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THE AUSTRALIAN AGRONOMIST MAGAZINE

Integrated approach vital to beat fungicide resistance

High-tech smart traps tested in WA grainbelt

Online resource pools crop trials data for all to access

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THE AUSTRALIAN AGRONOMIST

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NEW SORGHUM HYBRIDS LAUNCH WITH TRIAL DATA AND GROWER FEEDBACK TO BACK THEM UP

WITH THE LAUNCH OF TWO AUSTRALIAN BRED GRAIN SORGHUM HYBRIDS FROM NUSEED THIS SEASON, GROWERS FINALLY HAVE NEW AND COMPETITIVE ALTERNATIVES TO CHOOSE FROM.

Named 'Cracka' and 'Rippa' to highlight their strong performance characteristics and their Australian breeding and genetics, extensive trials have shown both to perform as well as, or better than, other hybrids currently available.

Nuseed's Crop Agronomy Trials, or CAT trials as they have come to be known, are farmer-led and aim to provide the most up-to-date varietal information about yield and agronomic characteristics to growers, agronomists and farm advisors. The focus of the CAT is to offer localised opportunities for farmers to trial Nuseed's developing hybrids against those already commercially available in 'farmer scale' strips.

This farmer-led approach has been developed and designed to give growers and advisors the opportunity to evaluate local performance on a larger scale, so important decisions can be made with real-world and scalable information regarding all aspects of their hybrids. In the 2016 growing season, and prior to their commercial release in 2017, there were 18 Cracka CAT sites, while Rippa was trialled at 11 sites, indicating the depth and breadth of the field research undertaken.

Andrew Loorham is Commercial Manager at Nuseed. Andrew said the CAT program gave growers a strong indication of how new hybrids Cracka and Rippa would perform in particular localised conditions.

Andrew said, "A farmer can look at one particular CAT paddock to see what the results were in their own particular area, which can help them make a decision for the coming season. Or they can look over aggregated results to evaluate and compare how various hybrids performed overall."

Beyond the scope of Nuseed's company run trials conducted by Kalyx Australia and the farmer-led CAT program, some growers are committed to their own approach to trial work on their properties. Joe Fleming is one such grower.

Joe is cropping manager at Parraweena Pastoral Company at Blackville on the Liverpool Plains in New South Wales. Summer crops include sorghum, sunflowers, mung beans and occasionally cotton, and winter crops include wheat and chickpeas.

Every year, Joe undertakes his own trial work to best evaluate current and new options, and how they might best fit his cropping system. Joe said, "A lot of farmers do their own trial work. I like to use my planter, and do it my way, so the results end up meaning more to me."

Joe explained his approach. He said, "I undertake large scale strip trials with the aim of replicating normal paddock conditions. In my case, each variety in a trial is a 9 metre width of the planter and 2 km long. I do this twice for every variety. I found that results are more accurate this way."

"Choice is always a good thing. Growers now have the benefit of two new sorghum hybrids to choose from that best suit their agronomic aims, soil type and environmental conditions."
Andrew Loorham

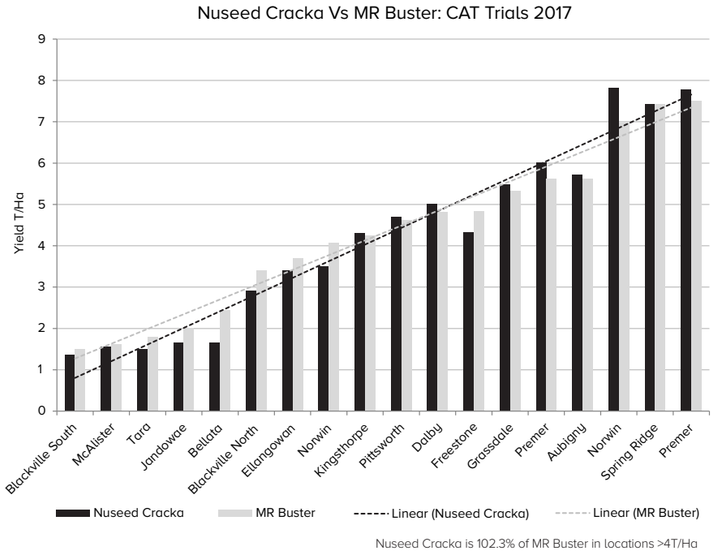
"Last year's sorghum trial included 12 varieties, which included the yet to be released Cracka and Rippa that Neil Weier from Nuseed gave me. Given there hasn't been any competitively performing new hybrid for a while, I was keen to see how they'd go against those currently available," he added.

Joe said that before he harvests the lot, he harvests one tenth of a hectare of each hybrid, in four spots in the paddock, two in each strip, as this gives a good indication of average weights. He then yield maps the whole paddock. While he believes this doesn't say much, unless there's a big difference between high and low performers, he thinks it still an important measure to have on hand."

Joe was pleased with the results of the trial, so much so Cracka will get a run this season. He said, "While I'd have to say the trial was fairly even, Cracka came out in the top three for both yield and quality, which was a promising result. In fact, it will be included in my sorghum trial this year too, and we're planning to plant at least one paddock of Cracka of 100 to 200 hectares as well."

"Overall Cracka performed well. I was impressed with the seed quality from Nuseed, and encouraged by my trial results. For me, it's good to see that there's a new hybrid that's competitive in my conditions and soil types," Joe added.

Andrew said the overall trial results from all sources showed Cracka and Rippa to be competitive choices for growers looking for a new hybrid. He said, "Choice is always a good thing. Growers now have the benefit of two new sorghum hybrids to choose from that best suit their agronomic aims, soil type and environmental conditions."



Nuseed Cracka is 102.3% of MR Buster in locations >4T/Ha

STRATEGIC MANAGEMENT BOOSTS SORGHUM YIELD

Sorghum growers in Queensland and New South Wales can boost sorghum yields by up to 60 per cent by better understanding how to match hybrid selection and agronomic management to their local growing conditions and seasonal outlooks.

Extensive trial work conducted by the Queensland Alliance for Agriculture and Food Innovation (QAAFI) and NSW Department of Primary Industries (DPI) between July 2014 and June 2017, found up to a six-fold increase in water use efficiency when the best combination of hybrid and management was used.

The trial work is part of a Grains Research and Development Corporation (GRDC) investment into tactical sorghum agronomy in the northern grains region and has amassed results from more than 1960 individual plots on research stations and farms across Queensland and New South Wales.

One of the project leaders, QAAFI Associate Professor Daniel Rodriguez said the research findings would help growers understand how to best manage commercially available hybrids to maximise yield and water use efficiency across the diverse northern growing environments.

“If we understand which hybrid and management combinations are top performers at any particular level of water availability, and why, growers can then use that information to adapt the agronomy and select hybrids that maximise yields and profits in likely dry, average and good seasons,” Daniel said.

The trial work assessed a range of commercially available hybrids, plant densities and row spacings in both low (below median yielding sites) and high (above median yielding sites) yielding environments.

The hybrids were evaluated for their performance in comparison to the widely grown MR Buster variety.

According to Daniel, most hybrids yielded more than MR Buster in both low and high yielding sites.

At the same time, some hybrids were higher yielding than MR Buster and also showed dynamic stability (much steeper yield response to better yielding environments) while some hybrids were higher yielding than MR Buster and also more stable, showing static stability (yield remained relatively constant across a range of low to high yielding sites).

“High yielding hybrids showing dynamic stability are better suited for irrigation or high yielding sites and wetter seasons, although lodging could become an issue in those sites On the other hand, if growers select more stable hybrids they might trade some yield in the better sites and seasons but pick up more consistent yield in the poorer sites and seasons.” Daniel said.

“Basically sorghum growers have options to chase higher yields or yield stability, they need to be aware of the trade-offs. The results of this research provide a helpful base with which to make some of those decisions,” he said in conclusion.

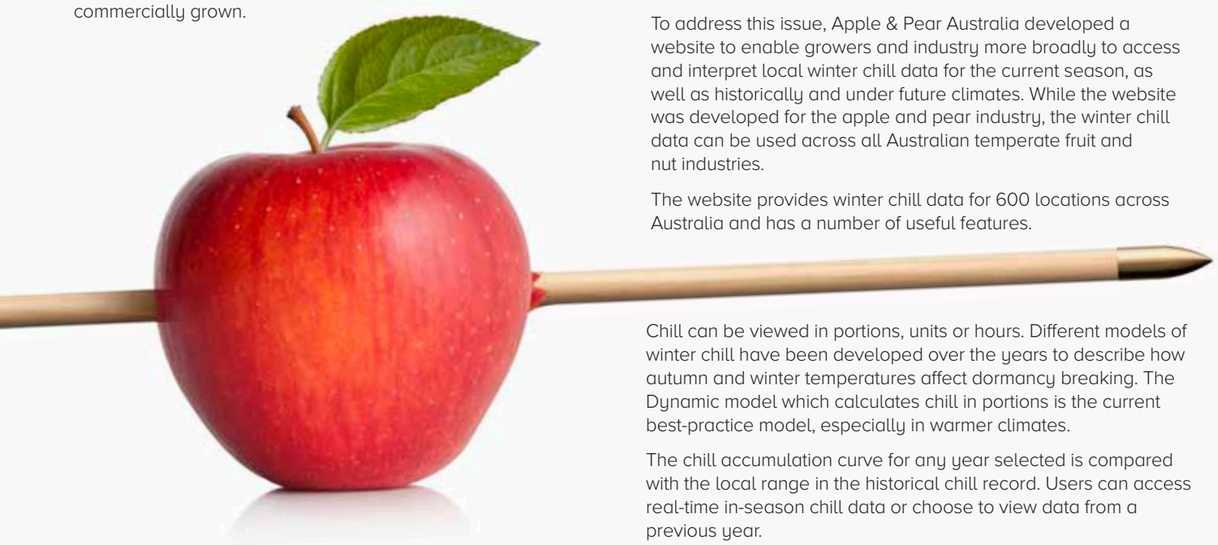
Results found that:

- Sorghum yields varied between almost zero to more than seven tonnes/hectare across environments.
- For any given yield environment the yield difference between the highest and lowest yield obtained from the best and worst combination of hybrid and management was up to 60 per cent.
- That the yield differences between the best and worst combination of hybrid and management translated into a six-fold change in water use efficiency.

ACCURATE WINTER CHILL DATA FOR APPLE AND PEAR GROWERS NOW ONLINE

A NEW WEBSITE IS PROVIDING ACCESS TO ACCURATE LOCAL WINTER CHILL DATA FOR AUSTRALIAN APPLE AND PEAR GROWERS, WITH BENEFITS FOR IN-SEASON ORCHARD MANAGEMENT AND LONG-TERM ORCHARD BUSINESS PLANNING.

Apple and pear trees need winter chill to break dormancy and promote healthy flowering in the spring. Failure to get enough chill results in delayed and uneven bud burst and flowering, with negative consequences for yield and quality. For this reason, the amount of chill accumulated in a region each year largely determines the crops and cultivars that can be commercially grown.



Despite its importance, there are differences across the industry when it comes to understanding winter chill. How is it measured? What's the difference between chill hours, units and portions? When does it start accumulating? How much chill have we had this year? A big part of the problem is that access to accurate local winter chill data for Australian growers has been limited.

To address this issue, Apple & Pear Australia developed a website to enable growers and industry more broadly to access and interpret local winter chill data for the current season, as well as historically and under future climates. While the website was developed for the apple and pear industry, the winter chill data can be used across all Australian temperate fruit and nut industries.

The website provides winter chill data for 600 locations across Australia and has a number of useful features.

Chill can be viewed in portions, units or hours. Different models of winter chill have been developed over the years to describe how autumn and winter temperatures affect dormancy breaking. The Dynamic model which calculates chill in portions is the current best-practice model, especially in warmer climates.

The chill accumulation curve for any year selected is compared with the local range in the historical chill record. Users can access real-time in-season chill data or choose to view data from a previous year.

The period of chill accumulation can be specified by the user. That is, the user can choose when to start and stop accumulating chill. For example, a user might start on a calendar date such as 1 March or a date based on a physiological measure such as 50 per cent leaf-fall.

After the location has been chosen, the website obtains daily maximum and minimum temperature data from the SILO database and calculates chill using the selected model. SILO is an enhanced climate database provided by the Queensland Department of Science, Information Technology and Innovation, using raw data from the Bureau of Meteorology.

Of the many thousands of weather stations available Apple and Pear Australia have selected those where temperature is currently recorded, or has been recorded for a substantial period.

Local historical and in-season winter chill data can be used for in-season decision-making in the orchard, as well as for longer-term strategic planning, particularly for milder winter growing regions where the amount of chill can vary considerably from season to season.

By recording accurate winter chill data alongside bud burst and flowering dates a grower can build up a picture of how chill varies from year to year in their region and its relationship with full bloom dates and length of flowering in different orchard blocks and cultivars.

This can be used to make more informed predictions about the timing of bud burst for the coming season by comparing progress of the current season's chill accumulation with that of previous seasons.

It can also be used to assess the climate suitability of different crops and cultivars. Identification of delayed and uneven flowering in a particular cultivar every time there is a lower chill year indicates problems with inadequate chilling, and it can help you make better-informed decisions on the use and timing of dormancy-breaking sprays.

This winter chill website came out of a larger research project looking at the effects of climate change on the apple and pear industry. As part of this work, Apple & Pear Australia developed climate projections for 2030 and 2050 for pome fruit regions across Australia. It was found that all regions could expect to experience declines in winter chill over this time period, with further details to be published at a later date.

The increased frequency of low-chill years in milder-winter growing regions will likely result in symptoms of inadequate chill in some cultivars. Recording of winter chill alongside bud burst and flowering dates can provide early indication of cultivars affected by inadequate chill, and therefore assist management decisions regarding varietal choice for new plantings and future orchard adaptation planning.

Access to accurate winter chill data enables the preparation of an orchard management strategy that can be enacted in low-chill years. For instance, through the effective application of dormancy-breaking chemicals to reduce climate-change-related risk.

A novel feature of the website is that it can be used to look at orchard data retrospectively. If a user has records of bud burst and/or flowering going back a number of years, they can use the website to access the winter chill for each of those years, and assess what affect any lower-chill years may have had, if any, to give a better idea of what to expect in the orchard in the future.

As well as providing winter chill for specific sites, the website can compare locations, calculate growing degree days and hours, and show minimum and maximum temperatures. In the future Apple & Pear Australia hope to add in-season forecasts of winter chill so that in early June, for example, a grower can forecast how much chill will be received and determine whether an intervention with dormancy-breakers might be needed.

The website can be found at www.tinyurl.com/ChillCalculator

CRACKING THE CODE OF MEGAPESTS

For the first time, researchers from the CSIRO have mapped the complete genome of two closely related megapests, potentially saving the international agricultural community billions of dollars a year.

Led by CSIRO, in collaboration with a team of renowned experts, the researchers identified more than 17,000 protein coding genes in the genomes of the Helicoverpa armigera and Helicoverpa zea (commonly known as the Cotton Bollworm and Corn Earworm, respectively).

They also documented how these genetics have changed overtime.

This level of detail makes it easier for scientists to predict both the caterpillars' weak spots, how they will mutate, and even breed plants they will not want to eat.

The bollworm and earworm are the world's greatest caterpillar pests of broad-acre crops, causing in excess of US $5 billion in control costs and damage each year across Asia, Europe, Africa, America and Australia.

The bollworm, which is dominant in Australia, attacks more crops and develops much more resistance to pesticides than its earworm counterpart.

"It is the single most important pest of agriculture in the world, making it humanity's greatest competitor for food and fibre," CSIRO Scientist Dr John Oakeshott said.

"Its genomic arsenal has allowed it to outgun all our known insecticides through the development of resistance, reflecting its name - armigera - which means armed and warlike," John added.

In Brazil the bollworm has been spreading rapidly and there have been cases of it hybridising with the earworm, posing a real threat that the new and improved 'superbug' could spread into the United States.

In the mid-1990's the CSIRO assisted Australian cotton breeders to incorporate Bt insect resistance genes in their varieties to try and tackle the bollworm.

'Bt cotton' plants dispatch an insecticide from a bacteria - Bacillus thuringiensis (Bt) - that is toxic to the caterpillar.

In the following ten years, there was an 80 per cent reduction in the use of chemical pesticides previously required to control bollworms.

However, the bollworm soon fought back with a small percentage of them building resistance to Bt cotton and scientists introducing further strains of insecticides to manage the problem.

CSIRO Health and Biosecurity Honorary Fellow Dr Karl Gordon said while a combination of Bt and some insecticides was working well in Australia, it can be costly and it was important to comprehensive studying the pest themselves to manage the problem world-wide.

"We need the full range of agricultural science. Our recent analyses of the complete genome, its adaptations, and spread over the years are a huge step forward in combating these megapests," said Karl.

Identifying pest origins will enable resistance profiling that reflects countries of origin to be included when developing a resistance management strategy, while identifying incursion pathways will improve biosecurity protocols and risk analysis at biosecurity hotspots including national ports.

As part of the research, the CSIRO and the research team updated a previously developed potential distribution model to highlight the global invasion threat, with emphasis on the risks to the United States.

The findings further provide the first solid foundation for comparative evolutionary and functional genomic studies on related and other lepidopteran pests, many of considerable impact and scientific interest.

This important genome project was undertaken by the CSIRO, in conjunction with the University of Melbourne, the Baylor College of Medicine in Texas, the French National Institute for Agricultural Research (INRA), the Max Plank Institute of Chemical Ecology in Germany, and the United States Department of Agriculture - Agricultural Research Service (USDA-ARS).

GETTING RID OF THE DEMON HIDDEN BENEATH VEGETABLE CROPS

They're tiny, microscopic, and hidden in the soil, but despite their size, nematodes can cause significant yield damage and loss in quality in vegetable crops.

The first step in managing these pests is to establish if there is a significant infestation of one or more of the types of nematodes that can cause damage.

Nematodes are parasites, meaning they rely on keeping the plant alive to a sufficient state whereby it continues to provide an ongoing source of food for them to multiply. Their speed of multiplication can be staggering when they are provided with a good host.

Often the effects can be quite discrete, such as plants lacking vigour, from their root system being impeded by the nematode feeding sites.

Key nematode species that damages many vegetable crops are root-knot nematodes, including Meloidogyne javanica and Meloidogyne incognita.

Key host crops in vegetables are beans, carrot, celery, capsicum, cucurbits, ginger, lettuce, potatoes, pumpkin and tomatoes, as well as over 2000 weed species.

Crop rotation will not eliminate root-knot nematodes, it will however significantly reduce crop losses when a susceptible crop is planted again. Winter cereals are useful because they are generally poor hosts. Root-knot nematode reproduction is also slower during the cooler winter months. Summer crop options include sorghum-sudangrass hybrids (particularly cv. Jumbo).

When it comes to cultivation and fallow, ensure plants are removed as soon as the crop is harvested to prevent further multiplication (if possible remove the roots as well). Repeated cultivation kills nematodes in the upper soil layers by exposing them to mechanical abrasion, and the heating and drying action of the sun.

Eggs can last up to a year and populations will persist on a range of weeds, therefore control the weeds is important. If the area is maintained weed free, nematodes will die of starvation. A 4-6 month fallow may reduce nematode populations by up to 95 percent.

If there is good market acceptance for root-knot nematode resistant varieties they can provide a very good level of protection. For susceptible varieties, chemical control options are fewer in number than in recent years, with regulation causing this decline of registered products.

Certain options for fumigation of the soil do still exist, but application can be very expensive and relies on moisture, application technique and soil type.

Syngenta has recently registered TERVIGO® for controlling root-knot nematodes with application through trickle irrigation in fruiting vegetables and cucurbit crops.

HORT INDUSTRY CONGRATULATES 2017 AUSTRALIAN FARMER OF THE YEAR

The Australian horticulture industry has welcomed the recent announcement of Victorian vegetable grower Andrew Bulmer as the Kondinin Group and ABC Rural 2017 Australian Farmer of the Year, calling the award well-deserved recognition of his hard work and commitment to the industry.

Andrew Bulmer is Managing Director of Bulmer Farms, one of the country's leading leafy vegetable growing operations. In 2016, Mr Bulmer received the inaugural AUSVEG VIC Grower of the Year Award, and in 2011, he won the AUSVEG Young Grower of the Year Award.

"Andrew's dedication to the Australian vegetable industry and his willingness to help other growers succeed has given him a great reputation in our sector. This award is a well-deserved honour that reflects his hard work and commitment to the industry," said AUSVEG CEO James Whiteside.

"Andrew has shown great leadership in the efforts to tackle some of the biggest challenges facing our industry, including by promoting increased environmental sustainability and working to engage younger generations in horticulture," James said.

"In doing so, he's played an active role in many industry initiatives that aim to deliver benefits to all growers, from hosting soil health field trials to inviting students on farm visits so they can learn more about the huge range of career opportunities available in horticulture," he added.

James went on to say he's also been a driving force behind the East Gippsland Vegetable Innovation Days, a great initiative that have brought growers together to learn about industry innovations and to network."

Hort Innovation chief executive John Lloyd said Andrew had a long history working with the horticulture Rural Research and Development Corporation, actively contributing across the full gamut of the organisation's activities.

"From participating in overseas study tours, advisory groups and educational videos, to sharing his knowledge at workshops, Andrew has a strong track record of promoting research and development for the betterment of the industry," John said.

"Andrew is a great role model for young growers rising up through the ranks and those who are looking to get into horticulture, an industry that is incredibly rewarding," he concluded.

AUSVEG CEO James Whiteside congrats Andrew Bulmer.

HIGH-TECH SMART TRAPS TESTED IN WA GRAINBELT

SMART TRAPS ARE BEING ERECTED IN THE WESTERN AUSTRALIAN GRAINBELT AS PART OF A RESEARCH PROJECT TO DEVELOP REMOTE SURVEILLANCE TECHNOLOGY TO IMPROVE CROP PEST AND DISEASE MANAGEMENT OVER INCREASINGLY VAST FARMING PROPERTIES.

The traps are being erected on properties around Geraldton, Northam, Merredin and Katanning to discover how effectively they monitor major threats to grain crops.

The research is part of the Department of Primary Industry and Regional Development grains projects to address challenges faced by Western Australian grain growers in addressing threats to crops.

Department development officer Christiaan Valentine and his team have been testing a collection of commercial smart traps, as well as several prototypes, that monitor pest and disease populations remotely.

Christiaan said some of the traps had been used successfully in the horticulture industry and showed promise for use in the grainbelt.

“We have been testing two types of automated moth traps from the United States for the past few months in the Carnarvon horticulture precinct, where moths are present all year round,” he said.

“The devices collect data about trapped moths, which is uploaded to the internet from which it can be accessed and interpreted. This information is used to determine the likelihood of moths migrating into crops and laying eggs to better target the caterpillars and spray applications. The traps also use a pheromone lure, specific to the moth species, so that they can be targeted,” Christiaan explained.

The department has also been developing its own automated moth trap to complement the commercial traps, as well as a prototype aphid trap.

“The automated moth trap is a more simple design, which uses a small circuit board to operate a camera that takes images of moths as they fall into the trap,” Christiaan said.

“A 3-D printer was used to create an aphid trap, attached to a mobile phone and powered by a solar panel.

We downloaded an app onto relatively cheap mobile phones, which enables the device to take an image of the insects in the trap and upload it to the internet. It’s a relatively simple device that has worked surprisingly well,” he explained.

DPIRD development officers Christiaan Valentine and Stacey Hansch install a sclerotinia camera trap and a spore trap at Wickepin as part of a project to improve crop surveillance. The devices will be on display at the upcoming GWN7 Dowerin Machinery Field Days.

The project team is also developing a way of monitoring the canola disease sclerotinia, as it develops in the field.

“The sclerote monitors use either a mobile phone or a mini-computer, called a Raspberry Pi, with up to four cameras attached to capture images of the small, mushroom-like structures (apothecia) that emerge from the germinating sclerotes,” Christiaan said.

“The Rasperry Pi’s also monitor soil surface temperature and moisture and the surrounding sub-surface air to help increase our knowledge of the conditions required for sclerote germination. The device also helps to predict when sclerotinia is likely to infect crops and the best time for management,” he added.

Passive spore trap prototypes, originally developed by department officers, have also been upgraded, via the use of a 3-D printer, to monitor sclerotinia and rust spores in paddocks.

“The ultimate aim is to set up a network or array of these passive spore traps in paddocks across the grainbelt to collect spores that are moving across the area. The spores can be collected and DNA technology can then be used to identify the pathogen at a molecular level, for rapid in-field diagnosis of the disease.” Christiaan said.

As grain properties expand and crop monitoring over large areas becomes more difficult, Christiaan said it was important to adopt and adapt new technologies that would aid pest and disease surveillance.

“The real-time data collected from these smart traps will help growers to control crop threats, as well as improve pest and disease modelling across the grainbelt,” Christiaan said.

“Identification and diagnosis is critical to minimise the impact of crop pests or diseases, whether endemic or exotic, and their impact on yields, profitability and market access,” he added.

The Boosting Grains Research and Development Flagship projects are funded by Royalties for Regions. The project also links to an Australian Government Rural Research and Development for Profit project, funded via the Grains Research and Development Corporation, to examine the use of next generation technologies to safeguard agricultural production and enhance the nation’s biosecurity reputation.

“The sclerote monitors use either a mobile phone or a mini-computer, called a Raspberry Pi, with up to four cameras attached to capture images of the small, mushroom-like structures (apothecia) that emerge from the germinating sclerotes.”
Christiaan Valentine

KEY TO DROUGHT TOLERANT CROPS MAY BE IN THE LEAVES

A solution to help farmers to grow crops in dry areas or during stretches of drought may depend on breeding and cultivating plants that protect themselves with a thicker layer of leaf wax, a new study shows.

It is thought that leaf wax acts as the equivalent of 'lip balm' for plants, protecting them from the harmful effects of drought.

Sarah Feakins, a scientist at the University of Southern California (USC) who has studied leaf wax in the context of climate change, teamed up recently with researchers at Texas A&M University to research and develop drought-resistant crops.

During tests with growing winter wheat, a type harvested for yeast-based breads and other such products, the team found that the cultivars in a high and dry area of Texas generated more protective wax on their leaves as a measure to protect themselves against more extreme conditions.

The results mimicked what scientists have found in leaves in natural ecosystems, that those which survive in dry climates have higher concentrations of wax.

"Water conservation depends on innovation, and in this case, we are hoping to find one solution by identifying the traits in this important food crop that would enable the wheat plants to tolerate drought and still produce plenty for harvest," said Sarah, a co-lead author of the study and an associate professor of earth sciences at the USC Dornsife College of Letters, Arts and Sciences.

All plants produce wax that helps their leaves repel water and shield the plant from insects and the elements, said Sarah, who has studied climate history of the Earth through the geochemistry of leaf wax in sediments.

Sarah said this latest study marks the first time she has applied her expertise to agricultural production. The United States is currently the top exporter of wheat in the world, according to the U.S. Department of Agriculture's Economic Research Service. Winter wheat is largely grown for bread products and ingredients, such as all-purpose flour.

For the study, the researchers grew test plots of winter wheat in two different areas of Texas, the high plains of Amarillo and a farming area known as Winter Garden, Uvalde.

At each location, scientists grew 10 cultivars of winter wheat that received regular irrigation and another 10 cultivars that received 13 percent to 25 percent less irrigation. The team compared the leaf wax of all the plots to gauge their drought tolerance.

The plot set to receive 25 percent less irrigation in Winter Garden ended up receiving 13 percent less because of greater-than-expected rainfall. But a similar plot grown with 25 percent less water in the most arid area, Amarillo, generated 50 percent more paraffin on its leaves than the other cultivars in all the other plots, which enabled the plants to tolerate their dry conditions.

"We see a strong effect in the higher and drier location. We see the plants adapt to their environment and to better protect their leaves, allowing them to respond well to reduced irrigation," said Sarah.

The lower available water was tracked through carbon isotopes in the plant leaves and in the waxes themselves, tools that are used to reconstruct climates of the past from ancient waxes in sediments.

"This is part of an effort to breed crops that are more drought-resistant. In the world that we are in today, with warming reducing available water, there will be more demand for crops that are drought-resistant," Sarah said.

Sarah said the team will next consider which of their cultivated wheat crop offers the best resilience and are able to generate high yields with low irrigation or precipitation.

INTEGRATED APPROACH VITAL TO BEAT FUNGICIDE RESISTANCE

WITH FUNGICIDE RESISTANCE CONSIDERED THE NEXT MAJOR THREAT IN AUSTRALIAN GRAIN PRODUCTION, GLOBAL CROP PROTECTION COMPANY, ADAMA, HAS DECIDED TO GET ON THE FRONT FOOT AND HELP ENCOURAGE THE INDUSTRY TO DEVELOP AN INTEGRATED APPROACH TO DISEASE MANAGEMENT.

In late July the company staged two workshops in Western Australia, which were keenly attended by a strong contingent of the state's agricultural advisers and agronomists, aware of the growing concern.

The Adama workshops allowed an opportunity to hear from two of the country's leading minds when it comes to fungicide research, resistance and disease management, including Geelong-based Nick Poole, Managing Director of the Foundation for Arable Research (FAR), and Dr Fran Lopez-Ruiz, Fungicide Resistance Group Leader at the Centre for Crop and Disease Management (CCDM) at Curtin University in WA. The CCDM is a joint venture between the university and the Grains Research and Development Corporation ,and only recently opened new state-of-the-art facilities.

Adama WA Market Development Manager Bevan Addison said the industry only needed to look over to Europe, where a heavy reliance on fungicides had created resistance issues due to lack of good management in the early stages.

Bevan said in Western Australia, an intensive cereal rotation, due to limited rotational options, contributed to increased likelihood of disease pressure and use of fungicides.

Fran updated the workshops on the different diseases showing resistance in a range of crops across Australia, including immediate concerns for powdery mildew and septoria blotch in cereals, and recently with spot form net blotch in barley near Esperance in Western Australia.

He said the industry had traditionally been slow to respond to reduced fungicide efficacy and he encouraged adoption of integrated disease management strategies whenever possible, including selecting resistant crop varieties, rotating fungicide modes of action, selecting fungicide mixtures with different modes of action, as well as testing stubble or fresh leaf samples.

Bevan said there was a requirement for more widespread testing and the CCDM facility was now available to the industry.

Nick discussed the development of disease and resistance over the life of a crop, spraying applications and the particular timing of treatments for best disease control, and provided an update on fungicide modes of action, their activity and different disease targets.

He said relevant disease levels, crop growth stage, crop conditions and fungicide timing windows all needed to be considered to assist correct spraying decisions.

"Making the most money out of fungicide and getting the best disease control can be two different things," said Nick, who also independently undertakes work for Adama as part of its ongoing product development program.

"A lot of guys want to put fungicides in with herbicides, but sometimes you may get better impact from an in-furrow treatment. With some diseases, the emergence of the 'money leaves' on the main stem and getting fungicide applications in that window will give best results," Nick added.

With resistance, there can be confusion between herbicide and fungicide resistance and while it is often considered that increasing application rates is a good measure against herbicide resistance, Nick said research data did not support this in the case of fungicide resistance.

"Increasing the rate, leading to better control, might be desirable, but it's not necessarily an anti-resistance measure when it comes to fungicide resistance," he said.

Nick said the fact there were fewer active ingredients available to the industry meant they would come under increasing pressure, and he encouraged advisers and consultants to "keep on top" of active ingredients and loadings.

Different active ingredients have different levels of resistance risk, with some, such as DMI fungicides, only slowly becoming less effective, while others, such as strobilurin fungicides, develop resistance and become completely resistant quickly.

Bevan said Adama would continue to work closely with industry and invest in training of key influencers in an effort to help sustain the limited range of fungicides used in Australia and provide solutions to growers.

"Adama has a suite of products that can provide solutions at most points in the season, however, as an industry, we need to develop integrated long-term strategies around fungicide use from seeding right through the life of the crop," Bevan said.

"The company is looking globally for alternative fungicide options and is constantly screening active ingredients and mixes that will suit the local disease spectrum and cropping systems in Australia," he added.

Fran said there also was an opportunity for companies to re-look at existing chemistries and recycling of compounds, which was another strong focus area for Adama.

Bevan said Adama was continuing to invest in ongoing development of older active ingredients, recently illustrated by the release of its high load propiconazole product, Bumper 625, which now allows for mixing of propiconazole fungicides more readily and with greater crop safety.

"It allows growers a one pass solution, whereas previously with older formulations, they were very wary of crop scorch. Two-and-a-half times the loading with less solvent means a much lower use rate and much lower solvent application, providing benefits to growers and also to the environment, with less solvent, drum disposal and transport," Bevan explained.

He said when developing a dual mode of action product, the company was striving to achieve the ideal ratio of high and low risk fungicides to help prevent unnecessary pressure on the higher risk fungicides, like strobilurin.

"A lot of guys want to put fungicides in with herbicides, but sometimes you may get better impact from an in-furrow treatment."

Nick Poole

INTERIM FINDINGS FROM CONTROL TRAFFIC FARMING RESEARCH

The impact on crop performance from trafficking in low rainfall zones has been found to be far less dramatic than in those of different soil types and climates.

Interim results come after two years into a five year research project, funded by the Grains Research and Development Corporation (GRDC), called "Application of controlled traffic farming (CTF) in the low rainfall zone".

The project's four research sites, located in Victoria, South Australia and New South Wales, show an impact on crop performance from trafficking on the soil with a 5-30% difference measured in severe traffic conditions.

At this point in the project the differences measured are not as large or as constant as found in the self-mulching clays of Queensland, or the sandy soils of Western Australia.

The question now for researches is why? It is hoped this 'why' will be answered from two more years of measurements off the research sites, and through activities to be undertaken by the five farmer groups who are partners of the project.

Crop yields

During the 2015 and 2016 seasons, the Farming System Group Partners (FSGP) undertook various activities connected to CTF, such as the investigation of the effect of wheel tracks on crop yield in farmer paddocks of three of the FSGP in 2016.

Crop cuts on and off wheel tracks were taken just before harvest, weighed and the results indicated that in the majority of cases yields were higher in non-trafficked areas compared to on wheel tracks.

However this was not always the case, raising the questions:

- Are the yield differences a result of wheel crushing of plants or is it the compaction effect?
- Why are some yields on wheel track better than off wheel track?

It is hoped that the FSGP will be able to undertake sampling again this season.

Soil compaction

To demonstrate to farmers the impact that compaction can have on both soil and machinery performance, the project is using a digital penetrometer and a 'pullmeter' on farmer paddocks and research sites.

The penetrometer records the soil resistance at varying depths as the rod (simulating a plant root) is pushed into the soil. This provides an insight into how tight a soil is across a determined width of paddock and to a depth of 50 centimetres.

The 'pullmeter' allows landholders to measure the impact on their equipment of the rolling resistance of soil, both on and off compacted wheel tracks. Rolling resistance affects the energy and fuel required to move or pull machinery.

Greenhouse gases

A paddock near Swan Hill was included, as part of a project "CTF Effects on Soil Emissions", to collect data on greenhouse gas emissions and denitrification loss.

The data showed that trafficked areas in a barley crop lost twice the amount of greenhouse gas emissions (690 kg/ha carbon dioxide equivalent) and denitrification loss (more than 25kg/ha N) than the non-wheeled areas.

Emissions are highly variable, so we can be more confident of the ratio of losses from beds and wheeled soil than the absolute values, but they are in reasonable alignment with other tests in Victoria.

Project partners

Project partners are the Australian Controlled Traffic Farming Association (ACTFA), Agriculture Victoria, South Australian Research and Development Institute, Birchip Cropping Group, Eyre Peninsula Agricultural Research Foundation, Upper North Farming Systems, Mallee Sustainable Farming, Central West Farming Systems and Society of Precision Agriculture Australia.

CORN KEY TO CLOSED-LOOP DENILIQUIN PIGGERY

A closed-loop farming system whereby pig manure is used to grow corn that is fed back to pigs is paying off for a pork producer at Deniliquin.

Donaldson Farming flushes the effluent from the pig sheds into a slurry pit every day, and from there it is pumped via a pipeline and mixed with irrigation water in nearby fields.

Tristan Donaldson, who manages the 445-hectare irrigated and dryland livestock and cropping business, said the system provided high crop yields, a high energy diet and reduced feed and fertiliser costs.

"Last summer we grew 64 hectares of PAC 606IT corn which produced 1000 tonnes of grain. Considering half the crop was patchy and the other half was amazing, overall we achieved 14.6t/ha at 12% moisture average, which is fantastic. Some of the corn was looking you in the eye driving the header." Tristan said.

"With an IT corn, we also have the option to spray herbicide in-crop to tackle our biggest weed, caltrop," he added.

Tristan planted from late-October into early November and harvested from late-April to early May, though a small amount of crop did not come off until June 5.

His previous season, 2015-16, was even better, with his corn averaging 15.5t/ha.

All of this has been achieved while dealing with the property's hard pan, a compacted layer of soil just below the soil surface which inhibits water and nutrient movement. This was made more difficult last year when, unlike previous years, the wet winter made it impossible to deep rip the soil before planting the corn.

"Because of our clay soils, we can get stunted growth in crops as the roots struggle to get down deep. Our agronomist Matt Barker from Rodwells is looking at ways to tackle the issue. Last season he did a leaf tissue test and sent it away for analysis to see what the plant was lacking. He then made up a special brew to address this. Strangely enough, our first block of corn sown was the last to be harvested due to hard pan. It took so long to grow in those tough spots," Tristan explained.

Corn provides the pigs with high digestible energy grain in the feed, where other proteins and vitamins are also supplemented to provide a balance ration for their growth.

"Corn grown for grain provides the energy, but we also grow our own wheat, barley, peas, baled vetch and canola meal which provides the protein and fibre," said Tristan.

He said the home-grown feed program helps keep the business profitable, because freighting in feed can cost $25/t.

"Paying for feed doesn't make it worthwhile. We have bore water and Murray channel irrigation water, so it makes sense to grow our own crops. We usually budget on 10ML/ha each season. By using the pig manure we're also cutting down the amount of synthetic fertilisers needed. I find growing a nitrogen crop like vetch in front of corn really gives it a boost too," Tristan concluded.

BLOTCH ON CROP HORIZON

Victorian wheat farmers in the Wimmera need to be on the lookout for a fungus which potentially could strip half their wheat yields.

Septoria tritici blotch has already been reported in Wimmera wheat crops and Agriculture Victoria cereal pathologist from Horsham, Dr Grant Hollaway, is urging growers to inspect their crops.

"Septoria was common in the Wimmera in low levels last year and this has provided the carryover of inoculum for this year. Given repeated wet conditions which are favourable for the disease, septoria can cause losses greater than 50 per cent," Grant said.

Grant said growers should look for symptoms on older leaves and fungicide control needs to be considered when septoria is found.

Symptoms growers should be looking for are pale grey to dark brown lesions which contain black fruiting bodies.

The Grains Research and Development Corporation (GRDC) has noted that long periods of leaf moisture are required for disease development. Early sown crops and crops sown into wheat stubbles are at most risk, however the disease has an early airborne component and all wheat crops should be scouted for symptoms.

To manage septoria, growers should be spraying at early stem elongation (growth stage 31-32) and follow up with a second application at flag leaf (growth stage 39) if necessary. Grant said the timing of fungicide application and choice of fungicide were both important in managing this disease.

"Because of increasing levels of resistance to fungicides in the Septoria tritici blotch population in Victoria, it is important that the same active ingredient is not used more than once in any season," he said.

"Where possible apply fungicides that contain a mix of actives. Growers are reminded to always read the chemical label and only use as directed," Grant added.

Adoption of an integrated disease management approach which includes crop rotation, selection of resistant cultivars and if necessary, the application of fungicides were noted by the GRDC as the most effective management tools.

HOW TO MANAGE RYEGRASS PASTURES TO MAXIMISE THE SPRING FLUSH

The 'spring flush' in ryegrass pastures occurs when soil water is readily available and temperatures reach their optimum range for growth. It is a production peak that growers want to maximise, because it really is a 'once a year' opportunity.

According to Heritage Seeds, transitioning from winter into spring is a time when producers should be liaising with their adviser and paying close attention to soil fertility. It's when pasture growth is high, demand for nitrogen and potassium is high and soil reserves are often low.

Nutrient mineralisation is slow in cold winter soils and come spring, autumn fertiliser applications are often depleted. Timely fertiliser application can help lift pastures out of winter faster. Make sure of the right nutrition will help drive spring pasture growth.

Spring management is about maximising both pasture and animal production, and the juggling act required to ensure the highest quality forage goes down the throat, or into the pit or bale.

The aim to maximise pasture utilisation, quality and regrowth by grazing before dry matter (DM) production reaches 3000kg/ha and taking livestock out when it's eaten down to 1500kg DM/ha residual.

This requires good management and attention to detail, but has the added benefit of helping to manage fungal diseases like rust. Spring foliar diseases can likewise be managed with cutting and planting resistant varieties.

It's unlikely a grower will ever have enough stock to have the perfect grazing regime in every paddock, and pasture utilisation and quality is certainly bolstered with effective fodder conservation. Here, it pays to be flexible.

Feed availability and growth can change rapidly, so constant monitoring is required. Therefore, it's desirable to adjust the ratio of grazing area to fodder conservation area, to account for variable growth rates.

While every season is different and each paddock is different, one thing is clear. Identifying fodder conservation areas early enables more time to take the appropriate action like booking contractors well in advance.

If planning to cut and carry more fodder from the paddock, there will be a need to up the fertiliser budget, because more nutrients are being exported than in a grazing system.

Growers are getting good results with pre-graze mowing. This is a great option to increase animal daily feed intake, and also with managing a feed surplus.

Lastly, when deciding on which paddocks to graze or conserve, producers should consider the next phase for that paddock i.e. allowing some over-sown kikuyu to come away early, or what will be the timeliness of next crop.

MAJOR CHANGES TO CROP PROGRAM AT PILTON

Darling Downs crop and cattle producers, the Ryan family, are making the biggest changes to their farm since adopting zero till in the early 2000's.

Michael Ryan, his wife Elissa and parents John and Mary, recently implemented controlled traffic farming (CTF) at their Pilton Valley farm, complementing their uptake of variable rate (VR) seeding and imidazolinone-tolerant (IT) corn.

Fourth-generation farmer Michael said they were embracing select new technologies to improve soil productivity and respond to a changing climate.

"Zero till greatly improved the moisture retaining properties of our paddocks, but we saw potential for more productivity increases and long-term savings," Michael said.

Michael said CTF was seen as a necessary move to fix soil compaction, and have gradually implemented it since the last summer crop season.

"In the current winter crop season we have moved to full CTF on 3m wheel tracks to minimise soil compaction, because it can really reduce yields," he added.

Additionally, he said using VR seeding was a more accurate way to seed across their dryland and irrigated paddocks, saving them money.

"A variable rate planter is good for using in our paddock irrigated by the centre pivot, because you can drop your planting rate right back to a dryland rate in any area. If you planted all areas at the same rate, the plant runs out of moisture due to the high population. We are saving a bag of seed over a 100 acre paddock because the planter puts on the exact population to what is desired. The planter also uses GPS or swath control so no seed is wasted with overlap in point rows or headlands that are already planted," Michael explained.

John and Michael Ryan are making big changes at their Pilton family farm.

The family started dairy farming in the area in the 1940's but today are producers of grain sorghum, corn, soybeans and mung beans in summer and wheat, barley and chickpeas in winter. They also buy weaners and store cattle to grow out and fatten on their licensed feedlot.

They have two Pilton properties, Alfred Park and Glenburnie, and share farm country with outside parties. Michael and Elissa also run their own place, Glentonvale.

One of their major upgrades to the cropping side of the business was the introduction of IT corn in the 2015-16 season. Michael said one of their hybrids of choice, feed/grit corn PAC 727IT, was selected for weed control, grain quality and toughness.

"We grow it for the Lightning herbicide aspect, because we can target in-crop weeds, but also because it produces good grain for the snack foods market. It also has one of the best disease and stress tolerance packages, which came in handy last season," Michael said.

Michael said their corn endured one of the hottest summers ever experienced in 2016-17.

"We could not have had a tougher summer. It was horrendous, as many farmers would know. On February 11 and 12 we had over 43 degrees which cooked the crops and made them basically ripen overnight. February was just relentless with heat with very little rain, which was definitely not an ideal scenario for corn tasselling," he explained.

Their 20ha of dryland PAC 727IT averaged 5t/ha and their 24ha under irrigation averaged 9t/ha.

"The best part of the paddock under irrigation was yielding 12t ha, so this was an excellent result for the harsh season. The corn definitely handled the heat well and to get 5t/ha dryland, we were really happy with it. The fact it was zero till and had good winter rain and subsoil moisture, meant it held on through the heatwave," Michael said.

The 44ha of grit corn was all forward-sold through a local grain trader. Both paddocks were sown on October 7 with a Norseman 8-row planter on 91cm rows and harvested on April 17. Both received 1.8L/ha of Dual Gold post-plant and 125g/ha of Lightning in-crop, as well as 1.5kg/ha of atrazine.

The dryland block was fallowed seven months out of grain sorghum, received 160kg/ha of N pre-plant with 50kg/ha of 812S starter fertiliser at planting, and the seeding rate was 35,000 seeds/ha.

The irrigated block was fallowed out of barley with 130kg of N/ha pre-plant, with a further 150kg/ha of N applied September. There was 60kg/ha of 812S fertiliser applied at-plant and the planting rate was 55,000 seeds/ha.

For the upcoming summer crop season, the Ryan's will plant PAC 727IT again, and add tough sorghum variety MR-Bazley to complement their mainstay MR-Taurus.

NEW STRATEGIC PLAN FOR SUGARCANE RESEARCH INVESTMENT

Sugar Research Australia (SRA) has released its new five-year Strategic Plan, following an extensive development and consultation process with growers, millers, government investors, and other stakeholders, aiming to shape the future of sugarcane research investment.

SRA CEO Mr Neil Fisher said SRA has listened to its investors and is responding to their call for SRA to deliver research that has a real impact on-farm, at-mill and in the communities and environment in which the sugarcane industry operates.

This new Strategic Plan allows SRA to addresses the challenges and opportunities facing the Australian sugarcane industry, with a focus on research where SRA can have the most impact. In short, SRA aims to deliver research that has a transformational impact on the profitability, sustainability, and resilience of the industry.

“Through our consultations, our investors were clear that they need SRA to be delivering tangible outputs and outcomes for sugarcane growers and millers,” Neil said.

“Our investors, through the Strategic Plan, have identified particular areas of attention and investment for SRA in coming years, which includes improving the efficiency of the sugarcane breeding program, improving adoption and communication, enhancing soil health while minimising nutrient run-off, and continuing to work on the yellow canopy syndrome dilemma. The bottom line is that SRA exists to help put more dollars in the back pocket of growers and millers, who underpin regional jobs and economies in large areas of Queensland and New South Wales,” Neil explained.

“SRA is committed to being accountable for our investment, and we do that through measuring and reporting on our performance. Our Strategic Plan has clear measures of success, and we are accountable to these measures through an annual Performance Report, and an Independent Performance Review every three years,” he added.

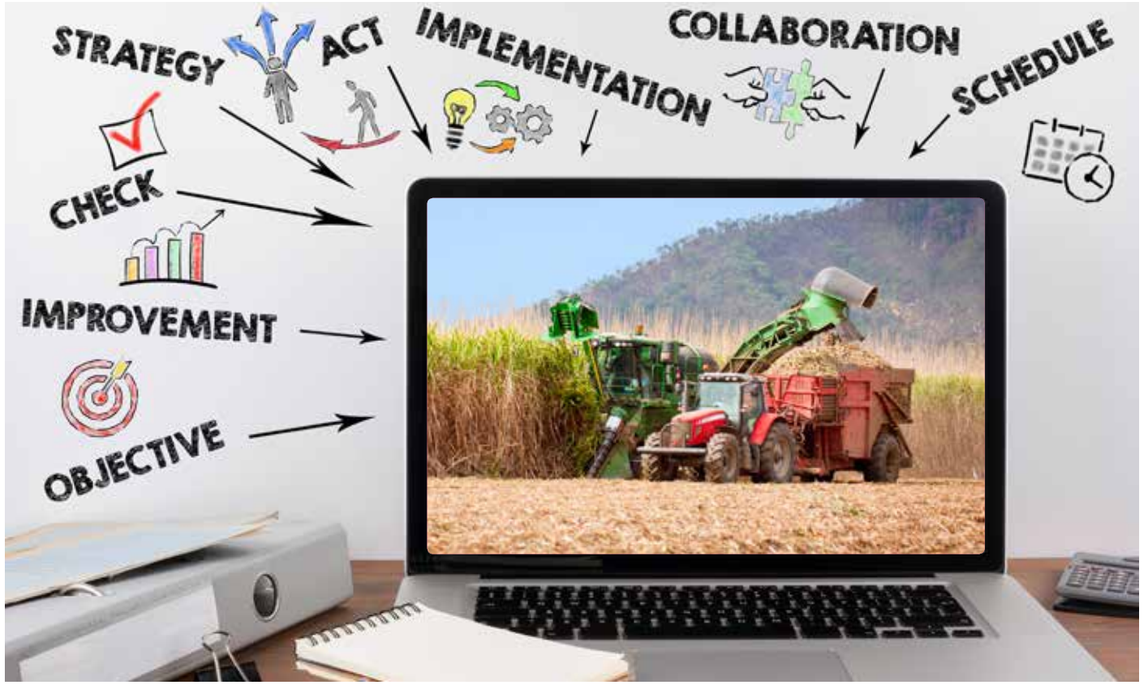
SRA has also consulted widely with Commonwealth and State Government investors, and the Strategic Plan aligns with the National Sugarcane Industry Research, Development and Extension (RD&E) Strategy, the Commonwealth Government’s Science and Research Priorities and Rural Research, Development and Extension Priorities, and the Queensland Government’s Strategic Objectives for investment in the sugarcane industry.

Neil said that what sets this Strategic Plan apart from the previous plan is the establishment of four goals that underpin research investment. These are to drive profitability, improve sustainability, enhance capability, and strengthen organisational excellence.

The Plan also has nine specific Key Focus Areas (KFAs) for SRA’s investment: optimally adapted varieties, plant breeding and release; soil health, nutrient management and sustainability; pest disease and weed management; farming systems and harvesting; milling efficiency and technology; product diversification and value addition; knowledge and technology transfer and adoption; collaboration and capability development; and organisational effectiveness.

“Each year, our Strategic Plan is enacted through an Annual Operational Plan, which has also now been released for 2017/18,” Neil said.

“These plans ensure SRA is positioned to lead, partner and invest in research, development and adoption activities that will enable growers and millers to remain profitable and our industry resilient over the long-term,” he concluded.



LAMBING PLANNING GOES MOBILE

Planning for lambing has gone digital with the popular paper-based tool, the Lambing Planner, now available as an award-winning mobile app.

The Lambing Planner is a best practice guide for lambing, developed by the Department of Primary Industries and Regional Development in Western Australia and Esperance-based farmer group ASHEEP.

Department senior development officer Mandy Curnow said the Lambing Planner had been one of the department's most popular tools.

"It is a simple tool that allows producers to change a lambing date or a joining date to see the impacts of that on other key times in the reproductive year," Mandy said.

"It has had strong uptake as a hand-held, paper-based tool and is now available as an app in both Android and iOS formats," she added.

The Lambing Planner calculates other key milestones in the reproductive year based on producer entries and sets out key management operations that make up the breeding cycle, providing information on ewe and ram nutrition, condition score targets at different stages and reproductive management.

The calendar displays the stages of pregnancy or lactation and current recommended activities with more detailed information at the click of a button.

The lambing planner app recently won gold at the 2017 TECH Design Awards.

ASHEEP committee member Bob Reed said he appreciated efforts to convert the planner into an app, after the success of the paper-based tool.

"ASHEEP's original intention with the planner was to sequence a system that made 100 per cent lambing outcomes an expectation rather than a surprise," Bob said.

"Such outcomes are now becoming a reality for many Esperance farmers," he added.

The app is free to download on Android and iOS.

Planning for lambing has gone digital with the popular paper-based tool, the Lambing Planner, now available as a mobile application.

PREVENTION IS ALWAYS BETTER THAN CURE FOR ON-FARM BIOSECURITY

Australian potato growers are being urged to renew their focus on on-farm biosecurity, including developing a biosecurity plan to reduce both the impact of destructive endemic pests and the likelihood of new pests being introduced onto their farms.

Following the recent incursion of tomato-potato psyllid in Western Australia, leading industry body AUSVEG is asking potato growers around the country to review their biosecurity arrangements and identify areas for improvement.

"Good biosecurity practices reduce the likelihood of new pests being introduced or spreading onto a farm, and they can also reduce the impact of endemic pests which a farm may already be dealing with," said AUSVEG National Manager – Science and Extension, Dr Jessica Lye.

"Most farm biosecurity plans already contain several common practices, such as signs with contact details for the farm manager or showing visitors where to park to avoid spreading infected soil. However, growers should also undertake risk assessments and identify any priority areas that require further attention," Jessica said.

"Maintaining farm biosecurity requires ongoing action from growers, including following appropriate guidelines for vehicle and visitor movements, providing adequate training and hygiene supplies to staff and contractors, and routine crop monitoring. Given the potentially devastating impacts that the spread of pests could have on individual growing operations and the industry as a whole, developing a clear, consistent biosecurity plan for your farm has long-lasting benefits," she went to explain.

AUSVEG is the leading horticultural body representing Australia's vegetable and potato growers.

Any growers or agronomists interested in obtaining a Farm Biosecurity Plan Work Booklet or an AUSVEG Farm Biosecurity Planner, including an extended biosecurity checklist and additional information about biosecurity practices and risks, can contact AUSVEG. Any unusual plant pest should be reported immediately to the relevant state or territory agriculture agency through the Exotic Plant Pest Hotline (1800 084 881).

SMASHING THE AVOCADO BOTTLENECK

A method of supplying 500 times more avocado plants to industry than is currently possible has been invented by University of Queensland (UQ) researchers.

The new stem cell multiplication method could double avocado production in Queensland, as well as reducing the time it takes for new avocado varieties to reach commercial orchards from 10 years to three years or less.

Professor Neena Mitter from the Queensland Alliance for Agriculture and Food Innovation, a UQ research institute supported by the Queensland Government, is leading the project.

"At present, to supply new trees, the avocado industry follows the same process they have for the last 40 years, which is to take cuttings from high quality trees and root them," Neena said.

"However, this is a cumbersome, labour and resource intensive process, as it takes about 18 months from the cutting stage to having a plant for sale, which creates a huge bottleneck for nurseries across the globe in the number of trees that they can supply trees to growers," she explained further.

Queensland produces 50 per cent of Australia's high-value avocado crop, worth $460 million a year.

However, the industry is hampered by a shortage of high-quality planting material and there is a backlog of plant orders until 2020.

With funding from the avocado industry and Department of Agriculture and Fisheries, Neena's team successfully developed a stem cell tissue-culture system that can supply 500 times more plants.

The technology is non-GM and environmentally-friendly, requiring less land, water, fertilisers and pesticides.

"10,000 plants can be generated in a 10 square metre room on a soilless media," Neena said.

"This is a potential game changer for the avocado industry across the globe," she added.

The Queensland-owned technology involves a secret recipe of media, light, temperature and other factors to grow and root multiple avocado plants from the shoot tip of an existing plant.

Neena's team is now working with banana growers in Lakeland who are seeking heat-adapted avocado trees to grow alongside bananas, as a way of diversifying their income.

Avocado growers in central Queensland, New South Wales and Western Australia are also collaborating on the project.

With new funding from the Queensland Government's Advance Queensland Innovation Partnerships, and in collaboration with Anderson Horticulture and other industry partners more than 600 avocado plants developed by the new method will be tested in regions across Australia.

Growers will capture performance data on the growth, flowering and fruiting of the trees.

"From an initial investment of less than $2 million from government, universities and industry, we should see an annual return of $335 million, with benefits flowing across the production and supply chain in Queensland," Neena said.

The project also involves collaboration with the University of Southern Queensland and Central Queensland University.

Neena said the avocado multiplication technology would establish Queensland as a world leader in avocado clonal propagation.

"It would substantially boost exports, and create growth and jobs in the regions," she concluded.

NEW PROCESS COULD MAKE FERTILISER PRODUCTION MORE SUSTAINABLE

EXCITING NEW NITROGEN FIXATION RESEARCH COULD OPEN THE DOORS TO A RANGE OF APPLICATIONS IN THE FUTURE.

Inspired by a natural process found in certain bacteria, a team of California Institute of Technology (Caltech) researchers is inching closer to a new method for producing fertiliser that could someday hold benefits for farmers—particularly in the developing world—while also shedding light on a biological mystery.

Fertilisers are chemical sources of nutrients that are otherwise lacking in soil. Most commonly, fertilisers supply the element nitrogen, which is essential for all living things, as it is a fundamental building block of DNA, RNA, and proteins. Nitrogen gas is very abundant on Earth, making up 78 percent of our atmosphere. However, most organisms cannot use nitrogen in its gaseous form.

To make nitrogen usable, it must be 'fixed'—turned into a form that can enter the food chain as a nutrient. There are two primary ways that can happen, one natural and one synthetic.

Nitrogen fixation occurs naturally due to the action of microbes that live in nodules on plant roots. These organisms convert nitrogen into ammonia through specialised enzymes called nitrogenases.

The ammonia these nitrogen-fixing organisms create fertilises plants that can then be consumed by animals, including humans. In a 2008 paper appearing in the journal Nature Geoscience, a team of researchers estimated that naturally fixed nitrogen provides food for roughly half of the people living on the planet.

The other half of the world's food supply is sustained through artificial nitrogen fixation and the primary method for doing this is the Haber-Bosch process, an industrial-scale reaction developed in Germany over 100 years ago. In the process, hydrogen and nitrogen gases are combined in large reaction vessels, under intense pressure and heat in the presence of a solid-state iron catalyst, to form ammonia.

"The gases are pressurised up to many hundreds of atmospheres and heated up to several hundred degrees Celsius," said Caltech's Ben Matson, a graduate student in the lab of Jonas C. Peters, Bren Professor of Chemistry and director of the Resnick Sustainability Institute.

"With the iron catalyst used in the industrial process, these extreme conditions are required to produce ammonia at suitable rates," Ben added.

In a recent paper appearing in ACS Central Science, Matson, Peters, and their colleagues describe a new way of fixing nitrogen that's inspired by how microbes do it.

"One fascinating thing is that we really don't know, on a molecular level, how the nitrogenase enzyme in these bacteria actually turns nitrogen into ammonia. It's a large unanswered question."
Matthew Chalkley

Nitrogenases consist of seven iron atoms surrounded by a protein skeleton. The structure of one of these nitrogenase enzymes was first solved by Caltech's Douglas Rees, the Roscoe Dickinson Professor of Chemistry.

The researchers in the Peters' lab have developed something similar to a bacterial nitrogenase, albeit much simpler, a molecular scaffolding that surrounds a single iron atom.

The molecular scaffolding was first developed in 2013 and, although the initial design showed promise in fixing nitrogen, it was unstable and inefficient. The researchers have improved its efficiency and stability by tweaking the chemical bath in which the fixation reaction occurs, and by chilling it to approximately the temperature of dry ice (-78 degrees Celsius).

Under these conditions, the reaction converts 72 percent of starting material into ammonia, a big improvement over the initial method, which only converted 40 percent of the starting material into ammonia and required more energy input to do so.

Matson, Peters, and colleagues said their work holds the potential for two major benefits.

The first is ease of production. Because the technology being developed does not require high temperatures or pressures, there is no need for the large-scale industrial infrastructure required for the Haber-Bosch process. This means it might someday be possible to fix nitrogen in smaller facilities located closer to where crops are grown.

"Our work could help to inspire new technologies for fertilser production," said Trevor del Castillo, a Caltech graduate student and co-author of the paper.

"While this type of a technology is unlikely to displace the Haber-Bosch process in the foreseeable future, it could be highly impactful in places that don't have a very stable energy grid, but have access to abundant renewable energy, such as the developing world. There's definitely room for new technology development here, some sort of 'on demand' solar, hydroelectric, or wind-powered process," Trevor explained.

The second is understanding natural nitrogen fixation. The nitrogenase enzyme is complicated and finicky, not working if the ambient conditions are not right, which makes it difficult to study. The new catalyst, on the other hand, is relatively simple. The research team believes that their catalyst is performing fixation in a conceptually similar way as the enzyme, and that its relative simplicity will make it possible to study fixation reactions in the lab using modern spectroscopic techniques.

"One fascinating thing is that we really don't know, on a molecular level, how the nitrogenase enzyme in these bacteria actually turns nitrogen into ammonia. It's a large unanswered question," said graduate student Matthew Chalkley, also a co-author on the paper.

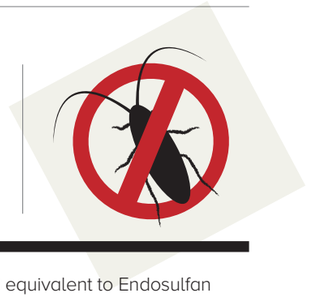
Jonas C. Peters said their research into this catalyst has already given them a deeper understanding of what is happening during a nitrogen-fixing reaction.

"An advantage of our synthetic iron nitrogenase system is that we can study it in great detail. Indeed, in addition to significantly improving the efficiency of this new catalyst for nitrogen fixation, we have made great progress in understanding, at the atomic level, the critical bond-breaking and making-steps that lead to ammonia synthesis from nitrogen," Jonas explained.

If processes of this type can be further refined and their efficiency increased, Jonas added, they may have applications outside of fertiliser production as well.

"If this can be achieved, distributed solar-powered ammonia synthesis can become a reality. And not just as a fertiliser source, but also as an alternative, sustainable, and storable chemical fuel," he said.

A NEW SOLUTION FOR THE CONTROL OF FRUIT SPOTTING AND BANANA SPOTTING BUG



Fruit spotting bug (Amblypelta nitida) (FSB) and banana spotting bug (A. lutescens lutescens) (BSB) are devastating pests of avocados, macadamia nuts, and citrus as well as most tropical and subtropical tree crops including, guavas, pecan nuts, lychees, and mangoes. The two species of pests are virtually indistinguishable. These native species are highly mobile and can cause significant damage even at very low pest density. In the past FSB was often controlled using Endosulfan; however, with its withdrawal in 2010 growers have been forced to use broad spectrum chemicals to control FSB which cause disruption to beneficial insect populations. Knowing that growers needed a better solution, Dow AgroSciences invested in an extensive research program to register a new insecticide called Transform™ with regulatory approval anticipated in the coming months.

Dow AgroSciences senior research biologist Dr. Rob Annetts in collaboration with industry researchers and government scientists demonstrated that Transform controls FSB & BSB equivalent to Endosulfan as demonstrated in the trial data below.

The replicated trial carried out near Bundaberg, QLD assessed nut drop. Assessments were made by cutting each nut open and observing damage. The results demonstrated that Transform applied at 40ml/100L controlled FSB equivalent to Endosulfan after the first application (A), following a second application (B) the % of damaged nuts was significantly better than two applications of Endosulfan.

Growers and industry scientists recognise that the reliance on a very narrow range of insecticides for control of FSB and BSB is unsustainable. The long spray window and limited chemical control options has put a huge amount of pressure on the production system in the absence of viable alternatives. Unfortunately, the current chemical control options are non-selective and severely impact beneficial insects. With the introduction of Transform insecticide, growers now have greater flexibility to manage insect resistance with a new Mode of Action (MOA) whilst preserving key beneficial insects.

An application for the registration of Transform for the control of FSB and BSB is currently with the APVMA and Dow AgroSciences expect to be granted registration in the coming months.

GROWING VICTORIA'S NEXT CROP OF AGRONOMISTS

The search is underway to find five graduates passionate about the Victorian grains industry to join an 18-month Agronomist Development Program (ADP) from February next year with Agriculture Victoria and the Grains Research & Development Corporation (GRDC).

Program leader Dr James Nuttall said the graduate program had been targeting grains research for the medium and high rainfall zones, but had recently shifted focus to production systems and networks in low rainfall zones.

Three of the graduates will do intensive 18-month placements with leading grower groups and agri-businesses, covering key areas including seasonal risk management, nutrition and pathology, trial development and management, pest, weed and disease identification and crop protection, as well as developing communication packages to support research adoption in Hamilton, Bendigo and Mildura.

The remaining two graduates will specialise in pulse agronomy in the Mallee and precision agriculture.

"The modified approach of these two positions reflects the growing need for agronomists with targeted skills to support these priorities," James said.

GRDC Senior Regional Manager – South, Craig Ruchs said the program aimed to accelerate the development of new grains sector agronomists with a focus on building industry capacity in the area of applied grains research.

"It provides a fantastic opportunity for graduates to establish broad cross-industry networks, develop a diverse skill base, and to attract talent from the broader community," he added.

Past graduate Jack Edwards said he gained specific grains experience and contacts that were not available at university.

James said the program had been well received by industry, with previous ADP recipients recruited to a range of grains related organisations.

The ADP sits under the broader Regional Research Agronomist (RRA) program designed to support translation of national research to the grains industry and capability development across southern Australia.

It's an investment in building future grains industry leaders through a bilateral agreement between the Department of Economic Development, Jobs, Transport and Resources and the GRDC.

PRODUCT CHOICE IS CRITICAL IN FIGHT AGAINST GLYPHOSATE RESISTANCE

NEW RESEARCH CONCLUSIVELY SHOWS THE USE OF A SUPERIOR GLYPHOSATE PRODUCT AND COMMITMENT TO INTEGRATED WEED MANAGEMENT HAS THE POTENTIAL TO DELAY THE ONSET OF GLYPHOSATE RESISTANCE ON FARMS ACROSS AUSTRALIA.

In a trial conducted by Plant Science Consulting, of Adelaide, South Australia, there was a clear difference between the efficacy of two different glyphosate formulations applied to susceptible and glyphosate resistant annual ryegrass biotypes.

Dr Peter Boutsalis, who conducted the experiment, pitted Roundup Ultra® MAX against a glyphosate 540g/L formulation.

Each formulation was applied to three annual ryegrass biotypes which included one susceptible and two that were resistant to glyphosate (one with weak resistance and one with strong resistance).

“Roundup Ultra MAX exhibited superior control at lower to intermediate rates on susceptible and glyphosate resistant biotypes compared to the Glyphosate 540g/L formulation,” Peter concluded.

The trial measured herbicide damage (biomass reduction) and survival of annual ryegrass plants sprayed with herbicide at a three-leaf growth stage.

Of particular note was the ability of Roundup Ultra MAX to control ryegrass with weaker glyphosate resistance at rates that were relatively low.

Roundup Ultra MAX produced 100 percent biomass reduction and 100 percent control at a rate of 800 g ai/ha compared to the Glyphosate 540g/L formulation which needed a rate of 1995 g ai/ha to achieve the same result.

“These results suggest that on ryegrass with weak resistance, common in the initial stages of resistance development, using a product such as Roundup Ultra MAX with the unique Transorb II surfactant technology can result in greater control and therefore delay the onset of resistance,” Peter reported.

As could be expected, both herbicide options were unable to completely control the ryegrass with the stronger glyphosate resistance, although there were some significant differences in the amount of control that was achieved.

Peter’s research showed superior results from Roundup Ultra MAX, particularly when the rates were increased to 1995 g ai/ha and 2850 g ai/ha.

“Roundup Ultra MAX caused significantly greater biomass reduction and improved control compared to the generic Glyphosate 540g/L product at equivalent rates,” he said.

Of particular interest was the percentage of biomass reduction and control between the two herbicide options on ryegrass biotypes that were susceptible to glyphosate.

Roundup Ultra MAX achieved 100 percent biomass reduction and control at a lower rate than the 540g/L Glyphosate formulation.

”At rates above 400g ai/ha susceptible ryegrass was controlled,” Peter said. “However, at 200g ai/ha the control and biomass reduction with Roundup Ultra MAX was significantly greater than Glyphosate 540g/L.”

“This indicates that under sub-optimal conditions, where efficacy could be reduced, using a product such as Roundup Ultra MAX will ensure greater weed control than less effective glyphosate formulations,” Peter added.

The trial was conducted in mid-spring 2016 and designed to simulate field conditions.

Plants were grown outdoors and sprayed in a spray cabinet with a twin boom using agricultural nozzles and a water rate and pressure similar to farmer spray equipment. No additional non-ionic surfactant was added to any formulation. Herbicide was applied at the three-leaf stage and assessments made on the level of biomass reduction and the percentage of plants that survived.

Previous published studies have identified that the ryegrass biotype with strong resistance to glyphosate was due to an altered translocation mechanism where target site resistance conferred resistance to the biotype with weak resistance.

Sinochem is heavily focused on assisting growers to improve weed control to achieve better outcomes in the short and long-term.

Growers and advisors should target 100% weed control using the best product available and by integrating other weed control measure to ensure the sustainability of glyphosate into the future. The research conducted by Plant Science Consulting demonstrated the ability of Roundup Ultra MAX to effectively control susceptible and even ryegrass with weaker resistance to glyphosate.

It also had a positive effect on ryegrass biotypes with strong resistance to glyphosate and demonstrated the importance to using higher rates of good quality glyphosate in paddocks known or suspected of containing ryegrass with resistance.

Growers should be targeting 100% weed control in every paddock for both the short and long-term benefit.

A ryegrass biotype that survives a herbicide application because of an inferior product, a sub-lethal rate, or unfavourable environmental conditions, has the ability to flower and cross pollinate with other survivors and accumulate weak resistance mechanisms that can lead to elevated glyphosate resistance.

ONLINE RESOURCE POOLS CROP TRIALS DATA FOR ALL TO ACCESS

DATA FROM THOUSANDS OF AUSTRALIAN ON-FARM GRAINS RESEARCH TRIALS IS BEING COLLATED INTO A CENTRAL, EASY TO ACCESS ONLINE INFORMATION SOURCE FOR GROWERS, AGRONOMISTS, RESEARCHERS AND THE WIDER GRAINS COMMUNITY.

Every year, across Australia, farming systems groups conduct an array of on-farm research trials to provide local grain growers with information and insights to help them overcome cropping challenges. And now it is not just members of the farming systems groups conducting trials that are benefiting from the outcomes, it's a much wider audience that can access this aggregated source of valuable information.

A Grains Research and Development Corporation (GRDC) investment, Online Farms Trials (OFT) at www.farmtrials.com.au has been set up to allow users to view, analyse and export grains research information.

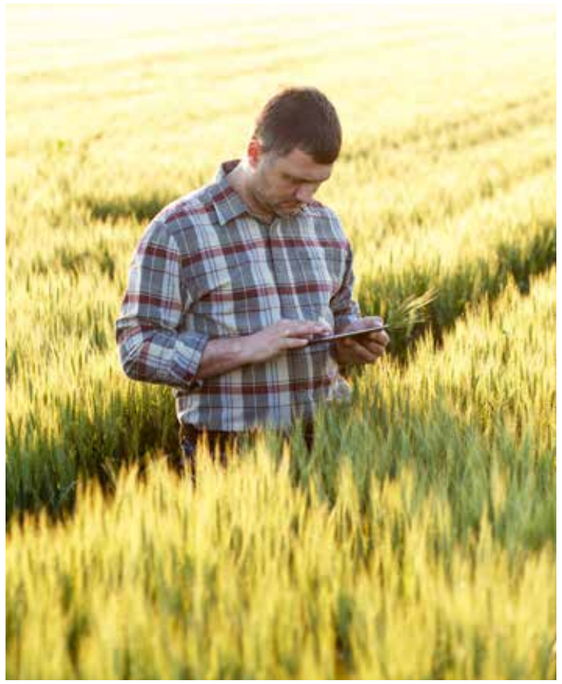
Using innovative technology, the OFT web portal has been developed by the Centre for eResearch and Digital Innovation (CeRDI) at Federation University Australia in Ballarat (Victoria).

Project leader Robert Milne says around 3400 trial projects have so far been published on the OFT site, with data contributed by grower groups and research organisations from across the nation, and he encourages growers, agronomists and other grains industry personnel to make use of the unique resource.

"Greater involvement across the grain research community is paramount for the long-term uptake of the trial data and the success of OFT."

Robert Milne

"OFT is an easy-to-use platform for discovering information from cropping trials conducted throughout Australia to assist with on-farm decision making and planning. Collation of this information in an online database allows historical, geographical and crop-specific comparisons to be made," Robert said.



Published trial projects cover a wide range of crops and treatment types, and the portal includes a number of key features, such as:

- An interactive map of trial sites with layers of relevant information such as agro-ecological zones and average rainfall
- Advanced search filters including treatment type, crop type and location
- Search results with graphical display of measured results such as yield data and disease scores
- Climate and soil information for each project
- Original trial report documents linked to each trial project
- Links to other relevant information sources

Grower groups and researchers are continuing to enter data onto the portal and the number of trials published on the site will continue to grow.

"OFT contains information on how to become involved in the project and how to submit research. Grower groups and other research organisations which have previously not submitted data are welcome to become involved," Robert said.

"Greater involvement across the grain research community is paramount for the long-term uptake of the trial data and the success of OFT," he added.

Grower groups and researchers retain all intellectual property rights and manage their own data, allowing them to submit, update or remove trial information on OFT.

The GRDC's OFT initiative last year won a Victorian Spatial Excellence Award as part of the annual awards conducted by the Spatial Industries Business Association and Surveying and Spatial Sciences Institute.

MORE CHOICE WITH RELEASE OF NEW CANOLA BREED

Canola growers will have even more variety choices from next season thanks to the introduction of a new breed of hybrid triazine tolerant (TT) canola.

Leading this new range from Nuseed Australia is HyTTec® Trophy, a medium maturity canola developed to give growers the best of both worlds.

“Our new line of HyTTec canola varieties will combine hybrid seed traits, such as early vigour, a strengthened disease background and excellent yield performance, with the same herbicide tolerance benefits of the TT system,” said Andrew Loorham, Commercial Manager for Nuseed Australia.

Triazine tolerant canola is the most widely grown technology in Australia due to the effectiveness of its weed management system and Nuseed is the market leading TT canola seed supplier.

Nuseed has been successfully investing in Australian agriculture for over 10 years through breeding and research programs.

Andrew said a full pipeline of HyTTec varieties was under development at the Nuseed Innovation Centre in Horsham, Victoria, with trials showing very promising results.

“HyTTec Trophy is currently in the ground in both National Variety Trials and Nuseed’s own grower-based Crop Agronomy Trials across the country, and we look forward to sharing the results at the end of the season,” he said.

Dr Nelson Gororo, Global Canola Seed Breeding Lead for Nuseed, said the introduction of HyTTec canola will give growers more choices for better crops.

“We’re always looking at ways to advance our seed breeding expertise into new areas, so we’re excited to add hybrid technology to our portfolio to keep the TT program moving forward and give growers additional tools,” said Nelson.

To reduce the up-front hurdles faced by growers when comparing traditional hybrid and OP options, Nuseed plans to use an End Point Royalty (EPR) arrangement for HyTTec.

“Growers are very supportive of our current EPR arrangements on open-pollinated varieties and the EPR program for HyTTec varieties will operate the same way,” Andrew said.

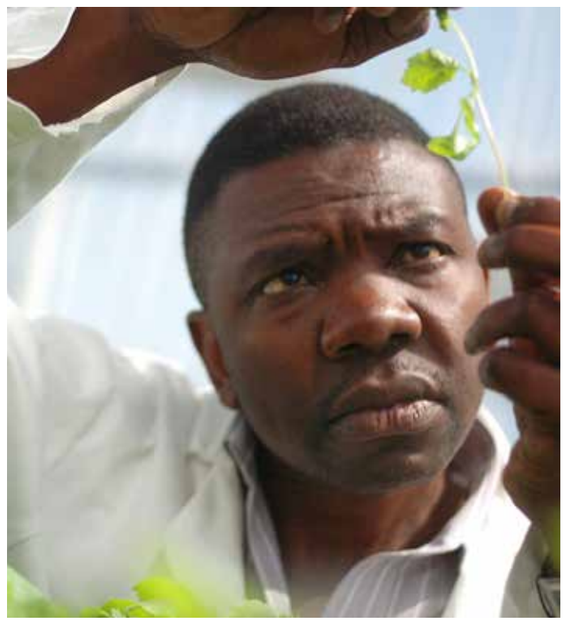
“We’ve conducted extensive market research to get a good understanding of growers’ views on the factors at play when they’re looking at the current hybrid offers in the TT segment, and we’re confident we’ve addressed one of the main barriers with our commercial offer,” he added.

Under the EPR system, growers are required to accurately declare their varieties at the receival point after harvest. The royalties are then reinvested in Nuseed’s breeding program, funding the ongoing development of both open pollinated and hybrid varieties.

Andrew said Nuseed’s pipeline of HyTTec varieties would be complemented by a range of current and future open pollinated varieties to provide growers with the most comprehensive variety choices.

“We are committed to ongoing investment in oilseeds research and innovation, mindful that growers need strong, high performing varieties that will deliver value to their bottom line,” he said.

“The Australian canola market is continually developing, and Nuseed is well positioned to keep playing a leading role in influencing this changing landscape,” Andrew added.



Dr Nelson Gororo, Global Canola Seed Breeding Lead for Nuseed, inspects the new canola breed.

NEW EDITION OF AGRICULTURAL BIOTECHNOLOGY GUIDE NOW AVAILABLE

The Agricultural Biotechnology Council of Australia (ABCA) has recently launched the third edition of The Official Australian Reference Guide to Agricultural Biotechnology and GM Crops at the AusBiotech AusAg & Foodtech Summit in Adelaide.

Mr Ken Matthews AO, ABCA Chairman said that although the role of agricultural biotechnology and genetically modified (GM) crops in meeting production and sustainability challenges is widely recognised by farmers, public discussion is not always based on factual and accessible information.

“This updated Guide provides independent, factual, science-based information to contribute to a more informed national discussion about agricultural biotechnologies,” said Ken.

The third edition of the Guide was developed using the latest scientifically valid data and reviewed by ABCA’s Expert Scientific Panel, which is chaired by Dr TJ Higgins from the CSIRO.

The Guide covers the science, performance, safety and regulation of commercialised GM crops, as well as products in the pipeline. This updated edition of the Guide highlights the evolution of plant breeding innovations, such as genome editing using CRISPR-Cas9.

“Australia’s agriculture sector is a significant exporter, employer and driver of rural and regional communities. The uptake of innovative and emerging agricultural biotechnologies allows the sector to remain competitive and innovative in the face of global challenges like a changing climate and a reduction in arable land,” said Ken.

A record 185.1 million hectares of GM crops were grown globally in 2016, and 60 per cent of the world’s population live in the 26 countries growing GM crops. Despite the widespread adoption by farmers, the technology continues to stimulate considerable community discussion.

“Public policy and a regulatory environment that is guided by scientifically credible and factually correct information on agricultural biotechnology is crucial as Australian farmers and the world’s farming sector seek to double production of food, feed and fibre to meet the nutritional demand of a growing global population,” said Ken.

In addition to providing factual information on agricultural biotechnology, the third edition of the Guide answers common questions about GM crops and clearly outlines the regulatory arrangements and food safety assessment requirements. The Guide also presents information on ways to enable continued coexistence between GM and non-GM farming systems and features cases studies of Australian farmers growing GM crops.

The Official Australian Reference Guide to Agricultural Biotechnology and GM Crops is available online at www.abca.com.au

RESEARCHERS HELP AUSTRALIAN MARKETERS PENETRATE HIGHER PRICED MARKETS

A BETTER UNDERSTANDING OF THE FUNCTIONAL PROPERTIES OF AUSTRALIAN GRAINS IS BEING PURSUED TO HELP THE LOCAL INDUSTRY ACCESS HIGHER VALUE, NICHE CONSUMER HEALTH MARKETS.

Cereal grains scientist Dr Glen Fox is leading GRDC-supported research into the properties of several grains (including wheat, barley, sorghum, maize and oats) at the Centre for Nutrition and Food Science at the Queensland Alliance for Agriculture and Food Innovation (QAAFI). The hope is for future crop varieties targeting specific health function properties, such as oats with higher beta-glucan levels to help reduce cholesterol. For consumers it means more grains-based foods with enhanced health properties.

Glen said it is important to understand not just the basic components of grain, the proteins and carbohydrates, for instance, but also the quality of those components and how they perform when subjected to processing.

“There can be significant changes in food qualities during processing, and also in what finally ends up in food and in the human gut. It’s really about starting at the human end and working back,” he said.

“We are unravelling some of the hidden components that processors are interested in, and we need to link that to the classification of our grains and to breeding so that either existing varieties can be tweaked or new varieties, better suited to niche markets, developed. Our research is targeting high-performance traits that certain buyers will want regardless of price, rather than a bulk commodity with an ‘average’ performance across a range of uses. Markets can already buy millions of tonnes of this, and from anywhere, because it’s just an average quality,” Glen added.

Some of QAAFI’s research into grain functionality is being done in partnership with the GRDC-supported Australian Export Grains Innovation Centre, based in Perth. QAAFI is an institute of the University of Queensland and is jointly supported by the Queensland Government.

In other grains performance research, Glen is looking to improve the malting performance of barley and to reduce sprouting and visual defects.

Glen said maltsters typically use three or four key specifications in selecting barley for malting prior to brewing, but sometimes the grain does not perform as expected in brewing, despite meeting these specifications.

His research is analysing dozens of other compounds in barley to identify which may contribute to these ‘out of spec’ results in malt and final brewing performance. This would allow maltsters and brewers to retest and troubleshoot, given they may have thousands of tonnes of barley or malt in storage.

“There can be significant changes in food qualities during processing, and also in what finally ends up in food and in the human gut. It’s really about starting at the human end and working back.”

Dr Glen Fox

He said understanding starch structure is particularly important for cereals such as barley and wheat. The size and structure of starch molecules can look very different as a result of environmental factors, particularly temperature extremes during grain fill. Grain from locations sharing similar weather conditions is more likely to have a similar starch structure than a single variety from a range of locations, which has experienced significantly different weather conditions.

“Measuring total starch does not tell us what the starch looks like and how it will perform in different situations during processing. And when grains such as barley are 55 per cent starch, or wheat at 65 per cent starch or more, this can really make a difference to the end result,” Glen said.

The other barley research Glen is conducting aims to determine what causes black point, a black layer of lignin-like compound on the germ of the grain, which does not appear to have any effect on the processing performance of barley in malting or brewing.

“But visually, customers don’t like it. Some customers have a zero tolerance for black point. A whole shipment could be rejected on the basis of one affected kernel,” he said.

Another project is identifying resistance to pre-harvest sprouting, which is triggered by rain. This project has already identified some germplasm with improved resistance, which has been provided to barley breeders. However, a bigger issue for maltsters is partial germination of the grain in storage, which results in dead grain in the final malt product and can represent a significant loss.

“We know what causes pre-harvest sprouting. Rain. But the germination in storage is unpredictable, even crops that don’t get rain during harvest can suffer from this. In 100,000 tonnes of barley, if 10,000t doesn’t germinate during malting because it’s already partially germinated, you lose 10 per cent of production,” Glen explained.

He said work to date indicates that storage conditions can exacerbate the problem, including on-farm storage prior to sale of the barley, but further research hopes to identify clear triggers and also barley germplasm that is more resistant to the problem.

EFFECTIVE RESISTANCE MANAGEMENT STRATEGIES ARE VITAL

AS PESTS, WEEDS AND DISEASES CONTINUE TO BE MAJOR THREATS TO THE PROFITABILITY AND SUSTAINABILITY OF AUSTRALIA'S FARMING SECTOR, IT IS CRUCIAL THAT AGRONOMISTS AND FARMERS CONTINUE TO MANAGE PEST RESISTANCE THROUGH APPROPRIATE AND JUDICIOUS USE OF CROP PROTECTION PRODUCTS.

Resistance to pesticides is an issue worldwide and can occur in as little as three to four years if appropriate strategies are not put in place to minimise its development. The resulting loss of pesticide effectiveness due to resistance development, facilitates faster development of resistance among target pests, diminishing the efficacy of remaining chemical options.

This makes the adoption of an Integrated Pest Management (IPM) system and an effective resistance management strategy for chemical crop protection products vital to the long-term viability and profitability of Australian farming.

Encouraging the ongoing sustainable use of agricultural chemicals also results in economic benefits for Australian farmers. Understanding the impact of resistance and carefully using agricultural chemicals in strict accordance with their approved label instructions will help farmers prevent and delay development of resistant pests, weeds and diseases that harm farming systems and natural habitats.

CropLife Australia's Resistance Management Strategies for fungicides, herbicides and insecticides, help farmers ensure that these important products remain a viable tool against the weeds, diseases and insects that are a constant threat to Australia's crops. These Strategies have recently undergone a detailed review, been officially updated and are now available on CropLife's website.

"Making best-practice resistance management advice freely available is part of the commitment of CropLife Australia and its members to world-leading industry stewardship initiatives."

Matthew Cossey

CropLife Australia's Chief Executive Officer, Mr Matthew Cossey, said "It is vital that farmers, environmental land managers and other agricultural chemical users adopt up-to-date best practice for managing crop protection product resistance."

"It is also essential that those who sell these products and agronomists who advise of their use, provide specific and relevant information, including CropLife's official Resistance Management Strategies, to end users," Matthew added.

"Making best-practice resistance management advice freely available is part of the commitment of CropLife Australia and its members to world-leading industry stewardship initiatives. These stewardships initiatives are a significant contribution to ensuring the ongoing sustainability of crucial crop protection products and Australia's farming sector. Each year CropLife updates and makes available Resistance Management Strategies developed by our scientific technical review committees in consultation with relevant national and international expert," Matthew explained.

Matthew said the recently updated strategies can now also be accessed using CropLife's easy to navigate search tools on the CropLife website. Farmers and agronomists can quickly search and locate the relevant world's best-practice Strategies to access crucial and timely advice on managing pest resistance."

"The plant science industry invests considerable resources and hundreds of millions of dollars into research and development of new and innovative agricultural chemical products each year. This is to ensure access to economically viable and environmentally sustainable crop protection solutions for farmers. This commitment extends to the responsible and ethical management of industry products throughout their lifecycle. This includes ensuring that agricultural chemical users have all the information they need on how to prevent pesticide resistance and use products in a way that protects themselves, their farms and the local community," he explained.

These strategies are part of CropLife Australia's StewardshipFirst program, which is a suite of world-leading stewardship initiatives that aims to assist all pesticide users in maintaining world's best practice use.

"Australian farmers, and the agronomists that support them, continue to embrace world-class farming practices to manage resistance and get the best value for money. CropLife's easy-to-access Strategies equip farmers with the means to ensure they maintain the effectiveness and extend the life of crucial farming tools," Matthew concluded.

WALL-TO-WALL LANTANA EFFECTIVELY MANAGED

Lantana (Lantana camara) is one of the worst weeds in Australia and listed as a Weed of National Significance and a Key Threatening Process under the NSW Threatened Species Conservation Act 1995.

The National Lantana Management Group, in conjunction with various government bodies and numerous community groups, has identified 1,322 native plant and 158 native animal species which are threatened by lantana in Australia.

Lantana forms a dense understorey that excludes other species, leading to its complete dominance. Furthermore, many lantana forms are poisonous to livestock. It has also been estimated that graziers spend $17.1 million a year on lantana control and lose in excess of $104 million in production due to lantana invasion.

Tim Collins, a beef producer at Ashvale Station, Toogoolawah, in southern Queensland has had incredible success tackling wall-to-wall lantana. His first large-scale herbicide application went on in April 2014, with additional areas subsequently treated.

Tim said his main problem is woody weeds. “There’s a lot of woody weed growth here. There’s a lot of lantana, a lot of wattle, a lot of everything. The lantana had been starting to take over. We had to get in, relatively quickly to make a big dent in it. In those areas, there basically weren’t any cattle running there, it was solid lantana with very little grass.”

“For this type of country, the key is pasture improvement. With improved pasture we can generally stock at least twice as much as natural pasture. With natural pasture we work on one adult beast to 6-7 acres, depending on the lay of the land. With improved pasture we’ve halved that to one beast every 2-3 acres. As our improved pasture comes online we can increase our stocking rate, it’s as simple as that,” Tim explained.

“This block of land is about 4,100 hectares, where we stock about 1,400 breeders. We’re slowly increasing our numbers up, with an aim to have up to about 1,600 breeders,” he added.

To meet his aims but with extremely dense lantana in some places, Tim knew that effective action was required.

“I made some enquiries, which led me to Dow AgroSciences. Together we came up with an ideal spraying regime to tackle the lantana. In areas, it was wall-to-wall lantana, there was no grass. It was basically impenetrable. That, combined with our steep hills and extensive treatment areas, led me to engage a helicopter company. Plus, we wanted to have a noticeable difference, so this was very effective,” Tim said.

Tim said that on the first day they sprayed 100 hectares with 10L/ha Grazon Extra and Uptake Spraying Oil applied at 200L water/ha and got an absolutely amazing kill.

“It was basically like having 100 hectares of beautiful improved pasture. You can see how these areas used to be along some missed strips, the thick lantana that we still have is what most of the hillsides were like. Anything that was sprayed is basically dead. We’re very happy. Hence, we did it again the next year, and we’ll probably do a little bit more later on,” Tim said.

“We didn’t have to re-seed it at all. We’re exceptionally happy with it. The green panic came back as thick as anything. Because it was dead, the cattle just shattered the lantana down as they grazed though it. A lot of it you can’t even tell there was lantana there now, so it was quite dramatic the difference it made. We’ve worked out the payback was 1.6 years, so we’re very happy with it,” Tim further explained.

Dow AgroSciences portfolio business manager, Bryce Sturgess, recently visited Tim and was able to see these amazing results for himself.

“Increasing productivity from 10 to 90% is incredible in anyone’s books. For a small investment, Tim has effectively bought himself an extra 100 hectares of pasture. It’s exactly what we would expect to see, and continue to see across Australia, but it never ceases to inspire and excite me to see such successes personally,” he said.

“Grazon Extra is really in a league of its own when it comes to these types of situations,” Bryce concluded.

Tim Collins with his breeding stock on Ashvale Station.

Missed swaths of lantana remain within rejuvenated green panic.

TWO NEW AUSSIE BRED CORN VARIETIES LAUNCHED

AUSTRALIAN CORN GROWERS ARE SET TO BENEFIT FROM HIGHER YIELDS OFFERED BY TWO NEW CORN VARIETIES, WHICH HAVE RECENTLY BEEN RELEASED TO THE MARKETPLACE.

Pioneer® brand P9911 corn hybrid and Pioneer® brand P1888 corn hybrid are proving themselves to be strong performers in Australian conditions.

Pioneer Australia National Corn and Microbial Product Lead Jason Scott said P9911 has a good fit for Australian farming systems as a quick maturing grain hybrid. Coming off a dry summer for many northern grain growers in 2016/17, the exceptional drought tolerance P9911 shows is also a critical trait of the variety.

“P9911 brings more attributes to the market than its predecessor, Pioneer® brand P0021 corn hybrid, being higher yield, a slightly quicker maturity and exceptional drought tolerance,” Jason explained.

“Disease tolerance between P9911 and P0021 is fairly similar, but there’s certainly an exponential gain in terms of drought tolerance and we saw that in southern Queensland this year where P9911 performed exceptionally well,” he added.

As a 99 CRM (comparative relative maturity) hybrid, P9911 is reasonably quick maturing, and is primarily designed for the stock feed and silage markets as a key hybrid for late planting or double-cropping.

“For growers coming out of their winter crop program and looking to plant a summer crop, P9911 has a good fit for the grain market, and will also make excellent silage in the 90 to 100 CRM range, allowing dairy farmers to cut corn silage and then back up with ryegrass in early autumn,” Jason said.

“In the 2016/17 summer cropping season we had a limited supply of P9911 in the marketplace and it was grown from south east Queensland all the way to Hobart, so it is very adaptable,” he added.

Pioneer® brand P1888 corn hybrid is another new entrant to the market, and was launched by Pioneer Australia in February 2017 at Norwin, on the Darling Downs in Queensland.

Importantly, Jason said P1888 was also bred from the company’s Australian breeding program, meaning it’s designed to thrive in Australian conditions.

“It’s a 118 CRM gritting hybrid, so it’s a processing hybrid to go into the human consumption market and the yields once again are really good. In certain scenarios we’re seeing yields of between 15 to 18-plus tonnes of grain per hectare, which is great. P1888 is for the gritting market predominantly, however being a harder grain with good starch content, it will also make excellent silage,” Jason explained.

The launch at Norwin was a chance to showcase P1888 in both dryland and irrigated plots to a range of industry stakeholders, and Jason said the reaction was good.

“We’ve had extremely positive feedback from exporters and the international market as well, including end users in China and Korea, so that’s been fantastic. In fact they’re looking at stipulating P1888 and P1756 on their contracts,” Jason said.

Mr Yum from Dongil Grain in South Korea, attended the Norwin field day, and was suitably impressed by the quality of the grain.

“Mr Yum is the largest importer of Australian gritting corn so it is great news for Australian corn producers that he is showing such a keen interest in the new hybrid,” Jason said.

Also in attendance was Andrew Cogswell from Lachlan Commodities, who specialise in supplying high quality grains to the international and domestic food industries. Andrew was very impressed with P1888 and believes it will be well received by the snack food industry.

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Jason Scott

“Considering the conditions last year, P1888 performed unbelievably on both dryland and irrigation. In both farming systems, it looks fantastic and has shown good disease tolerance. The performance on dryland was stellar given the pressure of the season and I believe this will be an excellent performing hybrid in Queensland. P1888 should be well received by snack food manufacturers and initial trials have demonstrated this. We’ll be conducting more trials this year and I fully expect the hybrid to be approved for use by these manufacturers,” Andrew explained.

Jason said the launch of new varieties such as P1888 is always exciting, as it’s a chance to showcase new genetics to the Australian marketplace.

“Breeding varieties is a long process and we’re pleased to work with Australian processors to ensure what we produce is what they need to manufacture products like corn chips and corn flakes,” Jason said.

We’re also confident the new varieties also have a really good fit for Australian growers, upgrading key traits such as yield and drought tolerance, while also being very marketable,” he concluded.

TWO INNOVATORS ANNOUNCE PARTNERSHIP TO SHARE KNOWLEDGE AND EXPAND OPPORTUNITIES

A NEW PARTNERSHIP BETWEEN TWO INNOVATIVE COMPANIES WORKING IN THE BIOLOGICAL SPACE WILL SEE BOTH SHARE EXPERTISE AND COLLABORATE ON PRODUCT DEVELOPMENT PROJECTS.

Australian company thinkbio recently announced that Spanish biological company, Symborg, took an equity position in the Australian agtech company.

Lisa Anderson is thinkbio Managing Director. Lisa said the sector is growing at an explosive rate as growers look for options to help enhance the long-term sustainability of their farming operations.

“Our objective is to provide innovative technologies that optimise fertiliser efficiency, improve soil and plant health and increase yields, while placing less stress on the environment,” she added. Specialising in agricultural microbial inoculants that improve crop performance and sustainability, thinkbio’s key innovation is trifixN®, a nitrogen fixing inoculant patented by the company.

Lisa explained that Symborg, with more than 40 products in its range, has extensive experience working with growers to introduce biological products into conventional nutrition programs. The companies are formalising reciprocal distribution and product agreements, along with plans for collaborative research, development and innovation programs. This includes the potential for expanded Australian and international trials of thinkbio’s flagship product, trifixN.

trifixN is a multi-strain foliar inoculant that includes C-Active Microbial Technology® for promoting plant growth. Kyle Merritt is thinkbio Technical Director. He said it can be used to either complement or reduce reliance on synthetic fertilisers, for improved crop yield and performance.

“We can now test for trifixN bacteria in the crop post application, using florescence and DNA methods, giving growers and agronomists greater confidence that effective inoculation has occurred.”
Kyle Merritt

“The three bacteria strains in trifixN each have different modes of action, providing multiple benefits for the plant. The bacteria combination helps the plant by fixing atmospheric nitrogen, as well as improving water and nutrient uptake via the secretion of phytohormones which influence root size, branching and root hair density. It also assists with the solubilisation and transportation of phosphate and potassium in the plant, along with siderophore production for plant resilience. This multi-action approach contributes to increased crop yield, produce quality and improved crop resilience in a range of environmental conditions.” Kyle explained.

Under development for more than six years, trifixN can be used on a broad range of crops including cereals, oilseeds, pulses and horticulture.

“It has a good fit in Australian dryland cropping areas,” Kyle said.

“As a foliar, it has a relatively wide application window in early crop stages, making it easy to fit around any pesticide applications required as part of the cropping program. It provides the plant supplementary bacterial nitrogen at a sustained pace throughout the growing season, with a total of up to 30 kg N/ha per season supplied by the inoculant. Growers can monitor their crop’s N level and top up with applied nitrogen later, as dictated by seasonal conditions,” he added.

Return on investment for using trifixN depends on the crop type and value, input costs and the yield increase achieved.

“If we take Australian canola as a general example, this year growers would need a 5% yield increase to get 100% ROI, and we would expect a 7-15% yield increase from using trifixN, depending on the season,” Kyle said.

“We have also seen trifixN increase protein levels of winter broadacre crops due to the extra nitrogen supplied to the plants by the constant nitrogen fixation process. It means that in the event of a dry finish to the season, where growers may be avoiding nitrogen applications, trifixN continues to deliver a steady amount of nitrogen to the crop along with root growth stimulation and improved water utilisation, helping plant performance through to the end,” he explained.

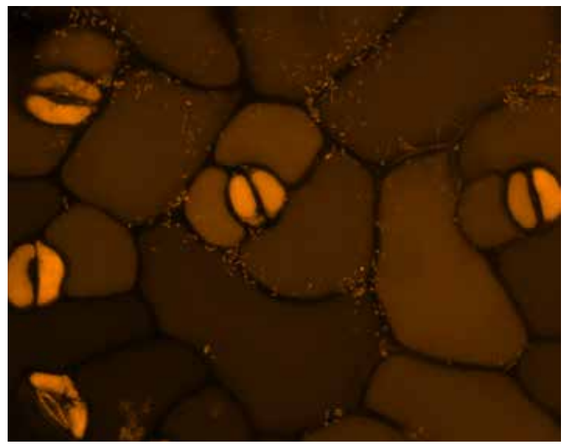
Research to assess agronomic performance and improve the efficacy of trifixN is ongoing, with technical and field trials underway in Australia and overseas. Internationally, trifixN is being trialled in southern Europe, Africa and Asia in rice, corn, sugarcane and some horticulture crops. Here in Australia, thinkbio also partners with organisations such as the Birchip Cropping Group on replicated field trials.

“In Australia, we are running several different broadacre trials, including large-scale canola, wheat and pulse trials across New South Wales and Victoria, as well as some work in cotton. Some large-scale commercial citrus operations have been using trifixN since we started, and it is now one of their standard inputs. And the support we get from ag retail stores, such as AgriWest in NSW, and their agronomists really helps facilitate grower cooperation with some of these large-scale trials and improves understanding of the technology,” Kyle said.

“We can now test for trifixN bacteria in the crop post application, using florescence and DNA methods, giving growers and agronomists greater confidence that effective inoculation has occurred. By building our knowledge and experience of using these and other biologicals in different crops and conditions, we are working to ensure we meet growers’ needs and that this innovative technology has a strong fit in modern sustainable agricultural practices,” he explained.

Lisa concluded by saying that, “The new partnership between thinkbio and Symborg is a notable opportunity to bring our teams together to share knowledge and opportunities in the biological space.”

Symborg and thinkbio celebrate their international partnership agreement. L-R: Vincent Fuerte, Business Development Manager, Symborg; Felix Fernandez Martin, R&D Director, Symborg; Kyle Merritt, Technical Director, Thinkbio; Lisa Anderson, Managing Director, Thinkbio; Jesus Juárez Molina, CEO, Symborg.



trifixN microbes on the plant’s leaf surface, post in-field inoculation of a canola crop. Image courtesy of Translational Research Institute using an Olympus FV1200 Confocal Microscope.

NEW PARTNERSHIP WILL APPLY LATEST DIGITAL TECHNOLOGY TO AUSTRALIAN FARMING

THE CSIRO AND ASX LISTED AGRIBUSINESS, RURALCO, RECENTLY ANNOUNCED A PARTNERSHIP THAT WILL SEE THE LATEST DIGITAL TECHNOLOGY, INCLUDING DRONES AND LONG-RANGE SENSING, APPLIED TO AUSTRALIAN AGRICULTURE.

$1.5 billion is invested each year in agricultural and rural R&D in Australia. This has contributed towards a 2.8 per cent per annum productivity growth over the past three decades and led to the application of new technologies across the agribusiness sector.

Through a series of projects to be rolled out in coming months, the two organisations will develop data-driven solutions for more efficient and sustainable farming.

The partnership will draw on CSIRO's expertise in data science research and engineering, and proven track record of agricultural innovation. Combined with Ruralco's on-ground network, the partnership offers potential to deliver new digital solutions to farmers throughout the country.

The joint areas of focus for CSIRO and Ruralco will include:

- Exploring the potential of Unmanned Aerial Vehicles (UAVs), or drones in long-range livestock detection to improve muster effectiveness.
- Nutrient and fertiliser management in areas of high conservation value, such as the Great Barrier Reef.
- The development of long-range sensing to automate and streamline operations, including water management, livestock safety and security.
- Adaptation of geospatial tools to provide an interface between Ruralco customers and their advisers, making use of real time data for improved decision making and planning.

Travis Dillon, CEO and Managing Director of Ruralco said he was delighted to be working with CSIRO to improve farm practices and better manage the environment.

"Drone technology is facilitating data-driven decision making in agriculture. Farmers can better analyse issues which affect productivity and sustainability such as effective nutrient delivery, plant growth, and combat bio-security issues such as invasive species and pest infestation," Travis said.

"Ruralco is well positioned to deliver innovative technology through our 600 national outlets," he added.

Ruralco is aligned with American company PrecisionHawk, their drone and data analytics innovation partner, which has led the development of accessible, farmer-friendly apps to analyse agricultural data in the United States, South America and Europe.

Adrian Turner, CEO of CSIRO's data innovation group Data61, said that his team has deep, globally recognised capability in robotics, remote sensing and data analytics.

"This partnership is an example of us teaming up with Australian industry to help them capitalise on the next computing cycle, at the intersection of data and domains like agriculture," Adrian said.

"Our work in cyber physical systems, machine learning and analytics, software and computational systems and decision sciences will all play a role. Our technologies are capable of storing and distributing data efficiently and reliably over long distances. More importantly, we are helping to make remote sensing accurate, robust, secure and trusted," Adrian explained.

"Ruralco will be a strong design and commercialisation partner with their large national footprint and customer base," he added.

Agriculture in Australia, a sector that has always embraced innovation, is worth more than $50 billion and grew by $3.1 billion in 2015-16.

Digital Agriculture lead with CSIRO, Dr Dave Henry said he was looking forward to working with Ruralco on furthering digital agriculture to support the continued growth of Australian agribusiness through becoming more productive, profitable and sustainable into the future.

"It's early days with the use of drones in agriculture, and this partnership with Ruralco will allow us to explore and quantify those situations where the use of drones will aid farmer decision-making in livestock and cropping," said Dave.

"This partnership is an example of us teaming up with Australian industry to help them capitalise on the next computing cycle, at the intersection of data and domains like agriculture."

Adrian Turner

INNOVATIVE AND EFFECTIVE PRODUCT PROTECTS AGAINST BOTRYTIS

Depending on the grape variety and seasonal conditions, botrytis can cause a yield loss of more than 50%. Given that the over use of current treatments of established infections can cause resistant strains of the fungal pathogen, Botrytis cinerea, to develop, a new and innovative way to protect grape vines is timely and much needed.

Nufarm's new biological fungicide for botrytis control, Botector, is different from other products as its innovative mode of action utilises two strains of Aureobasidium pullulans to act competitively and keep botrytis infections from forming in the first instance.

Micro-scratches on the fruit surface represent natural entrances for the botrytis pathogen. These scratches are colonised by Aureobasidium pullulans immediately after application of Botector, and given its high proliferation rate there is no opportunity for the botrytis pathogen to form. The micro-scratch ends up completely colonised, with Botector acting as a natural shield which protects fruit from infection.

Botector is a biological, organic product that causes no phytotoxic reaction and has no negative influence on ripening. No pre-harvest interval is required when used as directed, and there is no negative impact on wine fermentation or wine quality. It is highly reliable and efficacious in field, and an important tool in anti-resistance management strategies.

Botector is packed as water dispersible granules (WG) in 1.2kg packages.

TRAIL OF 13 MILLION YEAR OLD GENE TRANSFER UNCOVERED

Scientists from Agriculture Victoria have made a world-first scientific discovery that could have various applications in pasture and crop agriculture and positive implications for Australia's multi-billion dollar livestock industries.

The breakthrough event is the first documented example of a gene being 'horizontally' transferred from a fungal endophyte to a flowering plant.

Fungal endophytes are organisms that live between living plant cells and can help plants to develop better resistance to pests and environmental stresses.

This work looked at the interaction between a particular fungal endophyte and perennial ryegrass – a flowering plant which is the low-cost home-grown feed stock that drives Australia's clean and green $13.7 billion dairy industry and is a major contributor to the industry's competitive advantage.

Agriculture Victoria's Research Leader of Molecular Genetics, Professor John Forster, who is a co-author of the paper describing the work, explained that the discovery points to an "evolutionary puzzle," which has now been decoded through the hard work and genetic sleuthing of a team of scientists at AgriBio, the Centre for AgriBioscience in Melbourne.

"Horizontal gene transfer is not in itself uncommon – for example, between bacterial and land plants – but this is the first ever documented event of horizontal gene transfer from a fungus to a flowering plant," John said.

"The scientific significance is in the rarity of the event, since flowering plants have been interacting with fungi for millions of years," he added.

It was important to establish that this was a true occurrence of horizontal gene transfer.

Using genetic mapping techniques, the team determined that the complete gene of the endophyte was present in the perennial ryegrass plant's genome. Its presence, therefore, could not be explained by contamination of the sample.

The team also examined the genomes of groups of grasses that are closely related to perennial ryegrass to see which of them contained the gene. Using this approach, they were able to show that the gene appears to have been horizontally transferred into a single common ancestor between nine and 13 million years ago.

"This is a narrow window in evolutionary terms, and really quite recent," John said.

Further work will be undertaken to establish if this is a positive adaptation by certain grass species that has been retained over many generations. The knowledge will be used to breed better forage grasses to strengthen Australian agriculture.

MAJOR INITIATIVE TO HELP DRIVE AUSSIE SMART FARMS

John Lloyd
Horticulture Innovation Australia

In an environment where Australia needs to be increasingly competitive in international trade, and consumers are more discerning than ever, Horticulture Innovation Australia (Hort Innovation) has launched a multi-million-dollar Advanced Production Systems Fund.

Set to benefit all horticultural growers, the new initiative will comprise investment in projects that increase farm productivity through greater crop intensification, protection and disruption.

Hort Innovation chief executive John Lloyd said the grower-owned research and development corporation is looking to partner with suitable co-investors and research providers – such as universities and technology companies – to deliver a host of new projects.

"The Australian horticulture industry is stronger than ever domestically, and trade is reaching never-before-seen heights," he said.

"In the past financial year, Australia produced a record 6.36 million tonnes of horticultural products worth more than $11 billion and the value of our fresh produce exports jumped 36 per cent. To keep this momentum going, we need to remain competitive on the world stage and continue to ensure our consumers are getting the consistent, quality produce they need. This new investment fund will provide growers with the tools they need to help make that happen in a more cost effective manner," John explained.

The Advanced Production Systems Fund will comprise investments that deliver outcomes such as:

- Farm automation such as robotics, sensors and mechanisation.
- Plant genetics that employs next generation genomics and other platform technologies.
- Data integration that improves decision making through real-time, reliable crop data.
- Intensive farming through ultra-high-density cropping and advanced protected cropping systems.
- Access or develop superior planting materials including rootstocks and cultivars with exceptional characteristics.

This fund comes in the wake of the opening of the nation's first Horticulture Innovation Centre for Field Robotics and Intelligent Systems at the University of Sydney, which is home to more than $10M in robotics and autonomous technology investment.

The Fund is part of Hort Frontiers, a strategic partnership initiative developed by Hort Innovation that addresses the biggest challenges facing the future of Australian horticulture.

NATIONAL PLANT BIOSECURITY GETS MULTI-MILLION DOLLAR TECH INJECTION

Australia is on track to adopt some of the most sophisticated plant pest surveillance technologies in the world after Horticulture Innovation Australia (Hort Innovation) secured a Federal Government grant and co-investor funding to deliver a $21 million plant biosecurity push.

Announced by the Australian Government in late May, the $6.8M Rural R&D for Profit grant will complement more than $14M in investment across the seven plant Research and Development Corporations (RDCs) and partners such as the CSIRO, universities and state government agencies. Vegetable industry body, AUSVEG, and Plant Health Australia are also key collaborators.

Hort Innovation chief executive John Lloyd said the new project, which began in July, will further safeguard Australian agriculture from pathogen and pest incursions.

"The early detection and identification of any new pathogen or pest is critical, and a pre-emptive approach is vital to control. Pests and diseases can devastate growers, affect the supply of timber, food and fibre products and hinder trade opportunities. This new $21M initiative will utilise next-generation technologies to build on Australia's reputation for offering clean, green plant products," John explained.

The five-year project will see the construction and establishment of eight state-of-the-art mobile pest monitoring hubs, including a suite of smart surveillance traps that capture airborne fungal spores and insects and reference them against GPS, temperature, humidity, wind speed and direction data.

That data will then be fed real-time into cloud-based system AUSPestCheck, a national database that is already being used by State and Territory governments. It will then be distributed to producers, governments and industry groups in the form of immediate alerts, pest forecasts and general reports to support fast, informed and collaborative decision making.

John said these pilot monitoring hubs will be positioned on the edges of incursion areas to prevent the spread of threats, and also in new pest and disease zones to determine the breadth of any problems. They will also be employed for spot checks in pest-free regions, with the data gathered used to support market access.

"This new initiative will utilise next-generation technologies to allow producers to receive timely and accurate information about pests and pathogens in their region, help them with management decisions, reduce resistance and demonstrate pest-free status to export markets," John said.

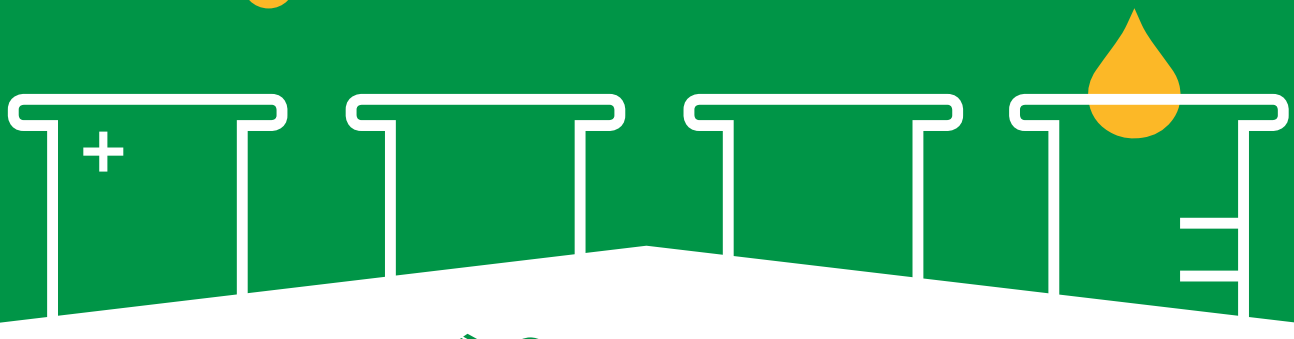
Throughout the life of the project, producers will be trained to access the data system, and shown how to use it to improve farm productivity and reduce farm input costs.

This initiative comes off the back of the nation's plant RDCs' commitment to unite efforts to strengthen Australian plant biosecurity, made in March. It also complements the Federal Government's announcement of three separate biosecurity projects in May.

Nufarm + Crop Care

TWO TRUSTED BRANDS ONE BRILLIANT REACTION

Crop Care and Nufarm are now one



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