecticides in the cotton industry. We don’t want to see the same situation repeated in grains,” she added.

Selective insecticides for Helicoverpa armigera control are now widely registered in grain crops.

The RMS is primarily built around product windows for two of the most widely used selective products, and indoxacarb and chlorantraniliprole, because:

- Indoxacarb (e.g. Steward®) is at risk due to genetic predisposition (high level genetic dominance and metabolic mechanism) and pre-existing levels of resistance in New South Wales and Queensland. The use of indoxacarb in pulses is also expected to increase.
- Chlorantraniliprole (e.g. Altacor®) is at risk from high levels of over-reliance in pulses, but resistance frequencies are currently low.

There are two regions targeted in the RMS:

- Northern region – Belyando, Central Highlands, Dawson and Callide
- Central region – Balonne, Bourke, Burnett, Darling Downs, Gwydir, Lachlan, Macintyre, Macquarie and Namoi

There is no RMS for the southern or western grain regions of Australia (Victoria, Tasmania, South Australia and Western Australia) as these regions have little broadacre summer grain crop production and biological indicators suggest the risk of Helicoverpa armigera occurring at densities that may result in control failures is low.

If required, the central region RMS may be used for Helicoverpa armigera management in summer crops in southern and western grains regions.

The early season use of synthetic pyrethroids (SPs) in winter pulses (August to early September) in the strategy assumes that early infestations will be predominantly Helicoverpa punctigera. But recent monitoring with pheromone traps, particularly in the northern grains region, indicates it is likely that the highly mobile Helicoverpa amigera moths may also be present at this time of year.

Lisa said the RMS for grain crops was not intended to sychronise with the cotton IRMS since insecticide use patterns in cotton poses little risk to the ongoing management of resistance, relative to the risk posed by year-round, high level use in grains.

“If growers follow the RMS economic thresholds, comply with label instructions for applying insecticide and avoid prophylactic sprays, they will minimise the development of resistance and maintain effective insecticide control of Helicoverpa armigera into the future.”

Attention to water volume, nozzle selection and speed in relation to crop canopy and weather conditions is critical. Application under cooler conditions may result in reduced or slower rates of mortality as larvae will not feed if temperatures are below 12°C.

Growers are also encouraged to monitor beneficial insects that will attack the eggs, larvae and pupae of Helicoverpa armigera, including predators such as damsel bugs, red and blue beetles, ants, lacewings and parasitoids e.g. Trichogramma, Microplitis, Ichneumon wasps and Tachinid flies.

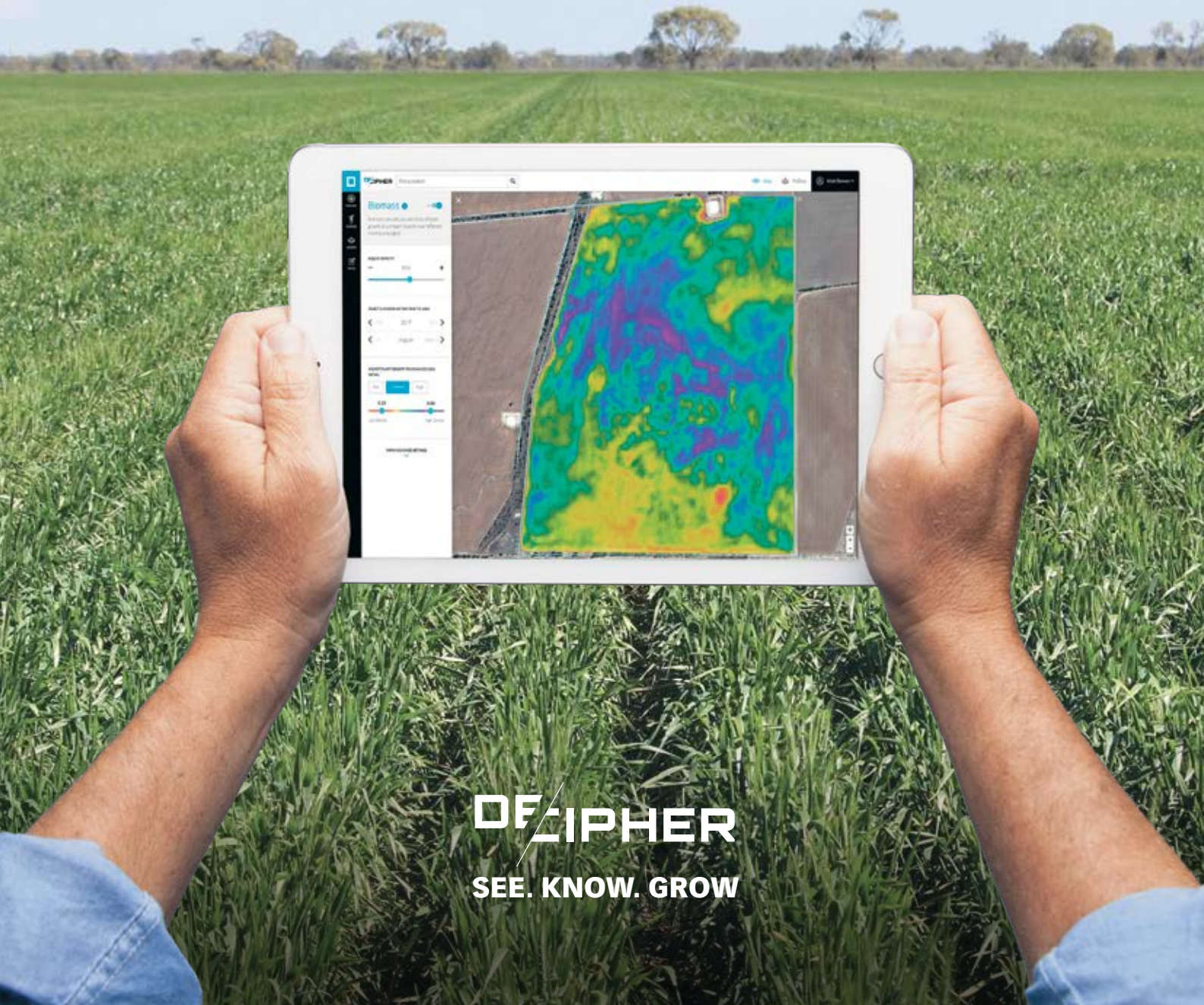
This RMS has been endorsed by Croplife Australia.

It's crop nutrition, simplified.

Understanding what's going on above and below the soil is the key to good crop growth. Powered by Google Earth Engine, Decipher lets you zoom in on a whole farm or a single paddock to see variability, know what's changing year on year through powerful charting features, and make the right decision to optimise productivity.

It's our job to make yours easier. Simplify the way you monitor crop growth, sample and compare farm nutrition data with Decipher.

Try it now for free.
Download the app or go to decipher.com.au



DECIPHER

SEE. KNOW. GROW

IT'S TIME FOR PLAN B FOR WILD OATS IN WHEAT

HERBICIDE RESISTANCE IS A WELL-KNOWN TOPIC. DESPITE THE FIRST REPORTED CASE OF RESISTANCE IDENTIFIED IN 1982, NEW CASES CONTINUE TO BE REPORTED WITH NEW SPECIES AND MODE OF ACTION GROUPS.

Ongoing research is unveiling the mechanisms different species engage to develop resistance, which will assist in the development of programs to better guard the sustainability of our herbicides. New active ingredients relieve pressure on existing products, but the directive of rotating chemistry, remains key.

According to GRDC, Australia ranks second in the world, to the United States, in the number of herbicide resistant weeds.

Twenty five species have been confirmed resistant to one or more herbicides. Annual ryegrass was the first species found to be resistant to diclofop in 1982, however cross resistance was quickly identified across the fops, dims, imi's, SUs and trifluralin.

It was quickly noted, however, that although wild oats was often found in the same paddock, and therefore subject to the same herbicide practices, it tended to remain susceptible to herbicides where annual ryegrass didn't. Research by Dr Busi et al in 2015[1] identified three critical elements to explain this difference.

Annual ryegrass has a diploid genome, with two copies of each gene, and wild oats is hexaploid, with six copies. So if there is a gene mutation that confers resistance, it is more strongly expressed where there are fewer genes involved. Annual ryegrass requires one gene mutation to express resistance. If there is one gene mutation for resistance in wild oats, it will display only low levels of resistance, more so if there are two and more again where three gene mutations exist.

Annual ryegrass requires cross-pollination, so any gene mutation that confers resistance is shared and the resistant population grows. Wild oats is self-pollinating, so the proliferation of a gene mutation is limited.

Finally, it has been found that annual ryegrass has a greater diversity of traits for herbicide metabolism than wild oats. When using label rates, these additional pathways are not normally employed. However, where low rates are used, larger weeds are sprayed and/or in sub-optimal conditions, which regularly occur in the paddock, resistance can occur via these additional pathways.

"Limiting wild oat resistance relies on doing the basics correctly: use full label rates, apply at the right timing to small, unstressed weeds and rotate the mode of action groups," said Dan Dixon, Market Manager at Corteva™ Agriscience Agriculture, a division of DowDuPont .

Despite wild oats' natural barriers to resistance, resistance to diclofop was identified in 1985, with cross resistance to haloxyfop identified in 1989. Group A (the 'fops, dims and dens') resistance has been on the rise around Australia ever since.

In fact, there are currently relatively high frequencies (30-40%) of Group A resistant wild oat populations across cropping areas in Western Australia, South Australia, Victoria and New South Wales[2]. With the reduction in price of many group A herbicides, the desire to use this chemistry group almost exclusively is exacerbating the potential for resistance.

Data from Graham Centre (graph 1) shows marked increase of resistance to fops in the slopes and southern New South Wales. Data from other areas is currently being analysed and compiled.

Dan advised that there are limited post emergent herbicide groups for the control of wild oats and brome grass in wheat and even less in barley.

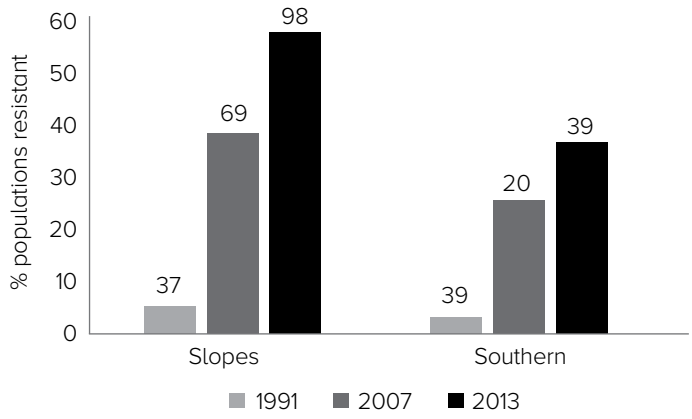
He explained that Rexade™ herbicide with Arylex™ active (Groups B and I) takes the pressure off the Group A herbicides by controlling grasses in the wheat phase that are still susceptible to Group B chemistries. Wild oats, phalaris, brome grass, and other grass weeds are well controlled by Rexade along with many of the common broadleaf weeds that can also infest wheat crops. In fact, there are few weeds that will escape an application of


Dan Dixon reviewing a Rexade trial near Echuca, Vic.

"Limiting wild oat resistance relies on doing the basics correctly: use full label rates, apply at the right timing to small, unstressed weeds and rotate the mode of action groups."

Dan Dixon

Graph 1. Increase in resistance to Group A 'fops' in NSW over time.



Rexade + MCPA LVE, but it may also be tank-mixed with a range of additional herbicides if required.

"Due to the late break this may be particularly important this season. Making the most of every spray day will become very important. Class leading re-cropping intervals across all soil pH types, and the easy to use granule formulation, makes Rexade an ideal choice", he added.

Chemical rotation is, however, only part of an integrated weed management strategy. Particularly where resistance has been identified, practices such as cultivation, burning, hay, use of livestock, crop rotation, double knockdown, pre-emergent herbicides, crop-topping, at harvest weed seed management and reviewing cereal varieties, sowing times and/or density should all be considered. Preservation of our herbicides is crucial to the long term viability of our industry and must form part of the decision-making process this winter.

1. Busi R, Girotto M and Powles SB (2015). *Response to low-dose herbicide selection in self-pollinated Avena fatua*. Pest Manag Sci.

2. Powles SB and Holtum JAM (1990). *Herbicide resistant weeds in Australia.* Waite Agricultural Research Institute, Department of Agronomy, University of Adelaide. Glen Osmond. SA 5064

3. Llewellyn RS, Ronning D, Ouzman J, Walker S, Mayfield A and Clarke M (2016). *Impact of Weeds on Australian Grain Production: the cost of weeds to Australian grain growers and the adoption of weed management and tillage practices*. Report for GRDC. CSIRO, Australia.

HIGHLY EFFECTIVE SNAIL AND SLUG BAIT FOR IPM PROGRAMS

DEVELOPED AND PATENTED BY AUSTRALIAN SCIENTISTS FOR AUSTRALIAN CONDITIONS, A HIGHLY EFFECTIVE SNAIL AND SLUG BAIT THAT DOESN'T DESTROY IMPORTANT NATURAL PREDATORS IS AVAILABLE FOR AUSTRALIAN GROWERS' INTEGRATED PEST MANAGEMENT (IPM) PROGRAMS.

Extensively tested alongside other commercial baits in Australian cropping situations, the Iron EDTA slug and snail bait Eradicate has proved to be an effective alternative to metaldehyde and methiocarb baits, providing similar or better levels of control.

Barmac technical support and product development officer, Chris Poletto, said Eradicate is the ideal IPM answer to the increasing problem of slugs and snails in today's farming systems, having no harmful impact on carabid beetles, one of the few predators of slugs in Australia.

"Predatory carabid ground beetles, both larvae and adults, do well in the same conditions that favour slugs, and have been found to have a significant impact on slug populations. One Australian study showed a healthy population of carabid in a paddock could provide a similar level of slug control to rolling. Work in Britain also indicates carabids are capable of maintaining slugs below damaging levels. So they are a very important factor in controlling slugs, in combination with baiting" explained Chris.

Common brown snails are particularly damaging to seedlings.

Natural predator carabids killed by some baits

"However, carabids are easily killed by some broad-spectrum pesticides, so avoiding these harder options can support carabid beetle predatory activity," he added.

Chris further explained that Methiocarb slug and snail baits are particularly toxic to carabid beetles, resulting in sole reliance on bait effectiveness, rather than working with these biological controllers. Metaldehyde has also shown toxicity to carabids. With many carabid species flightless and permanently inhabiting particular areas, populations are slow to recover from destruction by snail and slug baits.

"Eradicate is slug and snail specific, working with rather than harming such beneficial predators," Chris added.

He said Eradicate offered a viable, immediate alternative to other snail and slug baits that were disruptive to growers' IPM programs that had poor ecotoxiological profiles, were toxic to humans, animals and natural predators, and were potential contaminants in waterways.

GRDC May 2018 advice

In May, the Grains Research and Development Corporation (GRDC) urged field crop growers to monitor and manage slugs and snails to protect emerging and establishing crops, saying the move to minimum till in our farming systems had created a favourable habitat for these pests to persist from season to season, resulting in snail and slug population increases and a wider geographical spread.

"One of the important findings has been that bait density is a key determinant of snail and slug bait efficacy, affecting the chance of a snail or slug encountering a bait." Chris Poletto

Their advice included:

- Baiting is recommended in autumn and winter, depending on moisture.
- Growers should now be considering baiting in areas where snails and slugs have become active.
- The majority of slug and snail eggs are believed to be laid in autumn, but with sufficient moisture it appears mature snails and slugs can mate and lay eggs at any time.
- Even though the suggested autumn window of opportunity for baiting has come and gone, baiting now is still a very effective way to alleviate the burden.

South Australian Research and Development Institute (SARDI) reported in April 2018 that most snail reproductive activity occurred on average from late April to July.

Their advice included:

- Moisture is the major determining factor for breeding. Autumn dew and cooler night temperatures may begin that process, but eggs won't be laid until significant rainfall is received.
- Using recommended rates of bait now can generally drive down numbers significantly.
- A high density of snails should be baited at maximum label rate, and monitored over following days to determine the need for follow-up baiting.
- Baiting for slugs may be required at a different time to snails.
- Slugs can cause major losses from feeding damage at crop establishment, so the key for effective slug baiting is to protect the crop at sowing to prevent seed and seedling damage, with follow-up baiting to protect the young, establishing crop.

Small conical snails on underside of canola leaf. Supplied by GRDC.

Chris referred growers to up-to-date information from GRDC technical notes, providing tactics to deal with slug and snail populations.

He said excellent work is ongoing in Australia to understand the biology and behaviour of slugs and snails under a variety of conditions, and the effectiveness of baiting.

Bait density a key determinant of control

"One of the important findings has been that bait density is a key determinant of snail and slug bait efficacy, affecting the chance of a snail or slug encountering a bait. Snails seem unable to detect desirable food even at close range, so the aim is to know when snails are active and on the move, and to broadcast sufficient baits to provide the best chance of snails and slugs encountering and consuming a bait pellet," Chris said.

"The minimum bait density for controlling slugs is considered to be more than 25-30 baits per square metre. Included in a 2016 SARDI study, Eradicate provided 42 baits (feeding opportunities) per square metre at the higher recommended label rate. In a broadcasting study, Eradicate spread 20-24metres (up in highest spread category) from a twin-spinner machine. In another recent industry study, Eradicate recorded 90% snail mortality, a high figure, tested alongside the majority of baits on the market," he explained in detail.

Chris said Eradicate bait pellets should always be used as directed. They should be spread evenly and not placed in piles or heaps. Spills cleaned up. Pets and children should not be allowed to play unsupervised in treated areas or have to access bags or boxes of Eradicate. While low toxicity, consumed in sufficient quantities it can be toxic to dogs.

Comparative table of Eradicate and other snail & slug baits

ERADICATE - Iron ETDA product	Metaldehyde & Methiocarb products
Low toxicity. Active ingredient an allowed food additive in low doses. Not toxic to pets, native fauna if used as directed. Contains child taste-deterrent.	Very toxic, scheduled poisons. Metaldehyde highly toxic to birds, animals, humans, with use restricted in some countries. Methiocarb highly toxic to birds, animals, fish, bees. Banned in EU.
Does not kill natural predator carabid beetle.	Metaldehyde toxic and Methiocarb highly toxic to carabid beetles.
No WHP.	WHP up to 8 weeks before harvest and grazing agricultural crops and pastures.
Snails and slugs stop feeding (protecting plants) after eating small amount of Eradicate. Move away to die.	Snails and slugs seen dead near the bait.
No threat to surface or drinking water. Extremely low environmental impact.	Metaldehyde an emerging pollutant, persists in water. Methiocarb can contaminate water. Both products should not be used near waterways.

IS IT TIME TO INCREASE YOUR SKILLS IN CHEMICAL APPLICATION?

Farmers who are involved in broadacre spray application are encouraged to consider advanced training delivered under the $14.7m AgSkilled program in partnership with the New South Wales Department of Primary Industries (NSW DPI).

Aimed at the cotton and grains industries across New South Wales, the AgSkilled program focuses on emerging technologies such as the use of drones and satellite data, as well as farm machinery and business management.

NSW DPI Principal of Tocal College, Darren Bayley, said advanced spray application courses were offered through the college at locations across New South Wales to meet the needs of individual farmers, workers and their enterprise requirements.

"It is important for people who use chemicals to understand their responsibilities and the appropriate conditions for the safe use of agricultural chemicals," Darren said.

"Reducing herbicide chemical spray drift can help protect production and profitability in the cotton and grains industries. It also helps protect other sensitive areas and enterprises including bushland, waterways, beekeepers and the broader community. These courses are designed to ensure farmers and farm workers are equipped with the right skills to stay chemical safe," he went on to explain.

The advanced chemical spray application training courses are delivered in partnership with Spray Safe and Save's accredited trainer, Craig Day.

Craig said as cotton crops are sown in new areas of the state, more broadacre farmers are being challenged to ensure they reduce drift from their spray application processes.

"The workshops focus on a range of key herbicide application priorities including weather, drift management strategies, drift reduction technologies, chemical label requirements, personal protective equipment, work health and safety and more," Craig said.

"The advanced spray application training consists of a one day workshop, followed by a workplace visit to develop spray drift management plans customised to the enterprise's spraying requirements," he added.

AgSkilled is a new vocational training program for the cotton and grains industries aimed to increase the skills of existing workers and attract new people to the industry.

To register your interest for Advanced Chemical Spray Application training, contact Cath on 02 6345 5818, 0437 455 818 or craig.day@bigpond.com

FOLIAR FUNGICIDE NOW IMPORTANT TOOL FOR BLACKLEG CONTROL

Foliar fungicide application is now seen as an additional control strategy, especially in medium to high rainfall areas according to Australian canola industry leader, Trent Potter.

Blackleg is a major issue in canola production in Australia and the severity of blackleg has risen in recent years due to an increased area and intensity of production. Although not common, yield losses of 50% and greater have been recorded.

Trent, who has been involved with the canola industry since 1976 in agronomy, breeding, pathology and industry representative roles, said the combination of farming systems, rotations and the ability of blackleg to overcome varietal resistance means that growers have to maintain a wide range of management measures to at least 'keep up' with blackleg.

"Fungicide application is now seen as an additional control strategy especially in medium to high rainfall areas where canola crops are grown in close proximity to each other and previous canola stubble," Trent said.

"Foliar fungicides are now a useful additional control measure especially when they follow a fungicide applied at sowing as either a seed dressing of a fertiliser amendment," he added.

Trent said varietal selection used to be the key management strategy for blackleg, but as growers reduced the number of years between canola crops and increased the area grown to canola, the amount of canola stubble increased, and so too the inoculum levels.

Trent has recently been involved with trial work including MIRAVIS®, Syngenta's new foliar fungicide for the control of blackleg and white leaf spot (pending APVMA approval), including trials he conducted in 2013-15 and 2017.

He said MIRAVIS has shown consistent control of blackleg in all trials conducted under heavy blackleg pressure.

"MIRAVIS has performed consistently and when blackleg pressure is high, MIRAVIS plots have shown very good crop vigour. In 2014, Jockey followed by MIRAVIS was the highest yielding treatment. In 2015 and 2017, which was a low disease pressure site, MIRAVIS has performed as well as other control measures. In 2013, the blackleg pressure at the site was low but MIRAVIS gave very good control of white leaf spot," Trent explained.

MIRAVIS has a SDHI Mode of Action - ADEPIDYN™ - which is the first SDHI belonging to a new chemical group within FRAC group 7 fungicides.

Syngenta Product Lead, Angus Rutherford said the new fungicide is expected to significantly benefit Australian canola growers.

"MIRAVIS offers a step change in control versus current industry standards for blackleg. Trial results indicate a strong return on investment for growers in commercial crops," Angus said.

AGRONOMY IN PRACTICE TRAINING UPGRADE

Improvements to Agronomy in Practice this year mean that people who successfully complete the training program will be automatically recognised as Fertcare® Accredited Advisors (FAA), a symbol of quality soil and plant nutrition advice.

Agronomy in Practice, which is part of the Nutrient Advantage offering from Incitec Pivot, has earnt a reputation as valuable agronomist training course.

Nigel Bodinnar, Training and Quality Manager with Nutrient Advantage, said a number of changes were being introduced this year to make the course a better learning experience for participants and offer more valuable qualifications on completion.

"We have integrated Fertcare C into the updated Agronomy in Practice training resources and it has been independently assessed as meeting the FAA performance standards for soil and plant nutrition advice," Nigel said.

"This means people will no longer need to do two separate workshops to achieve initial FAA status, as has been the case in the past," he added.

Successfully completing Agronomy in Practice and being recognised as a FAA will result in:

- Improved fertiliser advice flowing on to productivity and economic benefits for farmers
- Competent agronomists who can confidently provide professional soil and plant nutrition advice
- A reduction in business risk associated with provision of fertiliser advice for businesses
- Improved assurance that the fertiliser industry is acting responsibly for natural resource managers and government

In welcoming the initiative, Jeff Kraak, Fertcare Program Manager, said Nutrient Advantage has been a long standing Fertcare assessed nutrient decision support system.

"It is great to see that Nutrient Advantage has made it simple for agronomists to be initially recognised and proudly display the FAA logo on their recommendations and other personal communications," Jeff said.

"The quality of advice farmers receive from both fertiliser supply companies and independent advisory businesses can vary widely. FAA provides farmers and other stakeholders with confidence that farm managers are receiving soil management and fertiliser advice of a high standard. It provides assurance that matters such as the process of making recommendations, the underlying supporting data, sampling methodology and laboratory competence are based on good practice and accepted science in Australia," he explained in conclusion.

NETTING HELPS CITRUS PRODUCERS KICK WATER EFFICIENCY GOALS

IT WAS AN AMBITIOUS PLAN TO SAVE WATER, AND GET A BETTER PRICE FOR THEIR FRUIT, THAT PROMPTED THE ARNOLD BROTHERS OF PYAP TO SERIOUSLY INVESTIGATE NETTING AS AN ON-FARM INNOVATION.

In 2015, Ryan, Michael, and Tim purchased the family citrus orchard from their retiring parents, and were keen to put their stamp on the 100-hectare property, located about 260 kilometres north-east of Adelaide.

"Data from our packing shed was showing us that a lot of the fruit in Class Two wasn't even paying its way to be picked and it was a result of wind blemish," Tim said.

"At the time, the difference between Class One fruit per tonne and Class Two fruit was around $800."

Tim said it was clear they had to find a way to protect the fruit while it was the size of between a marble and a golf ball, when it could be easily scarred.

"If a tree gets blown by the wind, it doesn't take much of a rub for that fruit to be damaged and for the fruit to grow with a scar that will knock it down from a Class One to a Two, and the price drops dramatically with that downgrade. That's where the netting idea came to us." he said.

A farm visit in Victoria's Sunraysia region convinced them of the benefits to be found with netting.

"I have to say, the trees we saw under netting at the property were not the most amazing looking trees I've ever seen," Tim said.

"They were pretty rough and sticky, but the fruit. The fruit was really incredible," he added.

"Wind speed is involved in the process of evapotranspiration and because the wind speed under the net has effectively halved, evapotranspiration has reduced by around 30%."

Tim Arnold

And, on learning about the estimated water savings of between 20% and 30%, they returned to South Australia with renewed enthusiasm, and successfully applied for a $1.4 million grant in Round One of South Australian River Murray Sustainability program (SARMS).

They became one of the Riverland's first netted orchards, and the brothers could not be happier with what they've achieved to date with their 20 hectare site of oranges and mandarins, safely sprouting under cover.

They are also sharing their experience as part of a three year research study, being conducted by University of Adelaide, to help grow the information available to producers about netting.

"We had searched and searched for information about netting but there wasn't a lot around," said Tim.

"The top part of the net is called 20mm quad, a square shaped mesh that doesn't give the trees too much shading but it does offer excellent protection from the wind," he added.

"They were quite young plantings when we started off in 2015 but they're delivering big yields, 50 to 65 tonnes per hectare year on year, which is quite unusual. Usually you'll have a year-on and a year-off for the big crops, but the big yields are being sustained annually so we've needed to hire more pickers for the fruit," he went on to explain.

As part of the study, a second weather station had been installed in the middle of the netted orchard to measure the difference in wind speed and evapotranspiration, the movement of water within a plant and the subsequent loss of water as vapour through stomata in its leaves, inside and outside the net.

"Wind speed is involved in the process of evapotranspiration and because the wind speed under the net has effectively halved, evapotranspiration has reduced by around 30%," he said.

"The quality of the fruit from the yields we're achieving, plus the water savings, have exceeded our expectations. Plus, we're returning more value for the water we use. We're not using water to grow fruit that's worthless and we're really looking forward to seeing the results of the study when it wraps up in around September," Tim added.

In the meantime, there's plenty to keep the brothers busy.

The brothers also used part of the SARMS grant to investigate the development of a new value-add product, a lemon cooler.

Production of their Arnold Brothers branded alcoholic lemon cooler has since stepped up from 600 cartons to 1,800 cartons per year.

The citrus and grape cooler is made from their own produce and the marketing is driven by the Arnold Brothers' fun yet cheeky vibe.

"It gave us an avenue to do more with juice of our lemons and add value to it," Tim said.

The University of Adelaide Research project is supported by the South Australian Murray-Darling Basin Natural Resources Management Board, through funding from the NRM levies and SARMS.

SARMS is contributing to the South Australian Government's commitment and implementation of the Murray-Darling Basin Plan. The 3IP grants program is supporting the sustainability of South Australian River Murray communities through investment in irrigation efficiency, water returns and irrigation industry assistance.

The Arnold's have covered 20 hectares of their orchard in a net structure to reduce wind blemish on their fruit

PROMISING NEW ROOTSTOCKS FOR AUSTRALIAN CITRUS

New growing areas, accelerated fruit size and increased yields are on the horizon for local citrus growers with the introduction of promising new imported rootstocks.

New South Wales Department of Primary Industries (NSW DPI) researcher, Dr Tahir Khurshid, said an overwhelming response from citrus growers across Australia has seen 16 orchards selected to participate in on-farm research trials of newly released Chinese rootstocks.

"Growers from New South Wales, Victoria, South Australia, Queensland and Western Australia are now growing valencias, navels and mandarins on the new rootstocks," Tahir said.

"Nine New South Wales sites were established at the end of last year in Gunnedah, Moree, Griffith Leeton, Dareton and Buronga to test performance in commercial trials. Our major objective is to test the rootstocks' performance on a variety of soils types and in different climatic conditions," he added.

Researchers will collect horticultural performance data to compare the new rootstocks with Tri22, the standard Australian trifoliata rootstock and Troyer citrange.

Tree growth rates, height, canopy diameter, trunk circumference, grafting compatibility, graft union and tree health will be assessed.

Once trees bear fruit, yield and fruit quality, including rind texture, juice content, soluble solids and acidity, will be measured.

Tahir said the new rootstocks have the potential to drive future citrus industry development.

"Rootstocks are a major influence on the profitability of citrus orchards. Their impact on fruit size, yield and yield efficiency is critical and will play a significant role in meeting demand from domestic and export markets. Buyers have shown a distinct preference for larger fruit, particularly navels, in recent years," he explained.

This project aims to evaluate and push the commercialisation of new rootstocks as part of the National Citrus Rootstock Improvement Program.

The grower trials have been funded by Hort Innovation, using citrus industry levies and funds from the Australian Government.

ACTION TO PROTECT WA CITRUS INDUSTRY

The Department of Primary Industries and Regional Development has taken action to protect Western Australia's citrus industry from the threat of citrus canker following the suspect detection of the disease in the Northern Territory.

The department has stopped the import of citrus plants, fruit and material from the Northern Territory.

Department chief plant biosecurity officer Dr Sonya Broughton said citrus canker was a serious bacterial disease which could affect all citrus plants.

"We are taking the right level of precaution to protect our industry against citrus canker," Sonya said.

"Citrus canker hosts, including fruit, plants and plant material from the Northern Territory are prohibited entry as a temporary measure to minimise any potential risk of spread. Tracing has identified a small number of imports of citrus nursery plants into Western Australia from Darwin. The department has contacted those known to have received plants to undertake surveillance and testing to manage any risks," she went on to explain.

The department is working with industry and asking the public to check their citrus plants for symptoms, particularly plants purchased in the past 12 months.

"We want to make every effort to protect our citrus industry, and early detection, reporting and not moving infected plants is key," Sonya said.

Citrus canker is a contagious disease caused by bacteria which can affect all citrus plants.

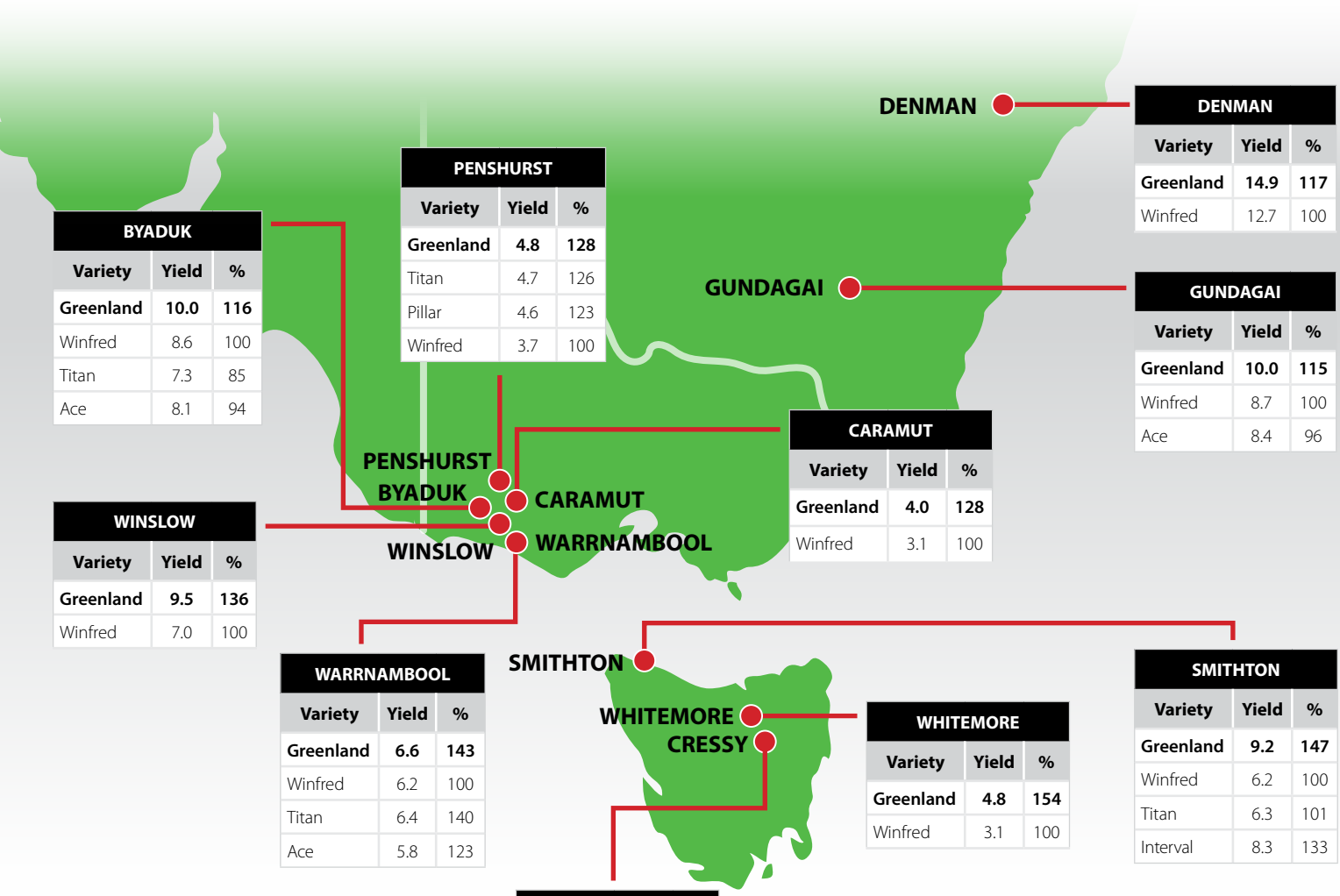
The symptoms of citrus canker include blister-like lesions on leaves, stems and fruit that are raised, tan to brown in colour, and are surrounded by an oily, water-soaked margin and a yellow ring or halo. Large or older lesions may have a crater-like appearance.

SF Greenland
forage rape

Australia's favourite, highest yielding forage rape.

Trials over the past 12 years confirm that SF Greenland forage rape continues to be Australia's highest yielding forage rape.

That is why it remains the No.1 choice by pasture agronomists.



DENMAN		
Variety	**Yield**	**%**
Greenland	**14.9**	**117**
Winfred	12.7	100

GUNDAGAI		
Variety	**Yield**	**%**
Greenland	**10.0**	**115**
Winfred	8.7	100
Ace	8.4	96

PENSHURST		
Variety	**Yield**	**%**
Greenland	**4.8**	**128**
Titan	4.7	126
Pillar	4.6	123
Winfred	3.7	100

BYADUK		
Variety	**Yield**	**%**
Greenland	**10.0**	**116**
Winfred	8.6	100
Titan	7.3	85
Ace	8.1	94

CARAMUT		
Variety	**Yield**	**%**
Greenland	**4.0**	**128**
Winfred	3.1	100

WINSLOW		
Variety	**Yield**	**%**
Greenland	**9.5**	**136**
Winfred	7.0	100

WARRNAMBOOL		
Variety	**Yield**	**%**
Greenland	**6.6**	**143**
Winfred	6.2	100
Titan	6.4	140
Ace	5.8	123

WHITEMORE		
Variety	**Yield**	**%**
Greenland	**4.8**	**154**
Winfred	3.1	100

SMITHTON		
Variety	**Yield**	**%**
Greenland	**9.2**	**147**
Winfred	6.2	100
Titan	6.3	101
Interval	8.3	133

CRESSY		
Variety	**Yield**	**%**
Greenland	**6.6**	**112**
Winfred	5.9	100
Goliath	6.2	105

Yield = tDM/ha
% = % control Winfred

www.seedforce.com

Seed Force
the power to grow

NSW'S KEY ROLE IN GLOBAL PERENNIAL WHEAT QUEST

Central west New South Wales has featured in an expansive project spanning nine countries, four continents and both hemispheres, as part of global efforts to develop perennial cereal crops.

New South Wales Department of Primary Industries (NSW DPI) researcher, Richard Hayes, said some of the most successful perennial wheat lines in the worldwide project were grown at Cowra.

"Good seasonal conditions over several years saw some wheat lines grown at Cowra persist and yield grain for four successive years," Richard said.

"A network of 21 experiments in Australia, Italy, Turkey, Nepal, United States, Canada, Sweden, Uzbekistan and Russia delivered a broad range of outcomes, highlighting variation in performance over time and location. These trials have helped inform future breeding strategies and highlight the need to target specific environments rather than one generic product for one global market," he explained.

"Our data highlights the importance of using locally adapted material to develop superior lines of perennial cereals for specific environments. In some situations, perennial crops from barley or rye lines may be more successful than wheat lines," Richard added.

Kernza®, a perennial grain developed by The Land Institute in the United States, is another success story from the study and is now commercially available in a staged US release to a beer brewing company and select restaurants.

Richard said farming systems based on perennial cereal crops offer the potential to boost sustainability and increase flexibility for farmers by offering grain and grazing options.

"Perennial cereals could help farmers adapt and better manage climate variability. In marginal cropping areas, particularly in drought years, perennial wheat may allow farmers to vary their inputs, reduce costs and deliver environmental benefits," he explained in conclusion.

Perennial crops can take advantage of out-of-season rain, which helps increase water-use efficiency, reduce soil acidification and salisination, and has the potential to reduce erosion.

SHARING KNOWLEDGE TO SAVE MORE SEED

The inner workings of the Australian Grains Genebank at Horsham were shared with two international scholars recently, as a part of an initiative to collect and conserve forest species in Indonesia and Papua New Guinea.

With support from the Crawford Fund and the Australian Grains Genebank (AGG), researchers Jimmy Frans Wanma and Gibson Sosanika travelled to Victoria for training in developing ex-situ genembanks for seed conservation.

In the two weeks prior to their visit to the AGG, Jimmy and Gibson visited Kakadu in the Northern Territory for training in crop wild relative seed collecting. This part of their trip was supported through the Millennium Seed Bank (MSB), Kew Gardens and the Australian Seed Bank Partnership.

Jimmy, who is a researcher and lecturer at the University of Papua, Indonesia and Gibson, who is a researcher at Papua New Guinea University of Technology, undertook the eight day training course with Australian Grains Genebank leader Dr Sally Norton, and Agriculture Victoria molecular plant

Sally said the training was aimed at assisting the international researchers to develop improved programs to conserve the forest species they work with in their home countries for resource management and food security.

"The AGG has implemented best practice into its activities and is well positioned to provide this training to the international participants," Sally said.

While in Horsham Jimmy and Gibson received hands-on experience in setting up seed viability tests, collecting data, assessing data integrity and the management of data in specialised databases. They also studied of the principals of post-harvest seed threshing and cleaning, and the preparation of seeds for long-term storage, which was complemented with practical experience.

Gibson said the training had provided him with an applied understanding of gene bank practices based on international gene bank standards.

"We hope to share our new skills and knowledge with colleagues when we get home, resulting in improved conservation of forestry species in Papua, Indonesia and Papua New Guinea," he said.

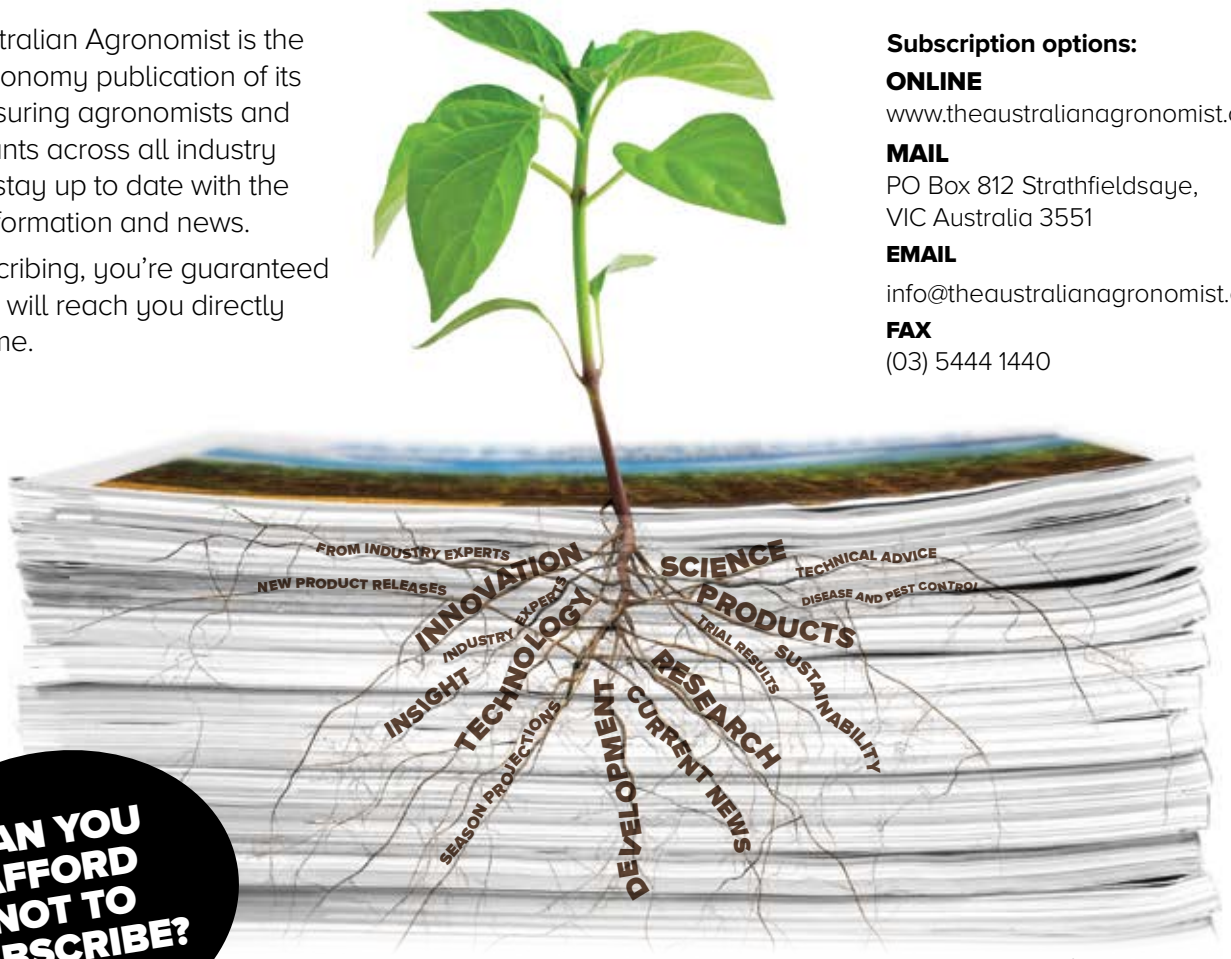
Sally said the training had resulted in strengthened connections.

"This has the potential to improve the exchange of germplasm and data and develop opportunities for collaborative research to more effectively use and conserve germplasm," she concluded.

GROW YOUR KNOWLEDGE WITH THE AUSTRALIAN AGRONOMIST MAGAZINE.

The Australian Agronomist is the only agronomy publication of its kind, ensuring agronomists and consultants across all industry sectors stay up to date with the latest information and news.

By subscribing, you're guaranteed an issue will reach you directly every time.



Subscription options:

ONLINE
www.theaustralianagronomist.com

MAIL
PO Box 812 Strathfieldsaye,
VIC Australia 3551

EMAIL
info@theaustralianagronomist.com

FAX
(03) 5444 1440

CAN YOU AFFORD NOT TO SUBSCRIBE?

Subscribe today for only

$40 for 4 issues (1 year subscription) | **$65 for 8 issues** (2 year subscription)

Personal details

Name

Address

Postcode

Telephone

Email

Payment:

☐ PAYPAL Subscribe online via our website
☐ CHEQUE To be made out to Regional Reach Pty Ltd
☐ CREDIT CARD Please fill in the details below:

☐ VISA ☐ MASTERCARD

Expiry Date: ☐☐ / ☐☐

Card Number: ☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐

Security Code (CVC): ☐☐☐ last three digits on signature strip

Number of issues:

☐ **$40** - 4 issues
☐ **$65** - 8 issues

TERMS AND CONDITIONS: Your subscription will start with the next available issue. You will receive either 4 or 8 issues. Minimum term of 12 months.

YOU CAN WIN A GIFT PACK OF ELLIS WINES FROM HEATHCOTE SUBSCRIBE TODAY

WWW.THEAUSTRALIANAGRONOMIST.COM

DRY THE WEEDS, KEEP THE CROPS

BY PENELOPE HILLEMANN

INTEREST IN ORGANIC FARMING IS GROWING. HOWEVER, CONTROLLING WEEDS WITHOUT SYNTHETIC HERBICIDES, AS ORGANIC CERTIFICATION REQUIRES, IS CHALLENGING. SCIENTISTS ARE STUDYING ALTERNATIVE TOOLS FOR WEED MANAGEMENT. ONE SUCH TOOL IS PROPANE FUELLED FLAME WEEDING.

Flame weeding sounds as if it means burning plants. But propane fuelled flame weeding systems do not set fire to plants. Instead, they control weeds by applying direct heat to plants. The heat rapidly raises the internal temperature of plant cells. The water in the cells expands and the cell walls burst. This release of water quickly dries out the plant tissue. Water loss and other heat related changes kill or seriously damage the plant.

Research conducted by Stevan Knezevic and colleagues at the University of Nebraska–Lincoln in the United States has led to a greater understanding of flame weeding.

Stevan presented his research at the 2017 Annual Meeting of the American Society of Agronomy, Crop Science Society of America, and Soil Science Society of America in Tampa, Florida.

The researchers have studied flame weeding techniques with seven crops: field corn, popcorn, sweet corn, sunflower, soybean, sorghum, and winter wheat. Insights from this research have now been compiled into a training manual. The publication describes the most effective 'recipes' for propane fuelled flaming as a weed control tool for these crops.

Flame weeding treatments can be non-selective or selective, Stevan explained.

"During non-selective treatments, everything in the treatment path, both weeds and crops, is fully exposed to heat," Knezevic said.

Non-selective treatments are effective for controlling seedlings of early emerging weeds. It's best used before the crop plants emerge or when grassy-type crops (corn, sorghum) are young and still able to recover from any treatment damage.

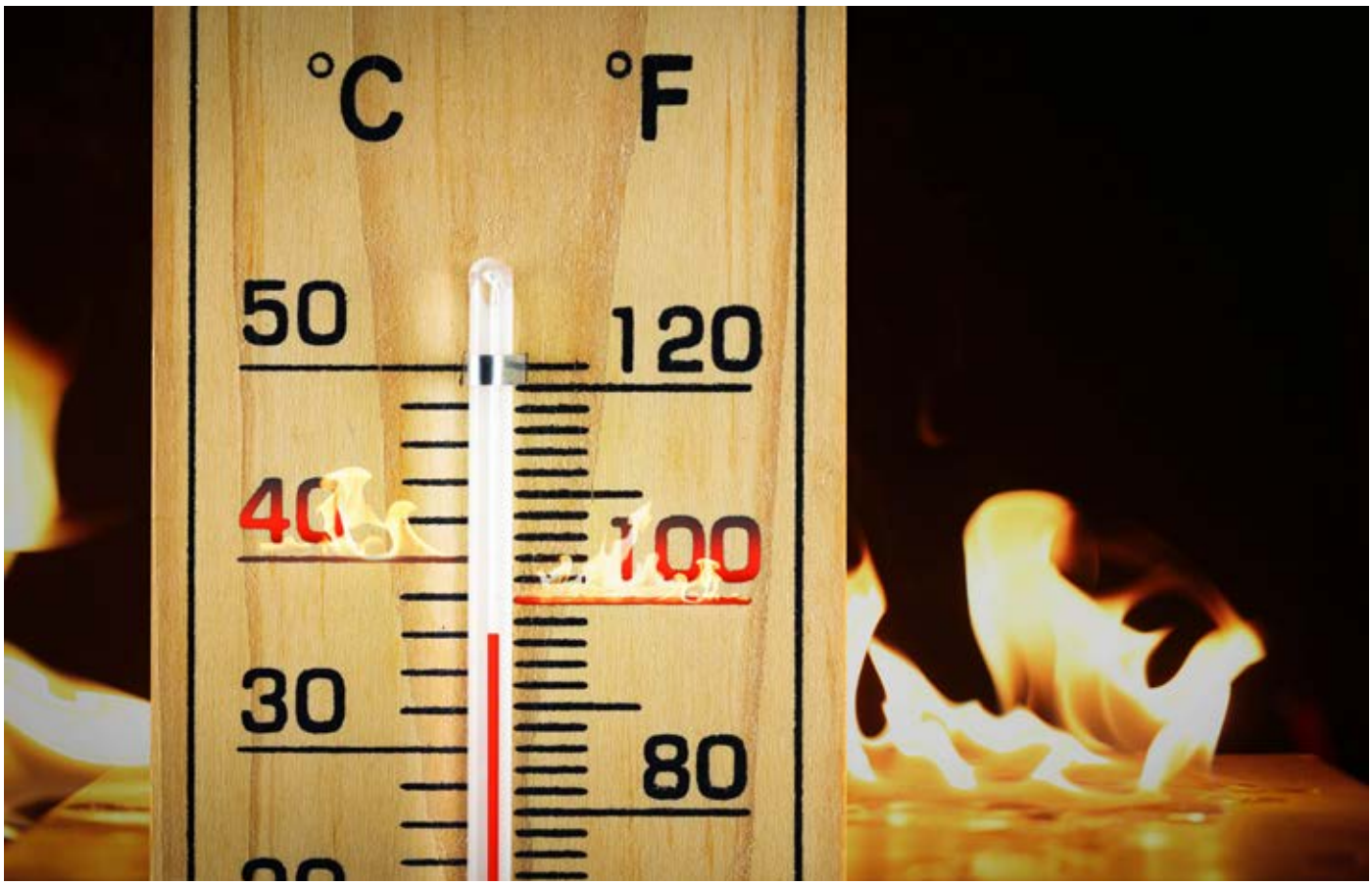
In contrast, Stevan noted, selective treatments are done after the crop has emerged.

"Selective flame weeding treatments aim to treat the weeds while minimising injury to the crop plants. This is usually done by positioning the torches or using hoods to direct the heat away from the crop plants," he explained.

When more propane is delivered to the torches, greater heat is created. But to manage costs and conserve fuel, it makes sense to use the lowest effective dosage (given this is US research, it was measured as gallons per acre) of propane.

"During non-selective treatments, everything in the treatment path, both weeds and crops, is fully exposed to heat."

Stevan Knezevic



The propane dosage needed for successful flame weeding depends on the growth stage of the weed, and 10-12 gallons per acre is a general use rate.

The researchers studied flame weeding with a wide variety of American broadleaf weeds. These included common waterhemp, redroot pigweed, field bindweed, kochia, ivyleaf morning glory, velvetleaf, Venice mallow, common ragweed, common lambsquarters, tansy mustard, and henbit.

The researchers also studied grass weeds, including green foxtail, yellow foxtail, and barnyard grass.

Knowing the stage of weed growth makes a difference. Smaller weeds of both types proved much easier to control with propane fuelled flame weeding than larger weeds, and required a lower propane dosage. Plant tissue is thin and delicate in these early growth stages. This makes the plant more sensitive to heat and prevents the weeds from recovering after heat damage.

When deciding to apply flame weeding after crops emerge, the crop growth stage is also critical. All crop plants are sensitive to heat, and flaming crops at the wrong growth stage can result in severe losses, especially in soybean and sunflower. Researchers developed guidelines with recommended crop growth stages for post-emergent flame weeding. The position of the torches and flames in relation to the crop row is an important factor in these guidelines.

Certain perennial and biennial weeds, such as dandelion and several thistle types, are very sensitive to heat. However, flaming does not reach under the soil to damage the roots, so the above-ground vegetation regrows and flaming must be repeated several times during the season.

“Propane fuelled flame weeding is a promising tool for weed control in organic agriculture. These researched guidelines for its most effective use will help make fields easier to manage,” Stevan concluded.

INNOVATIVE CAMPAIGN LAUNCHES IN SOUTH AUSTRALIA

South Australians are being urged to support local growers by overlooking small hail marks and enjoying apples and pears with a few spots and dots, as part of the recently launched 'Hailstorm Heroes' campaign.

In October 2017, a severe hailstorm hit the Adelaide Hills and South East when the pears and apples were in their early stages of growth, destroying a quarter of the South Australian crop according to the Apple & Pear Growers Association of South Australia (APGASA).

Following the storm, local growers worked hard to save the apples and pears that had some superficial marks on the skin but were still delicious and nutritious on the inside. This fruit will be sold as part of a Hailstorm Heroes campaign launched at supermarkets and greengrocers this week in South Australia and the Northern Territory.

Hort Innovation chief executive John Lloyd said the South Australia apple and pear industry has worked closely with Hort Innovation to develop the initiative.

"Affected growers are telling us they want to get the message out to consumers loud and clear: pears and apples with a few small hail spots are still great quality and good to eat," he said.

Fifth generation apple and pear grower Brett James said his orchard was hit three times by a battering of small hail during the night of the October storm.

"The fine hail was the size of rice grains and went straight through the hail net, covering all the trees and marking the skin of small fruit that was starting to grow," Brett said.

"Luckily, since the storm, we have had excellent growing conditions and a relatively mild summer so the apples and pears we managed to save have matured and developed delicious, full flavours. They really do taste great. We hope shoppers will look past the spots and support us by eating Hailstorm Hero apples and pears," he added.

Susie Green, APGASA CEO, said that all apple and pear varieties were impacted by the hailstorm.

"Royal Gala apples and Williams pears will be the first Hailstorm Heroes at supermarkets and greengrocers. However, the hail marks may actually be more visible on popular varieties harvested in late autumn, like Pink Lady and Granny Smith apples and Packham pears," explained Susie.

Hailstorm Hero apple or pear packs will be sold through the major supermarkets and some independent grocers.

The Hailstorm Heroes campaign is being delivered by Hort Innovation using apple and pear marketing levies, with assistance from APGASA and support from retailers, Primary Industries and Regions SA, and Brand South Australia.

VICTORIA AIMS TO BE THE AG TECH HUB OF AUSTRALIA

Victoria's farmers have been given a digital boost with the Andrews Labor Government recently announcing $15 million to enhance agricultural technology on farm.

Minister for Agriculture, Jaala Pulford, made the announcement at the inaugural AgTech Summit in Melbourne, which will be a game-changer for Victoria's $13 billion industry.

The Government is aiming to ensure Victoria is a world leader in digital agriculture and will consult with industry on the delivery of the package.

"Victoria is the AgTech hub of Australia, and with this investment we are looking at being a world-leader. Our farmers deserve the very best tools to get the job done and digital innovation is at the heart of this. We're proud to play our part in making this a reality," the Minister said.

The funding can be used for a range of digital innovations including the implementation of robotics on farm, wireless technology, biotechnology adoption and virtual fencing.

It brings the current Government's total investment in digital agriculture to $27 million, following $12 million for the Internet of Things (IoT) on farm demonstration trial in the Victorian Budget 2016/17.

The trial will begin in the regions surrounding Maffra, Birchip, Serpentine and Tatura from 1 July. IoT networks will be installed for farmer and public access, and benefits will be seen specifically in the dairy, grains, sheep and horticulture sectors.

Hundreds of farms will install sensors and devices to monitor, and in some cases control, farm operations. Data generated from the sensors and devices will be uploaded through nodes, gateways and servers for analysis and loading onto a software program that helps farmers make more informed decisions in real time.

Agtech has the capacity to revolutionise farming, improving productivity, sustainability and profitability on farm and down the value chain. The trial will help realise these opportunities by reducing adoption barriers relating to lack of connectivity, skills and capital.

The Government is also ensuring our regional communities are digitally connected with the $45 million Connecting Regional Communities Program, which increases digital connectivity and useability in regional areas.

UNLOCKING FARM INSIGHTS WITH DECIPHER

There are not many agronomists today who aren't using agtech of some description to better advise their clients. While these services can significantly enhance their offering, working out the exact approach that is best suited to them and their clients' business can be a challenge.

For Driscoll Ag agronomist Zachary East, a desire to get meaningful, in-depth farm data for his broadacre clients prompted him to become one of the early adopters of the newly released Decipher Plus service.

Recently released Decipher Plus and Decipher Pro subscription packages give agronomists and growers an easy way to detect and analyse the nutritional requirements of their crops, inform input decisions and track trends over time.

Zachary's clients grow predominantly cereals, legumes and pulses around Bendigo in Victoria. While the majority of them have used agtech in one form or another for various farm activities, Decipher's ability to layer imagery with yield mapping and soil sampling locations on the one platform was a feature that prompted him to add it into his client offering.

"It's really exciting to be able to bring even more accurate and powerful data into our farming analysis. With Decipher, we can layer specific paddock NDVI* imagery with yield maps, which means we can get exactly the information we need to make proper decisions for soil health programs," Zachary said.

"As an added bonus, there's no need to copy copious amounts of data from the farm planning software we've been using for a number of years. Previous farm maps and soil testing locations can be dragged straight into Decipher, so we are adding a tool into our nutrient management program that builds on information already gathered, and gives us unprecedented insights into farm health," he added.

Zachary currently collects clients' soil samples with equipment mounted on an all-terrain vehicle, and they are looking to use Decipher as a planning tool in this process.

"We can overlap NDVI imagery with clients' farm and yield mapping in Decipher, and use that combined data to determine highly accurate testing zones and carry out our soil testing and analysis. The ability to get a comprehensive picture of soil and plant nutrition, be it low or high, will be priceless. The great thing is that you can bring all the soil tests up at once and see and compare nutrient deficiencies, and locate them with pinpoint accuracy," he explained further.

Zachary has been using another farm planning software for a number of years, and the ability to import that information and data directly onto the Decipher platform in a seamless way was a major drawcard.

"We've only recently started using Decipher, but we can see enormous benefit in the insights it can unlock and we're looking forward to really ramping up the service as we move into the cropping season," he said.

"We're excited about the potential Decipher has. We're seeing it very much as another tool to help us keep delivering for our clients, making their lives easier and their farms more productive," Zachary said in conclusion.

*NDVI is Normalised Difference Vegetation Index. This is a measurement of how green (and therefore healthy) a plant is, based on the reflection of light.

NEW CROP OF AGRICULTURAL SCHOLARSHIP RECIPIENTS

Four young researchers from the University of Adelaide's School of Agriculture, Food and Wine have embarked on studies aimed at supporting grain growers through the development of new knowledge and understandings.

They are among nine recipients, from across Australia, of the latest round of Grains Research and Development Corporation (GRDC) research scholarships.

The GRDC's research scholarship program supports post-graduates in fields of study aligned with the GRDC's research priorities. The program is part of the GRDC's thrust to build research capacity within the grains industry.

The recipients will be focused on a range of constraints and factors that influence crop productivity and grower profitability.

PhD candidate Alicia Merriam is researching the common sow-thistle and prickly lettuce to help improve management of these weeds in lentil crops in southern Australia.

"Both of these species are herbicide resistant and they also have highly mobile wind-dispersed seed, so understanding the efficacy of proactive weed management and how they may be adapting to the selection pressures of the farming system is really important," Alicia said.

Christopher Ward's research will focus on diamondback moth, a major pest of brassica crops such as canola, and in particular the potential for the moth to adapt to new host plants, other than brassicas.

"In Kenya, the moth has expanded its range of host plants into legumes and my research will be looking at which genes needed to change to make that happen, and if there is a risk of it occurring here," Christopher said.

Resistance to group J herbicides in annual ryegrass is the research focus for David Brunton, who aims to characterise resistant populations, develop greater understanding of the mechanism(s) conferring resistance and inheritance of resistance.

"Most importantly, by conducting field experiments I will evaluate herbicide management strategies to directly address this emerging issue," David said.

The other University of Adelaide scholarship recipient is Brooke Schofield who is seeking quick and accurate ways to measure leaf nutrients, as traditional methods are often time consuming and must be performed in a laboratory.

"My project will try to develop a way to use hyperspectral phenotyping to accurately and reliably measure leaf nutrients which consists of shining visible, near infrared and shortwave light on a leaf and measuring the response reflected back, which indicates the levels of certain nutrients in the leaf," Brooke said.

COLLABORATION KEY TO SUCCESSFUL AGRICULTURAL TECHNOLOGY SOLUTIONS

UNIVERSITY of Southern Queensland (USQ) researchers are exploring new intelligence-based technology solutions for agriculture which involves a partnership with John Deere.

The USQ research aims to deliver real value to farmers and change the way primary producers look at land management and production, and the work with John Deere includes machine automation and control such as driverless tractors.

USQ said the collaboration is a global partnership, along with investments from both USQ and various funding bodies to help provide a gateway for the commercialisation of other technologies such as automated weed management systems.

USQ's Professor Craig Baillie said this global commercialisation strategy was an example of researchers working collaboratively with industry to understand problems facing the sector, to determine what new technologies would benefit farmers in the future. "This research partnership will not only benefit Australian communities but also international industries, which illustrates the global reach and relevance of USQ's research efforts in agricultural engineering," Craig said.

"It also highlights the importance that international organisations are giving to the development of future technologies that will transform agricultural industries over the years to come," he added.

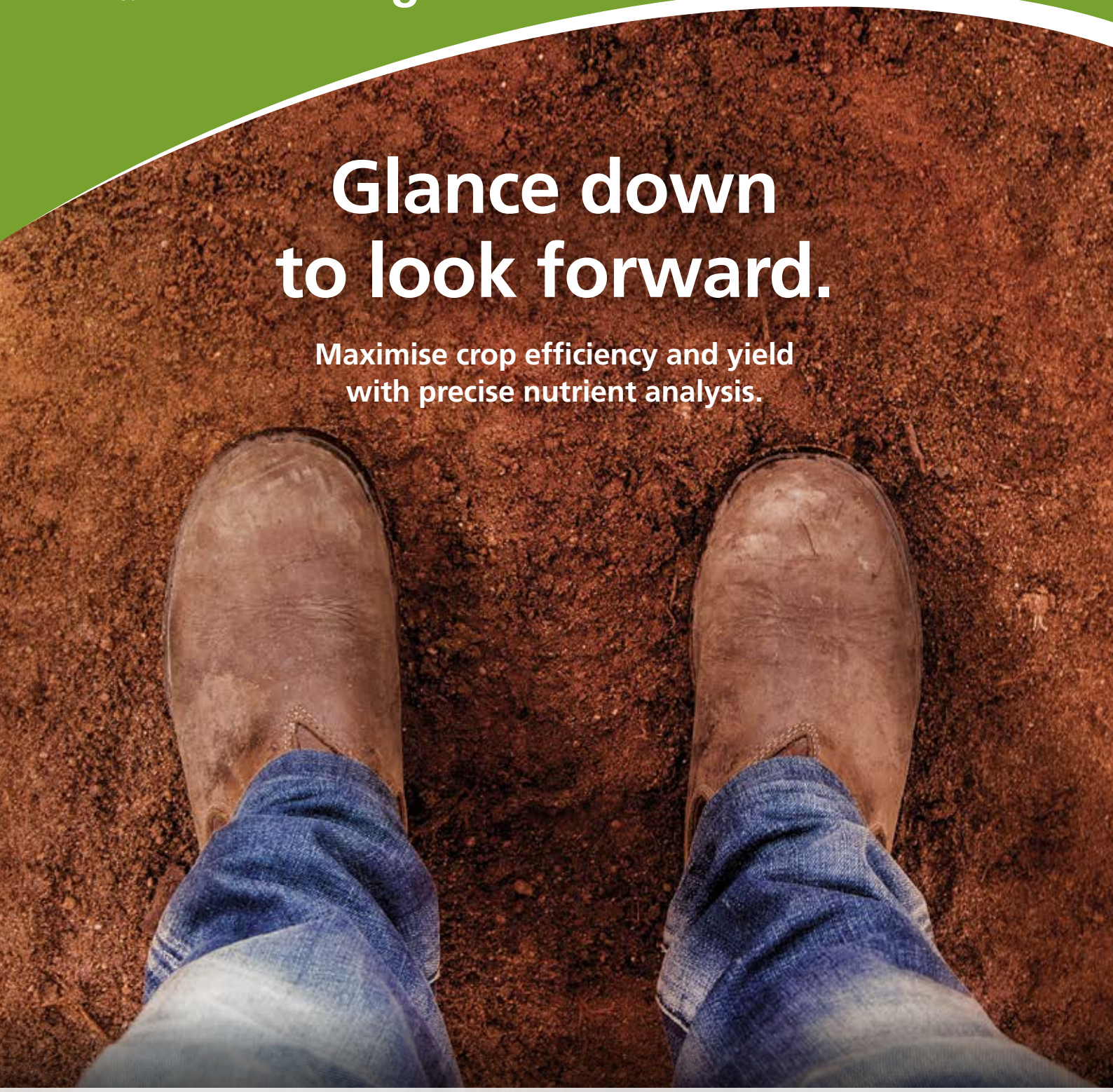
Craig said that high-tech farming is becoming an everyday tool for primacy producers, therefore, USQ researchers are consistently looking to improve the profitability, environmental sustainability and socio-economic wellbeing of our rural industries."

Work for the technology was originally funded through a combination of industry research projects between Sugar Research Australia, the Cotton Research Development Corporation, Horticulture Innovation and USQ, and has spanned the past 10 years.

Nutrient Advantage®

Glance down to look forward.

Maximise crop efficiency and yield with precise nutrient analysis.



Nutrient Advantage gives you the precision information and the confidence you need to get the best results from your high value crop. It delivers:

- Quality tissue and soil testing from a NATA accredited laboratory
- Credible results
- Fertcare accredited nutrient recommendations

Once you are armed with the information, Incitec Pivot's range of products can help to deliver your ideal result.

Incitec Pivot Fertilisers

Organisation FERTCARE®

For tailored Nutrient Advantage testing solutions, please call 1800 803 453 or visit nutrientadvantage.com.au to find out more.

incitecpivotfertilisers.com.au

We are Corteva [kor-teh-vah].

Dow AgroSciences and DuPont Crop Protection are aligning their scientific research and development, combining a portfolio of horticultural crop protection products which are leading innovation and focused on creating a healthier, more productive, more sustainable future for Australian farmers and the consumers that depend on them. Join the alliance!

PROUD SUPPORTER
HORT CONNECTIONS
YOUNG GROWER
OF THE YEAR

#GrowersAllianceWithScience
alliancewithscience.com.au

CORTEVA™
agriscience
Agriculture Division of DowDuPont