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THE AUSTRALIAN AGRONOMIST MAGAZINE

Imidacloprid in waterways of concern

Researchers discover a special power in wheat

New research may help prevent banana armageddon


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THE AUSTRALIAN AGRONOMIST

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RESEARCHERS DISCOVER A SPECIAL POWER IN WHEAT

A NEW PHOTOSYNTHESIS DISCOVERY AT THE UNIVERSITY OF QUEENSLAND MAY HELP BREED FASTER-GROWING WHEAT CROPS THAT ARE BETTER ADAPTED TO HOTTER, DRIER CLIMATES.

A research team led by Queensland Alliance for Agriculture and Food Innovation researcher Professor Robert Henry has recently published a paper in Scientific Reports, showing that photosynthesis occurs in wheat seeds as well as in plant leaves.

“This discovery turns half a century of plant biology on its head,” Professor Henry said.

“Wheat covers more of the earth than any other crop, so the ramifications of this discovery could be huge. It may lead to better, faster-growing, better-yielding wheat crops in geographical areas where wheat currently cannot be grown,” he explained.

Professor Henry said the work built on a biological discovery in the 1960s at the old Colonial Sugar Refining Company in Brisbane.

“Many said that discovery should have won a Nobel Prize. The Brisbane researchers at that time demonstrated that sugarcane and some other tropically adapted plants had evolved a different photosynthesis pathway than that seen in around 85 per cent of plants,” he said.

Professor Henry said the classic photosynthesis pathway was known as C3, and plants with the alternative photosynthesising chemistry came to be known as C4 plants.

“C4 plants capture carbon faster and have higher growth rates, particularly in subtropical and tropical environments,” he said.

“Our research characterised a previously unknown photosynthetic C4 pathway in the seeds of wheat – which is not a C4 plant. Like most plants, wheat photosynthesises through its leaves, but we’ve discovered there is also photosynthesis in the seed. This has never been known before, yet the wheat seed is quite green when you peel it off and it is the last part of the plant to die,” Professor Henry explained.

Professor Henry said photosynthesis, the process by which plants converted sunlight into energy for growth and produce oxygen, was arguably the most important biological process on earth.

“Wheat has the classic C3 photosynthetic pathway in its leaves, however C3 plants, which include rice, are less efficient in hotter, drier climates,” Professor Henry said.

“The holy grail of plant science has long been to bioengineer the photosynthetic pathways in C3 and C4 plants to grow larger, more productive crops that are better adapted to climate change and boost food security. The population of the world’s tropical regions will soon exceed that of the rest of the world, and this discovery may be important in growing food to meet future demand,” he added.

Professor Henry said the discovery was quite unexpected.

“We were looking at the genes in wheat seeds and all the computer systems kept coming back with these C4 genes, which we thought must be wrong because wheat is not a C4 plant. Eventually we discovered wheat does have all these C4 genes in different places, on different chromosomes. It’s never been known in wheat,” he explained.

Wheat had been cultivated for 10,000 years and it had always been a C3 plant, Professor Henry said.

“Wheat’s photosynthetic pathway evolved 100 million years ago when atmospheric carbon dioxide levels were up to 10 times higher than they are today,” he said.

“One theory is that as carbon dioxide began to decline, the plant’s seeds evolved a C4 pathway to capture more sunlight to convert to energy,” Professor Henry concluded.

“This discovery turns half a century of plant biology on its head.”

Professor Robert Henry

A STEP CLOSER TO UNDERSTANDING THE 'SWITCH' THAT TRIGGERS FLOWERING IN PLANTS

SCIENTISTS AT THE JOHN INNES CENTRE IN THE UNITED KINGDOM HAVE TAKEN ANOTHER CRUCIAL STEP TOWARDS UNDERSTANDING HOW PLANTS INITIATE FLOWERING.

This new development uncovers a previously unidentified step in the process of vernalisation, which links an important gene responsible for flowering time to the proteins that regulate it.

This new finding could contribute towards the development of new varieties of crops adapted to produce the food we need in a changing climate.

Decades of research have already gone into understanding the process of 'vernalisation', how plants sense periods of low temperature, and 'remember' this information in order to control the timing of flowering. It ensures plants avoid flowering during the destructive winter months, and instead flower during the warm spring and summer months when they have ample time and sunlight to produce seeds. Understanding vernalisation is therefore of vital importance to the success of commercial crops such as canola and broccoli, among many others.

This remarkable process relies on plants 'remembering' how much time has elapsed in low temperature conditions, through the gradual modification of a specific gene found in plant cells.

Previous research has shown that flowering is suppressed by a gene called FLOWERING LOCUS C (FLC). During periods of cold temperature, proteins around which the gene is wrapped are progressively modified and this shuts off expression of the gene, eventually enabling the plant to make the switch from the 'growing' stage to the 'flowering' stage of development.

While research has identified the regulators involved in shutting off the FLC gene, no research had managed to work out how these regulators identify their correct target.

In this new work, the team of scientists led by Professor Caroline Dean at the John Innes Centre let genetics show them the way. They studied a population of mutated plants and found an individual that failed to correctly respond to cold. They then tracked down where the mutation occurred in this individual, and found it to be a single base pair change within the FLC gene.

Further experiments successfully identified how the protein VAL1 recognizes the DNA sequence within the FLC gene. In the plant which failed to correctly respond to cold, the mutation prevented that recognition, so FLC could not be shut off.

Professor Dean said, "This exciting new development provides the first glimpse of how regulators in a cell identify which target genes to switch off. At FLC, a specific sequence is recognised and without this sequence FLC won't be suppressed and the plant will never flower."

The paper, co-authored by Argentinian visitor Dr Julia Questa and published in Science, also outlines how the team investigated the binding site of VAL1 in the FLC genes of several closely related Brassica species and found it to be conserved, suggesting this type of regulation has been evolutionary conserved for the control of flowering.

This research was funded by the Biotechnology and Biological Sciences Research Council and a European Research Council Advanced Investigator Grant.

About the John Innes Centre

The John Innes Centre is an independent, international centre of excellence in plant science and microbiology, based in the United Kingdom. Their mission is to generate knowledge of plants and microbes through innovative research, to train scientists for the future, to apply their knowledge of nature's diversity to benefit agriculture, the environment, human health and well being, and engage with policy makers and the public. To achieve these goals they establish pioneering long-term research objectives in plant and microbial science, with a focus on genetics.

TWO UNIQUE REGISTRATIONS FOR GRAPES AND APPLES

STRONG COLLABORATION IS THE KEY TO SUCCESS IN SO MANY AREAS OF ENDEAVOUR, AND COULD CERTAINLY BE SAID TO CONTRIBUTE TO TWO NEW PRODUCT REGISTRATIONS FOR APPLES AND GRAPES.

Through its Australian R&D and close association with growers and industry, Australian company Crop Care has been able to register two unique uses for their high quality dithianon fungicide Dragon 700WG, including apple protection from Alternaria and a low-dose-rate downy mildew treatment for grapevines.

Dragon 700WG is a good example of the company working with Australian growers and industry researchers to develop solutions to emerging industry problems, according to Crop Care innovation and planning manager Andre Sabeeney.

Andre said, "It's the complete Australian-based team that sets Crop Care apart. Our regionally-based technical staff and full research and development team, combined with Australian formulation in dedicated labs and pilot-plant facilities, plus local manufacturing, ensure that Crop Care keeps pace with Australian growers' changing demands and farming practices."

"From the laboratory to field trials to the paddock, Crop Care produces high quality agricultural formulations specifically tested and developed for Australian conditions,"he added.

Protecting apples from Alternaria, black spot/apple scab and bitter rot

Andre said that with increasing incidence of Alternaria disease in Australian orchards, and limited registered fungicides for its control, the industry organisations Horticultural Innovation Australia (HIA) and the apple and pear growers' organisation (APAL) had funded research into the disease, and its potential control with existing orchard fungicides.

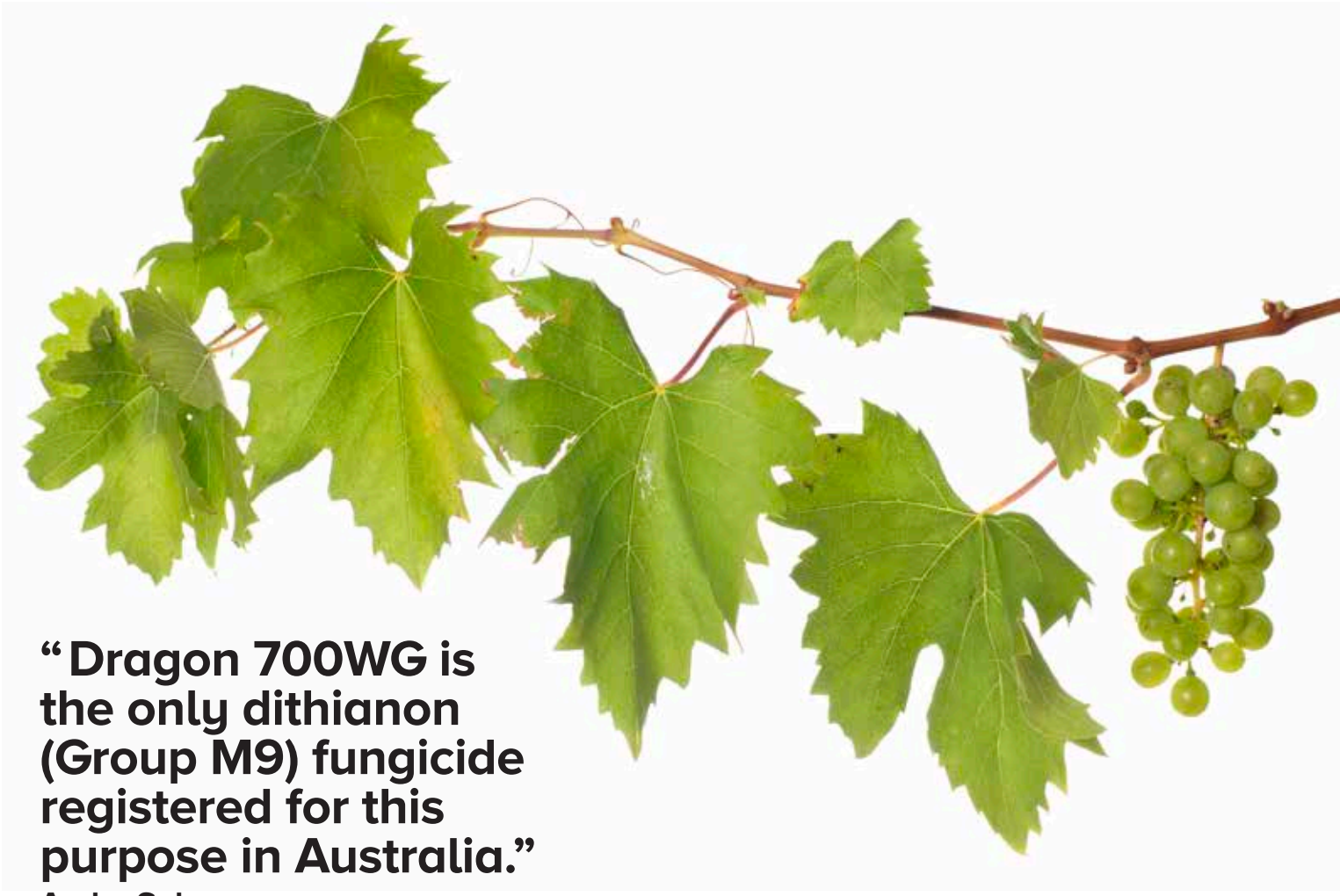
"In Queensland trials, a 700WG formulation of dithianon proved very effective for reducing Alternaria leaf blotch symptoms, defoliation and fruit spot. As a consequence, Crop Care sought registration for Dragon 700WG's use for Alternaria at the same rate that Australian orchardists were using against black spot/apple scab and bitter rot," he explained.

"Dragon 700WG is the only dithianon (Group M9) fungicide registered for this purpose in Australia," Andre added.

Queensland Department of Primary Industries and Fisheries (QDPI&F) has rated Alternaria leaf blotch and fruit spot alongside apple scab as the most significant apple diseases in Queensland, particularly of higher-value apple varieties Gala, Pink Lady, Fuji plus Red Delicious. Alternaria is now considered to be widespread in all major Australian apple production areas, particularly those with high spring/summer rainfall.

Andre said the best time for applying fungicide to control Alternaria leaf blotch and fruit spot in apples was during flowering and early fruit development, before any symptoms appeared.

"Using a broad-spectrum fungicide like Dragon 700WG several times during early-mid growing season for apple scab/black spot will reduce Alternaria in the orchard. Dragon 700WG label instructions for Alternaria are to apply as a foliar spray during flowering and early fruit development, with applications every 10 to 14 days, using the shorter spray interval if weather favours disease development," Andre explained.



“Dragon 700WG is the only dithianon (Group M9) fungicide registered for this purpose in Australia.”
Andre Sabeeney

Grapevine protection from downy mildew, black spot and phomopsis

One of the most economically important diseases in viticulture, downy mildew can only be controlled with canopy and bunch management, disease forecasting and monitoring, and timely use of fungicides.

The registered application rate for Dragon 700WG has been halved to 25g/100L for downy mildew, offering a commercially-viable control alternative to common fungicides such as copper and mancozeb.

Crop Care undertook research on a range of grape varieties prone to downy mildew in Queensland, Victorian and South Australian vineyards over three seasons to determine Dragon 700WG’s effectiveness against downy mildew at a low application rate.

Andre said that at all sites, Dragon 700WG at the low rate of 25g/100L had controlled both bunch and vine downy mildew equally as well as higher rates.

“Dragon 700WG is the only M9 fungicide registered for controlling downy mildew in grapevines at 25g/100L, providing an additional, affordable and effective fungicide for resistance management,” he said.

Andre also explained that Dragon 700WG had an excellent IPM profile, while other protectant fungicides, such as those based on mancozeb, were known to have a damaging effect on a range of predatory mites that assist in managing bud mites and rust mites in vines.

“Dragon is also soft on bees and earthworms. Its excellent rainfastness also protects vines longer in wet conditions than most other alternatives, and may allow growers to reduce the amount of copper applied in any season,” he said.

Dragon 700WG is also an effective, useful control for black spot and phomopsis in grapevines. For downy mildew Crop Care recommends that Dragon be applied when shoots are 10cm long, prior to infection occurring. While conditions permit infection, application can continue at 7 to 10 day intervals in wet conditions, decreasing to 21 day intervals in dry weather. To protect bunches apply during flowering and 7 to 10 days later, then every 10 to 21 days as above.

GROWERS URGED TO TAKE CONSIDERED MANAGEMENT APPROACH TO RUSSIAN WHEAT APHID

BY ALISTAIR LAWSON

GROWERS ARE URGED TO ADOPT A THRESHOLD-BASED MANAGEMENT STRATEGY IN CONTROLLING RUSSIAN WHEAT APHID FOLLOWING THE DECLARATION THAT IT IS NOT TECHNICALLY FEASIBLE TO ERADICATE RWA.

The National Management Group (NMG), comprising all Australian governments, Grain Producers Australia and Plant Health Australia, met early in June and reached a decision to move to a management approach.

This decision now triggers GRDC's involvement in developing a plan around the research, development and extension activities required to inform the on-farm management of RWA.

As the industry moves from the eradication of RWA to a management approach, Primary Industries and Regions SA (PIRSA) and the GRDC are calling on growers to adopt a threshold-based management strategy that considers impacts on beneficial insects.

SA Research and Development Institute (SARDI) science leader – entomology, Greg Baker, said growers should first consider the economic thresholds of when to spray for RWA.

International advice supports an economic threshold of 20% of seedlings infested up to the start of tillering and 10% of seedlings infested thereafter. In the majority of cases identified to date, population densities of the pest have been well below this threshold.

"Growers should consider lowering the rate of chlorpyrifos to 600ml/ha or applying pirimicarb at 250ml/ha under an APVMA emergency use permit. Pirimicarb has less of an effect on beneficial insects and natural enemies of RWA compared to chlorpyrifos."

Greg Baker

There are a number of natural enemies which attack RWA including parasitic wasps, ladybird beetles, lacewings, damsel bugs, hover flies and entomopathogenic fungi. Entomologists have already observed mummified and fungus-diseased RWA.

Greg said growers should consider lowering the rate of chlorpyrifos to 600ml/ha or applying pirimicarb at 250ml/ha under an APVMA emergency use permit. Pirimicarb has less of an effect on beneficial insects and natural enemies of RWA compared to chlorpyrifos.

Victorian growers may also consider the application of omethoate or dimethoate at registered use rates in cereal crops. Current information suggests that synthetic pyrethroids may not be as effective as organophosphates (OPs). Growers are reminded to always refer to the product label and adhere to local and State legislation relating to pesticide use.

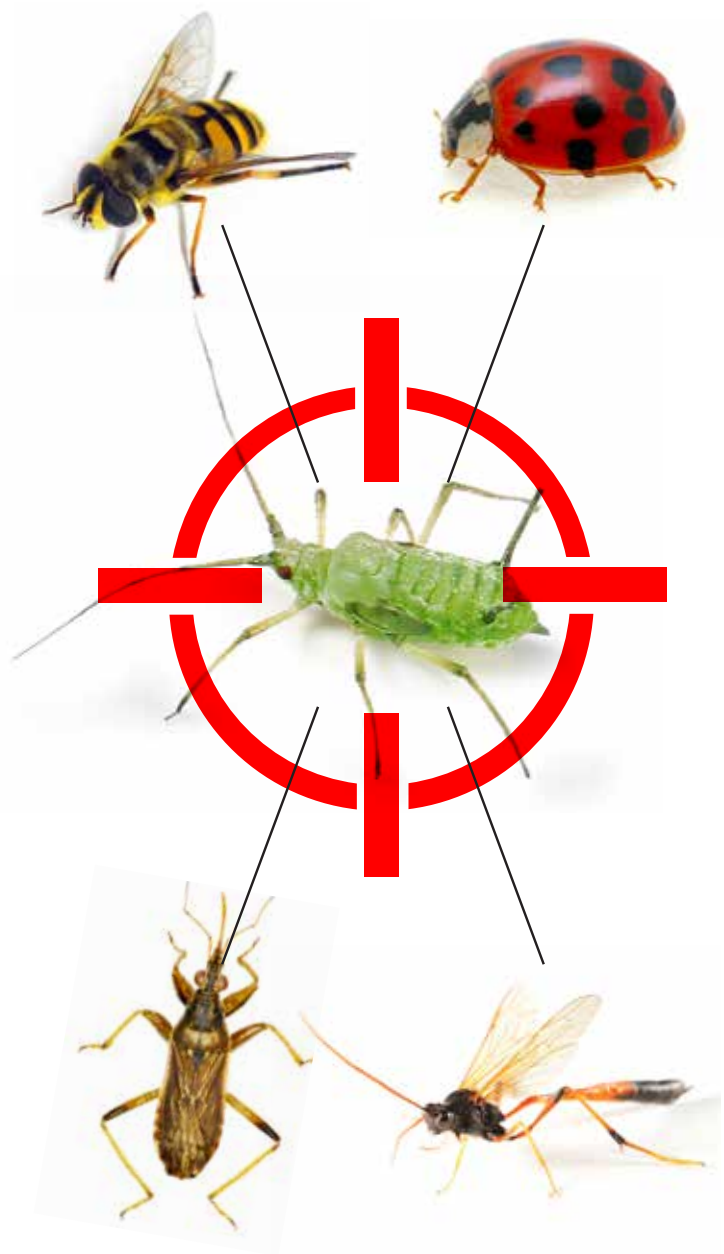
The first case of RWA was identified in a wheat crop at Tarlee in South Australia's Mid North on May 13, with infestations now stretching into Victoria.

RWA populations are strongly regulated by weather conditions. Rainfall and drying winds can kill RWA outside the shelter of leaf rolls, with heavy rain events able to cause 50 percent mortality in the aphid.

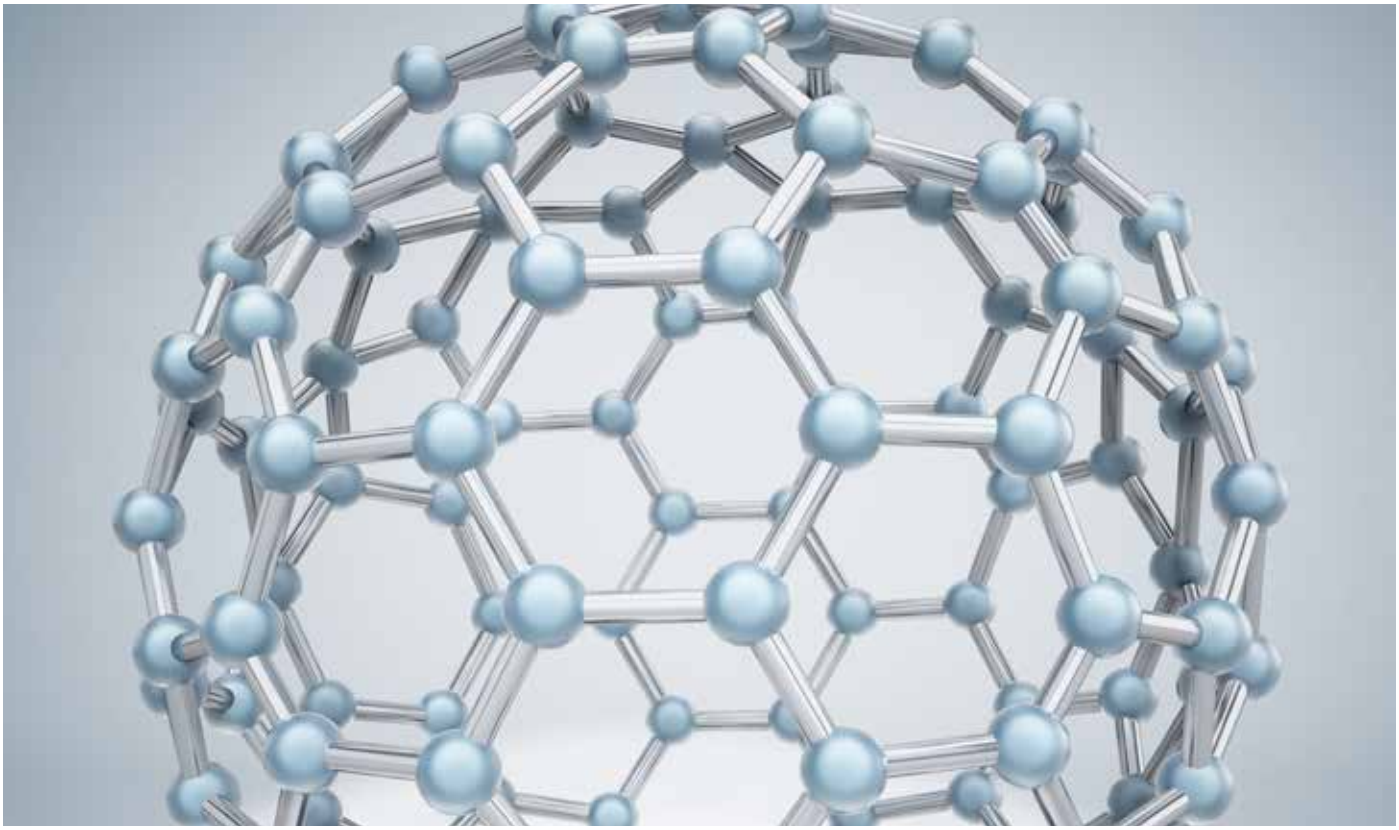
Growers and advisers are advised to look in early sown cereal crops and volunteer cereals on roadsides and in paddocks, and encouraged to report suspected sightings of RWA to the Exotic Plant Pest Hotline (1800 084 881).

More information:

- PIRSA – Russian wheat aphid information (including fact sheets)
- PestFacts newsletter – Russian wheat aphid in South Australia.
- PestFacts newsletter – Russian wheat aphid in Victoria.
- Plant Health Australia
- GRDC ute guide – Russian wheat aphid
- Biosecurity SA plant health enquiries (08) 8207 7820
- Exotic Plant Pest Hotline (1800 084 881)



SOIL INCREASINGLY AT RISK FROM SILVER NANOPARTICLES



Changing Australian soil conditions are exposing crops to silver nanoparticles, which are widely used in household products, a study led by The University of Queensland has found.

Dr Peter Kopittke from the School of Agriculture and Food Sciences is study author and senior lecturer in soil science. He said silver nanoparticles generally pose a low risk to agricultural food production, however testing in certain soil conditions led to an "unexpected" finding.

"The risk posed by silver nanoparticles increases substantially in saline soils and in soils irrigated with poor-quality water," Peter said.

"Unfortunately, unlike most other countries around the world, this applies to many of Australia's soils. Soil salinity in Australia is becoming substantially worse over time," he importantly added.

Peter said that due to their antimicrobial properties, silver nanoparticles were used in products ranging from detergents, textiles and home appliances, to socks, toothpastes, air filters, and nutritional supplements.

"The environmental safety of nanoparticles remains a topic of high public interest," he said.

Of particular concern is whether the nanoparticles can move from agricultural soils into plants and food.

"It's known that most silver nanoparticles eventually accumulate in biosolids at wastewater treatment plants, with most of these biosolids then applied to agricultural soils. As a result of their widespread production and use, there are substantial concerns regarding the risks of these silver nanoparticles upon their subsequent release into the broader environment, particularly into the agricultural soils from which we obtain the food we eat," Peter explained.

The study was conducted at the Australian Synchrotron which produces a powerful light source brighter than the sun.

The researchers applied biosolids containing silver nanoparticles to soils at rates equivalent to the "worst-case scenario" and found that the silver nanoparticles were generally rapidly converted to forms that were inert and not toxic.

"Nor did the silver accumulate in plants growing on these soils," Peter said.

"Even when added at high concentrations, the silver nanoparticles are of low risk to the crop plants. However, in saline soils, the risk increased markedly, although further work is required to determine the magnitude of the risk posed by silver nanoparticles in these saline soils," he added.

Peter concluding by saying that this study highlights the importance of carefully examining the risks posed by new chemical compounds to ensure that their use does not result in inadvertent adverse environmental and agricultural effects.

The research also involved researchers from the University of South Australian, and CSIRO Land and Water. It was conducted in collaboration with the Australian Synchrotron (Victoria), funded by the Australian Research Council (ARC), and published in Environmental Science & Technology.

IGNITING NEW HORTICULTURE GENERATION

In the face of an ageing horticultural industry and a fast moving technological landscape, Horticulture Innovation Australia has launched its biggest industry recruitment and leadership initiative in history.

The organisation is soon to fire-off a series of projects with partners, such as research institutions, government agencies and international and commercial enterprises, who have co-invested in a dedicated industry Leadership Fund.

Horticulture Innovation Australia Chief Executive John Lloyd said the fund will be used to identify and build future industry leaders at all stages of their career through investment in a host of new initiatives.

"This new Leadership Fund will provide opportunities for horticulture professionals, at all stages of their careers, to propel themselves up on leadership ladder. It will also provide significant resources to spruik to the nation that horticulture is a rewarding and creative industry to join," he said.

John said the industry has never been so diverse and exciting. A study commissioned by Horticulture Innovation Australia last year suggested the industry outperforms the average business in Australia when it comes to innovation, with almost 80 per cent of horticultural producers reporting some form of innovation, whether it was new to the farm or new to the industry.

"Never before have we seen this level of innovation in the horticulture industry. We are using drones and robotic technology to increase farm efficiencies, we are combating pests with ground-breaking science and we are breeding world-first produce varieties," John said.

"Increasingly, Australian growers are also finding ways to think outside of traditional fruit and vegetable offerings. For example a banana farmer in Queensland is operating a booming banana flour business after seeing dust rise from a bunch of bananas he ran over in his car," he added.

The same study, which was conducted by the University of Queensland, also showed 72 per cent of horticulture growers are aged over 50.

"We want to attract the best and the brightest people from a range of disciplines to careers in horticulture. However with increasing urbanisation, young people do not always view horticulture as a viable career option because they are not exposed to it, and they are missing out," John said.

He said this fund aims to turn that around. "There is so much passion and talent among the young people that are currently getting exposure to the industry. For example, a Sydney agricultural school student recently developed biodegradable plastic out of pistachio nut shells," he said.

"This Leadership Fund will give emerging generations of growers and agricultural scientists the resources to realise their ideas for the benefit of the industry, and all Australians," John concluded.

The first wave of Leadership Fund program announcements will take place in the coming weeks.

IMIDACLOPRID IN WATERWAYS OF CONCERN

WATER-MONITORING OVER SEVERAL SEASONS BY UNIVERSITY AND GOVERNMENT AGENCIES HAS SHOWN INCREASING LEVELS OF IMIDACLOPRID IN RIVERS AND STREAMS IN CENTRAL AND NORTHERN QUEENSLAND.

No detailed studies have been undertaken to examine or confirm the sources of stream contamination. However, with widespread use of the insecticide imidacloprid for cane grub control, sugarcane fields are potentially a major contributor.

This is of concern to the sugarcane industry, which promotes retention of applied crop treatments within the farm boundary by minimising off-farm loss in runoff water – for both economic and environmental reasons.

The two main formulations of imidacloprid registered for use for cane grub control are liquid suspensions and controlled-release granules (such as suSCon® maxi Intel®).

The liquids are applied annually for controlling canegrubs, while the controlled-release granules protect the crop for 3 to 4 years from one application to the plant crop.

suSCon maxi Intel is the latest controlled-release granular imidacloprid to be developed from a long term research and development partnership between Crop Care Australasia and the sugar industry.

Losses from liquid vs controlled-release formulations

A two year study from 2013 to 2015 in the Burdekin and Herbert regions was conducted by Crop Care to determine the propensity for imidacloprid to be lost in runoff water from cane fields to see if this differed between furrow-irrigated and rain grown cane, and to determine if there was a difference between liquid imidacloprid treatment vs controlled-release granules at recommended rates and application methods.

In conjunction with the Burdekin Bowen Integrated Floodplain Management Action Committee (BBIFMAC) trials were set up in plant cane and continued into the first ratoon, with concentrations of imidacloprid measured in runoff water from both irrigation and rainfall events.

Varying levels of imidacloprid were measured in runoff water at both sites – in many cases at concentrations high enough to cause concern.

Over the life of the study, imidacloprid levels varied with the type of runoff event (rainfall or irrigation) and the form in which imidacloprid was applied:

- Runoff from rainfall contained higher concentrations of imidacloprid than runoff from irrigation.
- The imidacloprid formulation had a major influence on concentration in runoff water. Imidacloprid losses from rows treated once in the plant crop with controlled-release suSCon maxi Intel granules were substantially (5.8 times) less than losses from rows treated with liquid imidacloprid in both plant and first-ratoon crops
- The farming system and crop-cycle stage had very little influence on results.

Crop Care marketing manager Chris Ramsey said the study provided vital information to the sugarcane industry for continuing development of its environmental credentials and best-practice, efficient cane-growing.

“One of the key findings was that loss from a liquid formulation moved earlier in the run-off profile, with the highest levels consistently detected within the first 3mm of runoff.”

5.8 times more imidacloprid in runoff from liquid vs controlled-release

“This is the first study to directly measure imidacloprid levels in runoff from cane fields. The stark fact is that the use of a liquid imidacloprid has the potential to cause imidacloprid levels in runoff water an average of 5.8 times higher than from the use of controlled-release suSCon maxi Intel. Over the duration of the two year study, imidacloprid levels in runoff ranged from 4 to 58 times higher for liquid formulations vs controlled release granules,” said Chris.

“One of the key findings was that loss from a liquid formulation moved earlier in the run-off profile, with the highest levels consistently detected within the first 3mm of runoff. By contrast, loss from suSCon maxi Intel-treated plots was much lower and relatively constant, required more runoff events to reach its peak, and was less prone to large losses from rainfall,” he added.

Even an extended period between application and a large rainfall event did not change the outcome.

Chris said, “At the Burdekin site, a large rainfall event, 82 days after a ratoon-crop application of liquid imidacloprid and 438 days after application of suSCon maxi Intel to the plant crop, caused 110mm of runoff. Losses from the liquid-treated ratoons were 4.1 times the level of losses from suSCon maxi Intel.”

Chris said rainfall was clearly the driver of increased losses, with up to 14 times more liquid imidacloprid lost per millimetre of runoff from rainfall, compared with runoff from irrigation.

“The volume and intensity of rain also strongly influenced the loss of Imidacloprid. The controlled release matrix of suSCon maxi Intel was superior in retaining imidacloprid in the placement zone and preventing large imidacloprid doses being available in the soil for runoff loss, compared with liquid Imidacloprid,” he explained.

Recommendations to growers

Chris said recent years had seen the sugar industry’s widespread adoption of best management practices (BMP) and environmental initiatives.

“The findings of this study will help cane growers to further fine-tune their farming efficiency and environmental credentials.”

He said growers could continue to both protect their crops from cane grub damage and minimise imidacloprid in runoff water by:

- Monitoring cane fields for risk of cane grub infection prior to planting and after harvesting. Risk will depend on history of infestation, proximity to fields with damaging cane grub levels, and (in some species) the presence of grubs in the row after harvest.
- Using suSCon maxi Intel to treat the plant crop in at-risk fields. The crop will then be protected against cane grub damage for 3-4 years.
- Applying liquid imidacloprid products to ratoon cane only as required, and strictly according to label directions for cane grub control.

SEED FORCE CELEBRATES 10TH BIRTHDAY

A little more than 10 years ago, a group of people sat together, discussing the new business venture they were about to embark on. With a clear vision and strategy to become a leading player in the forage seed industry, that core group of people is still behind the company, having built a successful business that continues to grow from strength to strength.

That company is Seed Force, and last week a 10th birthday celebration held at the hallowed grounds of the MCG brought staff, customers, shareholders and suppliers to reflect on the journey and milestones so far achieved, as well as look to the future and exciting times ahead.

Seed Force was set up in Australia in 2006 to provide a source of world class forage genetics, 100% researched in the local environment. The company has a dominant Australasian shareholding with considerable experience in the seed industry.

Over the past ten years Seed Force has screened over 10,000 plots covering 24 species at multiple sites in all six Australian states to find new forage and crop options that can deliver improved performance and profitability over existing commercial varieties.

While the product range was small to begin with, Seed Force now offers an extensive range of short term grasses, medium term grasses, perennial grasses, brassicas, herbs, legumes, fodder beet, forage sorghum, wheat, oats and canola.

Mike Gout is Director, Australian Business Development and has been with the company from the very start. He said that right from the outset, the company wanted to provide value to all stakeholders along the supply chain, not only shareholders. In his speech on the night, Mike said, “Without the support of a company’s other stakeholders you do not have a business.”

“We identified our key stakeholders as our employees, our retail and wholesale customers and the end users who ultimately plant our products. However, the support of others in the industry, including consultants, service providers and RDCs has helped us understand the market and facilitate our ability to conduct our business,” Mike added.

Andrew McNaughton is Country Manager, Australia. Promoting the profitability of Australian farmers, as well as forging strong retail partnerships were key topics in the speech he gave at the celebration. He said that in the beginning just a few key staff wore several hats each, but as the business grew, so did the number of employees and specialised roles.

“It’s not good enough to just have well researched, top performing varieties of seed, we also need to make business easier, simpler and more profitable for our retail clients. Over the years we have listened to our customers, strived to meet their needs and make improvements. This is an ongoing process that hopefully will never end,” said Andrew.

David Gould is Trading Manager and Northern Victoria/Tasmania Sales. His speech thanked customers and service providers, and made the important observation that many of the retailers who placed orders in the early days, are still loyal customers to this day, many of them sharing in the evening’s celebration at the MCG.

David said, “We are so grateful to those clients who supported Seed Force from the very beginning. We would not be here today if it wasn’t for them.” He was generous in his praise for the company’s service providers too, and said “we look forward to partnering with you over the next 10 years and beyond.”

Through its linkages with the RAGT group, Seed Force has access to a world class breeding program covering 24 species. This covers temperate annual and perennial grasses, forage and bio-fumigant brassicas, wheat and barley. Seed Force also has close ties with other world class breeding programs from Europe, North America, South America, South Africa, New Zealand and Australia covering annual grasses, annual legumes, perennial grasses, perennial legumes, forage cereals and forage herbs.

Warwick Green is Chairman of Seed Force. In his speech he said that in today’s world the importance of global reach and access to the very best science and new IP is of utmost importance, not only for agriculture but also for any business.

Warwick said, “Today, as a focused proprietary forage seed company, we source our genetics from within the group including RAGT, as well as externally where these genetics have proved to have a fit. In RAGT, we have a significant world leading research and development provider across some 24 species, and we will strategically align our business to include these where the opportunity presents itself.”

The evening was an opportunity to reflect on the company’s journey over the last 10 years, however much enthusiasm and commitment to the future was evident in all the topics discussed, especially the importance of good relationships at every level of the business. Without doubt, everyone enjoyed themselves immensely.

Warwick summed up the sentiments of all at Seed Force when he concluded, “We look forward to the next 10 years working with you all for the benefit of Australian agriculture.”

Seed Force
the power to grow
10 YEAR ANNIVERSARY

Past & present Seed Force staff

Steve Andrews, Sophie Schultz, Craig Henson

Seed Force NZ 10 year members - Directors Andrew Moorhouse and Bruce Garrett and Technical Extension Manager Liam Donnelly

Dr Phil Nichols senior plant breeder from DAFWA with Daniel Andrews

AGF Seeds Jade Killoran, David Toose and Tim Brown with Paul Smith from Bade Ness.

Steve Fulton, Chris Willis, Dennis Panozzo and Garry Allison

Past and present Seed Force employees enjoying the MCG tour.

Seed Force's Andrew McNaughton, David Leah, Warwick Green and Mike Gout

Former employee James Brady with Seed Force's David Gould and Kelvin Ridgway from Narrikup

Michael Dunn of APS Seeds with Graham Byron from Numurkah

AUSTRALIA'S LARGEST PLANT BREEDING COMPANY TO TAKE ON LUPINS

Department of Agriculture and Food, Western Australia (DAFWA) and the Grains Research and Development Corporation (GRDC) recently announced that Australian Grain Technologies (AGT) would take forward their successful lupin breeding program.

The move delivers considerable commercial and technical breeding capability to lupin breeding in Australia and provides a sustainable footing for the industry.

AGT Chief Executive Officer Steve Jefferies said the company was committed to developing varieties that delivered greater returns to growers.

"AGT has the scientific expertise and track record in the development of successful wheat varieties including Mace and more recently Scepter, to accelerate the rates of genetic gain in lupin breeding," Steve said.

"We want to make a real difference to the value of lupins in Australian cropping systems," he added.

Steve also said he was very pleased to announce the recent appointment of lupin breeder Dini Ganesalingam to the AGT team.

"Dini is a young enthusiastic Western Australian with relevant training and expertise in plant breeding. Dini will work from our newly expanded Northam base and in close collaboration with DAFWA's lupin breeding and genetics expert Jon Clements," he explained.

Steve said lupins complemented AGT's existing cereal breeding work which included wheat, barley and durum.

"Lupins are the fifth largest winter grain crop in Australia and we will be examining how we can best increase the value of lupins in Australian farming systems through improved yield, disease resistance, broader adaptation, herbicide tolerance and seed quality," he said.

DAFWA and GRDC have co-invested in the breeding and commercial release of lupin varieties for the past 20 years.

The licensing arrangement will allow AGT, as the licensee, to commercially develop the current germplasm developed through these combined breeding activities as well as invest directly in improved new varieties.

GRDC Western Regional Panel chairman Peter Roberts said AGT's entry into lupin breeding was an exciting opportunity for the lupin industry.

"AGT has a strong track record in the development and commercialisation of crop varieties that address the needs of Western Australian and Australian growers," Peter said.

"GRDC will continue to support lupin development through our pre-breeding and systems agronomy investments," he added.

DAFWA grains research and development executive director Mark Sweetingham said the injection of commercial breeding expertise would provide greater certainty for the future of lupin breeding for Western Australian growers.

"The move to a commercial partnership will maximise opportunities to provide new and improved traits, aimed at improving the profitability of growing lupins," Mark said.

"DAFWA will continue to deliver applied lupin agronomy and crop protection research through its regional network and will provide expertise to existing pre-breeding genetic improvement projects," he concluded.

THE POWER OF WASP WARFARE AGAINST APHIDS IN POTATOES

With pesticide resistance rising in species of aphids which feed on potatoes and spread viruses, one of the best control options for growers battling these pests may be found in nature, free of charge: parasitic wasps.

Three species of parasitic wasps can target the aphid species found in potatoes, finding young aphids and injecting eggs into their body. These eggs grow and feed for two to three days before hatching, with the larval wasp then creating a cocoon and feeding on the inside of the aphid before emerging through a chewed hole in its back when mature.

“While it may sound grisly, this method of controlling aphid populations can deliver valuable benefits to potato growers by offering an option which doesn’t run the risk of increasing chemical resistance among aphid populations,” said AUSVEG spokesperson Shaun Lindhe. AUSVEG is the leading horticultural body representing Australia’s 9,000 vegetable and potato growers.

“Chemical resistance is a pressing concern for the potato industry, and this is especially true of green peach aphid, which has several insecticide-resistant strains that are currently moving freely across growing regions,” Shaun said.

Shaun explained that while most insecticides used to control aphids will also kill these beneficial wasps, there are some spray products where the approved active will still allow them to establish a population.

“By rotating between these multiple approved actives, growers can prevent aphids from building up resistance and allow the wasps to continue their good work,” he added.

“Adopting integrated pest management strategies is a great way for the industry to avoid resistance rising in problem pests, and this is a key area of research and development for the Australian potato industry,” concluded Shaun.

STUDENT WINS NATIONAL AWARD WITH RESEARCH ABOUT NITROGEN BREAKDOWN IN SOILS.

Chelsea Stroppiana from Queensland was recently announced as winner of the Ag Institute Australia (AIA) National Student Award for 2016.

The prestigious AEV Richardson Memorial National Student Award, sponsored by Peracto, is competed for annually by undergraduate students who have completed an Honours research project as part of an agricultural science (or related) degree.

Each AIA state division selects a finalist to compete nationally with a written submission on the background of their project and a 15 minute presentation on the outcomes to a judging panel.

Chelsea impressed judges with her honours project into the compounds released from the roots of Australian native species and how they affect the breakdown of nitrogen in soils (nitrification).

The long-term implication of the project is to model synthetic nitrification inhibitors to improve nitrogen use efficiency in cropping systems.

“I'm very honoured to have received this prestigious award. Agriculture is an essential industry and it's great to see the AIA and Peracto promoting high-level science in this area,” said Chelsea.

“I'm encouraged by the quality of the research being undertaken by my peers, and hope that as the next generation, we can continue to innovate and advance agriculture in Australia,” she added.

Elya Richardson from Tasmania was runner-up, while Chris Baldock from NSW took out third place.

The award was presented in Adelaide at AIA’s Innovation Conference, where delegates heard from Australia’s Chief Scientist Dr Alan Finkel, in his first official visit to Adelaide.

Dr Finkel outlined areas of innovation for the agricultural sector to target in what he termed ‘three boundless plains’.

The three areas were to ‘boost yield’, ‘boost the dollar return’ and focusing on ‘selling what we know, as well as what we grow’.

“We’ve cracked the challenge of farming in six different climatic zones, from temperate to equatorial to desert. So why not profit from that expertise and win investment at the same time in local research, local skills and local firms?” Dr Finkel asked the audience.

In other news from the conference, a new chairman of AIA was appointed, Andrew Bishop from Tasmania.

Andrew, who is Chief Plant Health Manager for the Department of Primary Industries, Parks, Water and Environment (Tasmania) said taking the helm of an organisation such as Ag Institute Australia at a time of such innovation in the sector was an honour.

“It’s an exciting time in agriculture, as was made obvious by our guest speakers discussing innovation in all aspects of agriculture at our conference,” said Andrew.

“We heard from both ends of the innovation pipeline, from policy to on-farm benefits, and when you add in the enthusiasm and passion of the Student Award finalists, it certainly highlighted the challenges and, more importantly, the opportunities ahead,” he concluded.

NEW STUDY IDENTIFIES RICE CROPS THAT CAN SAVE FARMERS MONEY AND CUT POLLUTION

A NEW UNIVERSITY OF TORONTO SCARBOROUGH STUDY FROM CANADA HAS IDENTIFIED "SUPERSTAR" VARIETIES OF RICE THAT CAN REDUCE FERTILISER LOSS AND CUT DOWN ON ENVIRONMENTAL POLLUTION IN THE PROCESS.

The study, authored by U of T Scarborough Professor Herbert Kronzucker in collaboration with a team at the Chinese Academy of Sciences, looked at 19 varieties of rice to see which ones were more efficient at using nitrogen.

Nitrogen, when applied as fertiliser, is taken up inefficiently by most crops. In tropical rice fields, as much as 50 to 70 per cent can be lost. The problem is that nitrogen negatively impacts water quality by contaminating nearby watersheds or leaching into ground water. It's also a significant source of gases such as ammonia and nitrogen oxide, which are not only harmful to aquatic life but also a significant source of greenhouse gas emissions.

While nitrogen is one of three main nutrients required for crops to grow, it also costs the most to produce, said Professor Kronzucker.

"Anything we can do to reduce demand for nitrogen, both environmentally and for farmers in the developing world struggling to pay for it, is a significant contribution," he added.

Professor Kronzucker's study for the first time identifies a novel class of chemicals produced and released by the roots of rice crops that directly influence the metabolism of soil microbes. They found that key microbial reactions that lead to an inefficiency in nitrogen capture can be significantly reduced in certain varieties of rice plants through the action of those specific chemicals released from root cells.

One of the main reasons crops waste so much fertiliser is that they were bred that way. In the past fertilisers were relatively inexpensive to produce because fossil fuels were abundant and cheap. As a result, plant geneticists bred crops that responded to high fertiliser use regardless of how efficient they were at using nitrogen.

"These inefficiencies used to be of little interest, but now, with fluctuating fuel prices and growing concerns over climate change, it's a much bigger issue," says Professor Kronzucker, who is the Director of the Canadian Centre for World Hunger Research at U of T Scarborough.

“Anything we can do to reduce demand for nitrogen, both environmentally and for farmers in the developing world struggling to pay for it, is a significant contribution.”
Professor Herbert Kronzucker

There are more than 120,000 varieties of rice stored at the germplasm bank at the International Rice Research Institute (IRRI) in the Philippines, but the professor’s team only focused on varieties that met important criteria. For one, they concentrated only on Japonica (the rice used in sushi) and Indica, the world's most popular rice type commonly grown in China, India and Southeast Asia. The varieties also had to be currently grown by farmers, have a high yield potential, be disease and pest-resistant, grow to the right size and have strong enough roots to withstand monsoon-force winds.

"They had to be proven in the field as viable options. It's not practical if a rice farmer isn't going to touch it," added Professor Kronzucker.

Going forward, the hope is for this study to inform rice-growing strategies throughout Asia. One option could be to provide farmers with government incentives like tax credits, to switch to a more nitrogen-friendly variety. Another outcome could be better breeding programs where even better species of crops can be produced.

"There's no reason a crop can't result in less pollution while also saving farmers money, the two aren't incompatible. If we can produce more responsible plants that don't waste fertiliser needlessly, everyone wins,” concluded Professor Kronzucker.

NEW RESEARCH PARTNERSHIP TO BOOST NORTHERN CATTLE INDUSTRY

A recently launched multi-million dollar research and development program will provide a massive boost to Australia's vital northern beef cattle industry.

The Northern Beef Collaborative Partnership between Meat & Livestock Australia (MLA) and The University of Queensland (UQ) is the most significant injection of research funds into northern beef cattle for 20 years, and is designed to deliver significant productivity gains for producers.

MLA Managing Director Richard Norton said the collaboration between the MLA Donor Company (MDC) and UQ was worth up to $8 million a year for a minimum of three years and targeted productivity improvement research projects in three main areas:

- Animal nutrition, supplementation and feed base
- Cattle health and welfare
- Reproduction efficiency and management
- "Investments of this calibre are vital to the ongoing prosperity of northern beef producers," said Richard.

UQ Vice-Chancellor and President Professor Peter Høj said the partnership would create change across a vitally important sector of the Queensland and Australian economy.

"Collaboration between researchers and industry is essential if we are to translate world-class research into achievable, practical solutions that benefit industry, society and the environment," Peter said.

"This exciting development takes advantage of the extraordinary research capacity at UQ which has been built with support from the Queensland Department of Agriculture and Fisheries," he added.

UQ's Professor Stephen Moore, Director of the Centre for Animal Science at the Queensland Alliance for Agriculture and Food Innovation (QAAFI), said the investment recognised the challenges facing northern beef producers.

"With the support of longstanding partners at the Department of Agriculture and Fisheries, this new investment will allow us to increase the impact of our research in northern beef," Stephen said.

"We aim to build sustainable growth across the industry, harnessing technology-driven changes to help northern beef enterprises face challenges such as uncertain climate conditions and regulatory impacts," he added.

Richard went on to say that the partnership would drive on-farm productivity gains in northern Australia and have the scope to include wider research into other key profit drivers in the North.

"This is an exciting opportunity for northern red meat producers and will demonstrate the importance of collaboration across our industry when it comes to new research and adoption," Richard said.

"Through collaboration with respected partners like UQ, and the use of our subsidiary the MLA Donor Company, MLA is generating new research and development investment that will have a real and lasting impact for industry," he concluded.

NEW LODGING TREATMENT ADDS YIELD TO CEREAL CROPS

For farmer Winston Broun, the 2015 cropping season was one of his best ever.

His property, east of Carnamah and near Coorow in Western Australia, enjoyed good summer rains that held moisture throughout the year, and as a result had a bumper year for wheat, canola and barley.

Winston said he likes Scope barley in the rotation as it provides versatility with its malt characteristics, meaning it can either make malt or feed, and it is also IMI tolerant.

“However, it can still get a bit weak under the head, which sometimes becomes a problem, and we were worried about this last year,” Winston said.

As a control measure, he carried out a plant growth regulator trial on two barley crops of 2.3 hectares each, two kilometres apart.

The paddocks had been in a barley rotation for three years and the application of Moddus Evo, a plant growth regulator, plus Prosaro, was made between GS31-GS33.

The results showed that the trial barley crop was shortened by around six inches, with an increased yield of over half a tonne.

“Our agronomist, Andy Regan, had seen it in Europe, so when he said it had become available here, we put our hand up to give it a try,” said Winston.

“It definitely strengthened the straw. The areas where we didn’t use it were quite tangled and lodged so with the yield result we got out of it, it paid for itself,” he added.

When applied to growing, healthy crops, Moddus Evo shortens the crop height and increases stem thickness, making it less prone to lodging. It also improves head retention with the result being less lost grain, higher yields and an easier harvest.

Following this year’s good summer rains, Winston said he was going to treat his barley again with Moddus Evo following the success of the trial.

“As long as the early wetness continues and crops are not stressed, we will treat the entire barley crop, plus around a quarter of the wheat,” Winston said.

“Being harvested after canola, barley is often the problem crop. You can lose so much before you get to it, so it is our focus,” he added.

Landmark Coorow Agronomist, Andy Regan, said with good early rains this year, he’ll be encouraging farmers to apply Moddus Evo to strengthen the straw.

“A lot of farmers north of Perth like Scope because of its IMI resistance. It’s good at controlling brome and barley grasses, but head retention can be an issue,” he said.

“A lot of barley has gone in already, earlier than usual, so it’s going to get a bit of height about it. To shore that up for the rest of the season, I’ll definitely be encouraging Scope growers to give it a go,” he added.

THINGS TO KNOW ABOUT GROUP A RESISTANCE

Making the right post-emergent weed control decisions is vitally important.

Herbicide resistance is a key driver in the decision-making process and agronomists and growers need to be responsive to the fact that the most common Wild Oat resistance is to the Group A FOP herbicides.

The FOPs are a subgroup within the Group A herbicides, and include diclofop (Hoegrass), fenoxaprop (Wildcat) and clodinafop (Topik®). With widespread FOP resistance, growers are increasingly using herbicides from other chemistries.

According to Syngenta Solutions Development Lead, Ben Parkin, some of those solutions are subgroups within the Group A herbicides, namely the Group A DIMs and the DENs (Axial®).

“Axial belongs to the DEN subgroup which has a unique chemical structure, its own unique resistance profile, and as such offers the potential to control FOP-resistant Wild Oat populations,” Ben said.

“In most cases Axial will be a very effective and robust option for Wild Oat control, even on FOP-resistant weeds. Importantly, Axial can also have activity on those Wild Oats populations that have developed metabolic resistance mechanism to the DIM subgroup,” he added.

Although not as widespread as Wild Oat resistance to the FOPs, DIM and DEN resistance is developing and Ben recommended “doing your homework”. This may include conducting resistance testing to determine which chemistries within the Group A herbicides offer useful activity to their own populations of Wild Oats.

Axial can be sprayed from the two-leaf crop stage up to first awns visible of the crop (GS12-49) on Wild Oats in a spray topping scenario. Selective Spray Topping (SST) is the relatively late use of a selective herbicide in crop to reduce the amount of viable seed returning to the seed bank.

The registration of Axial for SST provides a flexible, effective and less environmentally influenced tool to minimise Wild Oat seeds returning to the seed bank.

Axial can now be applied in wheat and barley at 200 mL/ha from stem elongation (GS30) to flag leaf sheath opening (GS47) of the Wild Oats plant giving Axial one of the widest application windows for Wild Oats control of any product in cereals. This application must be made no later than when the first awns are visible (GS49) of the crop.

PROBING THE PROBLEM OF INSECT PESTS

Cost effective detection of beetle pests in grain silos is best achieved by combining a couple of simple methods, a Queensland study has shown.

By using shallow probe traps in the grain at the top of the silo and sieving samples from the bottom, beetles can be detected quickly, cheaply and safely, so that timely treatments can be administered.

The conclusions emerged from a pilot study conducted by the Queensland Department of Agriculture and Fisheries (DAF) that compared several straightforward methods of pest detection.

As growers increasingly move to on-farm storage of grain, there is corresponding requirement to manage pest incursions for the protection of grain marketability and profitability, according to DAF principal research scientist Greg Daglish.

“There is an urgent need for appropriate sampling methods to help farmers manage the risk of insect infestation and minimise marketing delays,” Dr Daglish said.

“Simple, safe, cost effective and easy to interpret sampling options will enable growers to make informed decisions about pest management,” he added.

Speaking at a recent Grains Research and Development Corporation (GRDC) Grains Research Update in southern Queensland, Dr Daglish outlined findings from the pilot study which tested the use of probe traps in the top and side hatches of the silos and sieving grain samples from the top and bottom of the silos, to determine the most effective and cost efficient combinations of the two.

“In beetle-infested silos, sieved grain from the bottom of the silo yielded 82 per cent of the beetles known to be present, compared to just 20 per cent from samples taken from the top of the silo,” Dr Daglish said.

“When comparing shallow and deep probe traps, the shallow traps captured 82 per cent of beetles and the deep traps just 18 per cent. Probe traps inserted from the top hatch captured 76 per cent of pests, and those inserted from the side hatch collected 24 per cent,” he added.

Dr Daglish said the results demonstrated that combining the use of probe traps in the top of a silo with sieving a grain sample from the bottom was an effective insect detection method.

“The trial work has resulted in some key preliminary recommendations. If sieving grain is to be limited to one location, then a sample from the bottom of the silo is preferable to one from the top of the silo,” he said.

“Probe traps should be inserted into the grain bulk so that the top of the trap is level with the grain surface. If trapping is limited to one location then inserting the probe trap into the grain through the top hatch is preferable to inserting it through the upper side hatch. In terms of frequency, probe traps should be initially inspected after one day in case there is a heavy infestation which risks large numbers of beetles clogging the traps. If no or few beetles are trapped in the first instance a longer trapping period can be used,” Dr Daglish explained.

Dr Daglish advises that checks not be done after early morning. As the sun rises, heat in the silo head space becomes too great for beetles to survive, so a midday check may show little signs of life in a silo that is infested at depth.

While the research didn’t distinguish the significance of one beetle compared to many beetles in a sample, the presence of beetles straight after harvest compared to later during storage, or the habits of the five different beetle pests of grain - some of which may prefer living deep in the grain bulk, some on the surface – it provides a vital first step towards efficient assessment and detection.

“There are many beetle species that can infest stored grain, and at least five pest species were detected in this study,” Dr Daglish said.

“From a scientific perspective, knowing the identity and exact numbers of beetles in grain samples or probe traps is valuable. From a grower perspective however, the presence of any beetles in stored grain is a problem,” he concluded.

INVESTIGATING PRACTICES TO HELP GRAIN GROWERS INTEGRATE SHEEP

With an increasing number of Wimmera and Mallee farmers running sheep as a means of mitigating business risk, Birchip Cropping Group (BCG) has been investigating how livestock can be integrated without compromising the cropping program.

Research carried out by BCG through the GRDC-funded Grain and Graze initiative has shown that, if managed appropriately, cereal crops can be grazed without penalising yield.

BCG research achieved this using long season wheat varieties, sown early on adequate soil moisture, and grazed before the crop has reached stem elongation.

Apart from the economic benefits that comes from using crops for sheep feed, as well as grain production, the practice provides logistical benefits for farmers with a nutritious feed source available at a time of year when, typically, feeding-out may be required.

This year, BCG is taking this research further with a barley trial at Kalkee in the Wimmera (which is jointly supported by BCG and Agritech Rural), examining the interaction between grazing and crop row spacing and how this effects plant density, dry matter and yield.

The research, which has been designed and developed by new BCG recruit Jessica Lemon, is being conducted through a recently launched graduate program. Supported by the Hugh D. T. Williamson foundation, this program provides an opportunity for first year researchers employed by BCG to develop and manage a trial that responds to farmer inquiry.

The objectives of the research are to:

- Determine if grazing barley will provide a greater lamb growth without a negative impact on yield;
- Investigate the relationship between stubble and barley's ability to recover from grazing on a legume versus a cereal stubble;
- Answer the question 'Will there be less dry matter and more crop waste on wider row spacings?'; and
- Identify if plant growth will compensate for a low plant establishment on a wide spacing.

The trial was sown in late May with barley planted on 9", 12" and 15" row spacings.

At the end of the year the yield, biomass production and grain quality of grazed plots will be compared with that of their ungrazed counterparts and it will be determined if row spacing had an influence.

GROWERS ENCOURAGED TO CONTROL BARLEY LEAF RUST EARLY

Growers in Western Australia's Great Southern and south coastal regions are encouraged to check barley crops for leaf rust and to spray infections early because the disease is difficult to manage if left unchecked.

Growers are also advised that, despite having a relatively durable form of resistance, the feed variety Oxford is behaving unusually this season – a high pressure year for barley leaf rust - and fungicides should be applied pre-emptively to it.

Department of Agriculture and Food (DAFWA) researcher Dr Kith Jayasena conducts research under a Grains Research and Development Corporation (GRDC) funded project which aims to reduce costs and diseases attributed to crop diseases in Western Australia.

"Seasonal conditions and large amounts of regrowth barley, which has facilitated disease carry-over from 2015, has fostered this year's development of barley leaf rust which can reduce grain yields by more than 30 per cent when infections are severe," he said.

Dr Jayasena said Oxford carried the adult plant resistance (APR) gene Rph20 which tended to be effective at the adult plant stage.

"Research has shown that a number of APR barley varieties, such as Westminster and GrangeR, can be grown without fungicides in leaf rust-prone environments. However, Oxford is behaving differently this season and, despite many crops being at a relatively advanced stage, is becoming widely infected with leaf rust," he explained.

Dr Jayasena said this was possibly due to the effect of temperature which was known to influence the expression of APR.

"I recommend that Oxford should this year be treated like a susceptible variety and be sprayed with fungicide pre-emptively because we don't know when its resistance genes will be activated," he said.

"Fungicides can be applied at the same time as any post-emergent herbicides that might be required and a follow-up spray four weeks later may be necessary. However, growers should always apply fungicides in accordance with product label directions including specific instructions for timings, withholding periods and spray compatibilities," he added.

- Details of registered foliar fungicides for barley leaf rust are available on the Australian Pesticides and Veterinary Medicines Authority's Public Chemical Registration Information System Search (PubCRIS) database.
- Information about managing barley leaf rust is available by searching the DAFWA website.
- Information on developing a rust management strategy can be found on the Rust Bust website, accessible via this link.
- If rust is detected on crops, samples should be sent to the University of Sydney Plant Breeding Institute for pathotype analysis.
- Rusted plant samples can be mailed in paper envelopes (not plastic wrapping or plastic-lined packages) to the Australian Cereal Rust Survey Plant Breeding Institute (PBI), Private Bag 4011, Narellan, NSW, 2567.

The GRDC-funded annual surveys of rust variability carried out at the PBI continue to form the basis of all genetically-based cereal rust control efforts in Australia.

Genetic resistance to rust in wheat and barley delivers significant benefits to Australian grain growers, estimated at $1.1 billion annually, and remains the basis of rust control, especially in wheat.

WEED SEED PROJECT IN SOUTHERN CROPPING REGION

In the southern cropping region's high rainfall zone (HRZ), the answer to an important question is being sought: how can harvest weed seed practices be adopted to reduce soil weed seed banks to address herbicide resistance?

And more specifically, how can growers get weed seeds into the header?

Southern Farming Systems (SFS) is answering these questions through its Grains Research and Development Corporation-funded HRZ harvest weed seed control (HWSC) project.

Paddock-scale trials will demonstrate to growers the suitability and effectiveness of a number of HWSC measures, using commercial equipment to highlight the potential of these management practices to complement large scale trials.

Trial plots have been established at SFS's Lake Bolac site in western Victoria and in Tasmania.

SFS project lead Aaron Vague, who is conducting research at the Lake Bolac site, said there are two main aims to the project.

"Firstly, we want to focus on how we can change crop maturity and crop physiology to match the requirements to be able to use harvest weed seed techniques," Aaron said.

"Then, we can go into the paddock, use the big machinery, talk to the farmers and actually refine how those techniques are going to be worked into their system, and how beneficial to profit and economics they're going to be at the end of the year," he added.

According to James Jess from Western Ag, the management needs to be an integrated approach.

"That's the way I put it to my clients. It's not going to be one thing that's going to get you out of the woods – it's got to be a combination of good techniques," James said.

"The key to profitable farming is to get the weed seed management under control so you can get profitability across the whole farm. If you have gaps in the paddock or slug patches that have managed to get through, that's where the ryegrass really persists and gets going, and suddenly you get big areas in a paddock that blow out, and it can be very detrimental to your bottom line, " James continued.

The other key question for growers to consider is whether or not it's possible to manipulate the physiology of the target weed, so it can be fed into the harvester.

> **"What we're trying to do is synchronise the maturity and growth of the crop you're growing, and also of the weeds you're trying to control," Aaron said.**

"If you get a wheat crop that might be over a metre tall, your ryegrass is now over a metre tall. So what if we perhaps either sow later, or use a different crop cultivar, just to try and get that weed seed at a different level, change its physiology, and then allow that to feed through the header and put it in a usable form," he added.

The project aims to measure the suitability and efficacy of reducing weed seed bank numbers across a range of weed species and crop types.

Regional best management agronomy will be implemented for other control measures as standard across treatments to deliver a functional package to the southern HRZ.

More information on the project can be found in the Harvest Weed Seed Control YouTube video at https://www.youtube.com/watch?v=RrvQQYqSmdE.

VIRTUAL HERDING TECHNOLOGY TO ADVANCE WITH HELP OF NEW GRANT

Dairy Australia has been successful in obtaining a Commonwealth Government grant for the development of virtual herding technology.

The grant announced by the Deputy Prime Minister and Minister for Agriculture and Water Resources, the Hon. Barnaby Joyce, will fund research into managing individual grazing animals and better matching their feeding requirements with the availability of feed.

"Dairy Australia invests in research and technology to help ensure the longer term viability of dairy farmers," said Dairy Australia managing director, Ian Halliday.

"While we are tightening our belts, with budget cuts to manage our way through very difficult times, we are committed to longer term initiatives that will benefit farmers," he added.

As a result of this research overall animal and pasture productivity will be improved, resulting in reduced production costs and improved farm profitability.

"The high upfront cost of developing technologies like virtual herding, which will reduce the cost of production, would not be possible without the shared contribution of farmers through the research levy and the support of the Commonwealth Government, which will fund approximately two-thirds of the project," said Ian.

"This project will put Australian livestock industries at the forefront of applying advanced digital technologies. Virtual fencing and herding technology has the potential to transform individual, small group and entire herd management," he added.

Virtual herding or fencing technology will allow farms to manage both individual and small groups of animals within a herd better and will contribute to a reduction in labour required to move and draft cattle.

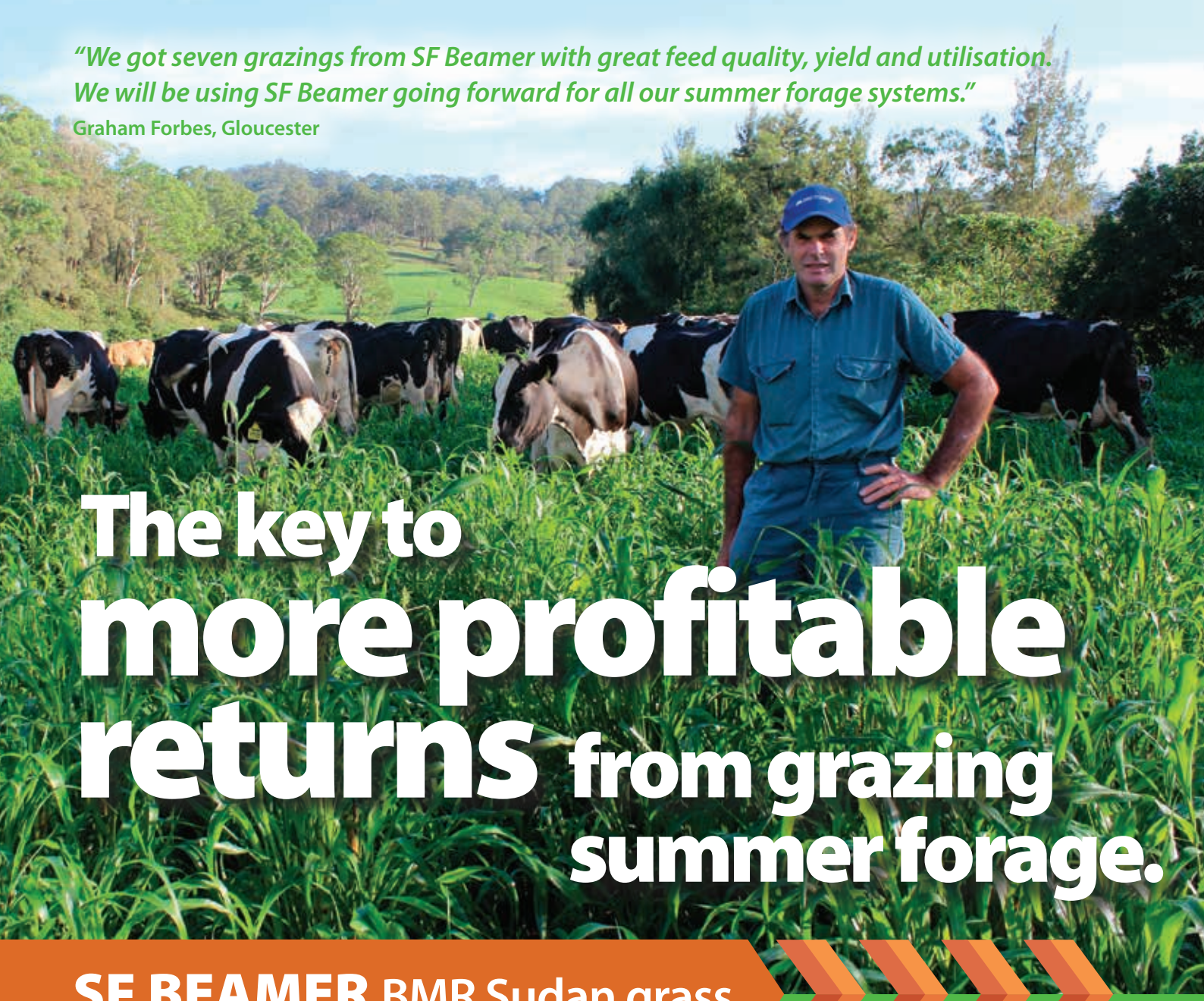
By keeping animals out of sensitive areas and managing overgrazing virtual herding will also help to improve environmental and animal welfare outcomes and give farm managers a better way to manage animal health and welfare.

The research grant is made under the Commonwealth's Rural Research and Development for Profit program and will be conducted in partnership with other RDCs, including Meat and Livestock Australia, Australian Wool International and Australian Pork Limited.

Research providers and other partners for this project are Tasmanian Institute of Agriculture, CSIRO, University of Sydney, The University of Melbourne, University of New England and Agersens Pty Ltd.

"We got seven grazings from SF Beamer with great feed quality, yield and utilisation. We will be using SF Beamer going forward for all our summer forage systems."

Graham Forbes, Gloucester



The key to more profitable returns from grazing summer forage.

SF BEAMER BMR Sudan grass

New research into summer forage crops including forage sorghum, sudan grass and millet has highlighted that **SF Beamer** BMR sudan grass is considerably higher in feed quality than other summer forage options. It is the only BMR sudan grass available in Australia. The research has shown that when grazed at 50cm in height **SF Beamer** can deliver high yields of much higher quality feed than other options tested, delivering greater meat or milk profits per ha.

VARIETY	YIELD	NDF%			ME MJ/KGDM			CP%		
height	kg DM/ha	0.5m	1.0m	1.5m	0.5m	1.0m	1.5m	0.5m	1.0m	1.5m
SUDAN GRASS										
Beamer BMR	**12,119**	**41**	**55**	**60**	**12.4**	**10.4**	**9.7**	**25.3**	**20.4**	**19.0**
Superdan 2	11,577	44	60	63	11.9	9.8	9.2	24.2	19.1	16.2
SSS	11,254	45	60	60	12.0	9.8	9.8	24.8	18.1	18.0
Nudan	10,094	46	65	68	11.9	9.0	8.5	24.2	15.9	15.5
SORGHUM X SUDAN										
SF Flourish	10,417	48	61	58	11.4	9.7	9.9	23.2	18.2	16.6
BMR Revolution	10,583	45	57	64	11.2	9.7	9.3	21.8	20.6	15.3
Boost	10,576	47	62	59	11.2	9.6	9.8	20.7	16.5	20.0
Octane BMR	8,497	49	54	64	10.8	10.3	9.1	21.2	18.7	17.5
MILLET										
Millet	4,228	47	66		11.6	8.8		24.9	15.3	

1. refer Seed Force 2016 Forage Sorghum Gazette for management advice and financial analysis
2. trial undertaken Murwillumbah 2015/16
3. Feed quality data from NSW DPI Feed Quality Service Wagga Wagga

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WHEAT BREEDING RETURNS TO TEMORA

WHEAT BREEDING IS RETURNING TO TEMORA AGRICULTURAL INNOVATION CENTRE (TAIC), WITH DOW AGROSCIENCES ENTERING A COMMERCIAL AGREEMENT WITH FARMLINK TO UTILISE A NEWLY DEVELOPED IRRIGATED CROP BREEDING PRECINCT.

Season 2016 is seeing Dow AgroSciences Australia leasing irrigated paddock space which has been developed to ensure successful germination and growth of new dryland wheat varieties. Water for the project is being piped from Temora's recycled water facility and will be distributed via a lateral irrigator.

FarmLink Chief Executive Officer Cindy Cassidy has been working closely with Dow AgroSciences and Temora Shire Council for some time to ensure the proposal for an irrigated crop breeding precinct at TAIC came to fruition.

"This is a big development for TAIC, Temora, the Riverina and wider agricultural community," Cindy said.

FarmLink is a not for profit farming group focussed on delivering innovation for farmers across southern New South Wales.

Cindy said that partnering with Dow AgroSciences and Temora Shire Council to bring an international R&D organisation to the region is fabulous news for farmers and local communities.

"This is a big development for TAIC, Temora, the Riverina and wider agricultural community."

Cindy Cassidy

"It's great to see TAIC strengthening its reputation as a thriving hub of agricultural research and development. The irrigation precinct will add to the already impressive swag of R, D and E that we have running here at TAIC, from the new CSIRO soil water project and MLA Satellite Flock, to the ongoing GRDC projects looking at stubble, carbon, micronutrients and strategic tillage," Cindy went on to say.

The proposal has the active support of the Temora Shire Council.

Local mayor Rick Firman said, "In its previous life as a research station, TAIC accommodated the development of wheat and oat varieties which made a huge contribution to agriculture in Australia. Dow AgroSciences bringing wheat breeding back to Temora is a positive move for regional agriculture. Temora Shire Council has been very keen to work together with FarmLink and Dow AgroSciences to ensure this development goes ahead."

Plans are also being developed for beyond 2016. FarmLink and Temora Shire Council, with the support of Dow AgroSciences, have submitted a National Stronger Regions Fund application to further redevelop the site and expand the crop breeding precinct.

The larger precinct will include construction of a 100 mega litre dam to store water, sourced from overflow from the recycled water facility, and an existing storm water holding dam. This water will allow development of a much larger area of land into irrigable trial area for Dow AgroSciences. Works will also be carried out at existing TAIC facilities to provide office space and seed processing capability to support new employees as a result of the jobs expected to be created by the project.

Dr Matt Cahill, Dow AgroSciences R&D Leader for ANZ, said the new wheat breeding program would tap into the international genetics and technical resources of Dow AgroSciences.

"We are targeting significant productivity gains in the wheat varieties we are developing, which is great news not just locally, but regionally too. We are keen to build the field capacity to match our global capability in advanced breeding technology," added Matt.

From his perspective as local mayor, Rick said the development has triple bottom line benefits for regional New South Wales.

"Our proposal has economic, environmental and social benefits that stretch beyond Temora and our shire. It will see new investment, jobs creation, sustainable use of recycled water, skilled people attracted to the region and delivery of innovation that improves profitability for farmers in southern NSW," he concluded.

WEED CONTROL CRITICAL WHEN WATER AVAILABILITY DRIVES CROP PRODUCTION

When you have a major focus on plant available water and related trigger points for crop production, you don't want weeds drawing on your valuable resource.

This is a driving factor for Andrew McFadyen, Company Agronomist and Cropping Manager at Paspaley Rural Properties' 'Kurrajong Park' group of farms near Coolah.

In his 15th season with the group, Andrew manages a 5500 hectare continuous cropping program that includes summer and winter crops. He said, ideally, sorghum would account for about half of the program.

Rotations can include sorghum/sorghum/long fallow/wheat or barley, while canola or chickpeas can also come into the rotation before a return to sorghum.

'Kurrajong Park' comprises ironbark beach sand country through to rich, black vertisol soils. The cropping program is managed on red clay loams through to the black vertisol soils.

Of the 675 mm average annual rainfall, Andrew said they factor in 250mm of in-crop rainfall and they start with 100-150mm of plant available moisture.

He said managing the different climates and ecosystems across the properties was a real challenge, as was weed control, including herbicide resistant weeds.

"We have mainly had to deal with glyphosate-resistant ryegrass. A huge reliance on glyphosate over the winter fallow period led to problems with resistance. Two out of every three winters was Roundup®, with no crop competition. "We also have a little bit of annual ryegrass with resistance to Topik® and black oats with resistance to Mataven®," Andrew said.

"Grasses are our biggest problem. If we lose plant available water, we lose sowing timeliness," he added.

The crop rotation program has since been extended, double knockdowns occur across the board, strategic grazing effectively provides a triple knock, and cultural practices, including windrow burning, are also employed. Residual herbicides and using pre-emergent herbicides with a fallow option are other considerations.

Andrew said trifluralin herbicide, good crop competition and Intervix® herbicide were keeping grasses under control in winter crops, while black oats were being killed in the fallow phase with glyphosate.

The range of broadleaf weeds they tackle includes wireweed, deadnettle, bindweed, sowthistle, turnip weed and other brassica weeds, as well as volunteer canola.

Andrew said the winter cropping program was becoming more heavily weighted to barley due to higher yields, quicker maturity and, hence, better frost tolerance, and, in conjunction with the use of the post-emergent herbicide, Velocity® from Bayer, it was proving to be highly effective against weeds.

"Velocity in barley, with good crop competition, leaves the country clean. As part of our broader herbicide management, it offers good chemistry, a different mode of action and we have no plantback problems. It is a good product," Andrew said.

"If we are coming out of canola, where there can be some Group B (herbicide) tolerance, having Groups H and C with Velocity is good. It also works well on any volunteer canola," he added.

Velocity is based on the novel active ingredient, pyrasulfotole, and also includes bromoxynil and Bayer's crop safener, mefenpyr-diethyl. The pyrasulfotole interrupts several biological processes crucial to weed growth, while the bromoxynil, which acts primarily as a contact foliar herbicide with virtually no soil residual activity, further disrupts the photosynthetic process, resulting in a unique action against weeds.

"We were previously using MCPA (Amine) and Ally® in a mix, but went to Velocity with Axial® for grasses in the one pass at the 3-4 leaf stage. The wireweed and bindweed can be a bit tougher if we don't get in early," Andrew said.

"The Axial is getting the black oats, phalaris and ryegrass. We still get ryegrass suppression and the crop competition is also taking them out, so they are getting a left/right jab," he added.

The spray mix is applied through medium to coarse nozzles with water rates of around 75 L/ha.

"We also test our water here. It's one of the biggest things to check. It's also about nozzle selection, knowing your conditions and knowing your product," Andrew said.

Local Agronomist with CRT store, Haynes Farm and Hardware, Ed Blackburn, who works closely with Andrew, said throughout the wider region, the Velocity and Axial spray mix in barley and wheat had been highly effective.

"It has left paddocks very clean," Ed said.

Ed and Andrew pictured during the recent harvest at 'Kurrajong Park'.

LATEST CANOLA TECHNOLOGY PUT TO THE TEST

John Snooke may have stepped down as chairman of the Pastoralists and Graziers Association's (PGA's) Western Grain growers committee last year to focus on his family and Cunderdin farm, but his advocacy for growers' access to the latest cropping technology remains unchanged.

John farms 2800-hectare 'Rockdale' with wife Julie, daughter Savannah and parents Kerry and Beverley.

He has been an avid supporter of GM crops, joining 18 other growers in successful large-scale on-farm trials of GM canola in 2009 and in commercial production in 2010 following regulatory approval.

Six years on, he is evaluating the latest technology – canola hybrids which allow the knockdown effect of Roundup® with the residual activity of triazine – marketed as RT®.

John said in a hybrid market consisting of Clearfield (CL), triazine tolerant (TT), and Roundup Ready® (RR) technologies, the new RT dual herbicide tolerant hybrids offered growers an extra tool in their integrated weed management (IWM) arsenal to combat more weeds, more often.

"Our consultant is certainly encouraging us to rotate our herbicide technologies and modes of action from a resistance perspective," John said.

"RT technology will have a fit for us, even if there is a small yield penalty, we'd happily accept that. We're trying not to incur massive costs in the future by way of resistant weeds. This keeps us economically sustainable," he added.

Last season, John sowed 10 hectares of Hyola 525RT alongside established varieties Hyola 404RR (400ha) and 43Y23 (150ha).

He said for an unpredictable season and rainfall dropping from their annual average of 350mm to 274mm, he was happy with yields and weed control.

"Last season was erratic to say the least. We had good autumn and winter rain then the tap turned off. We like to start seeding around Anzac Day and harvesting early November, but harvest was pushed back to October 25, indicating a very dry finish," John said.

"The RT was seeded to a good piece of country and on the yield maps there was no difference between 404R and it, with both around the 1.4t/ha mark. Given our tight finish, it realised its potential," he said.

John said overall average canola yields were at 1.2t/ha and the crops "ended up very clean".

The operation's cropping program includes barley, wheat, canola and lupins, as well as small amounts of pasture and hay making.

Proponents of zero-till and auto steer, they run a Case tractor with a Flexi-coil airseeder on 30cm row spacing, deep banding Flexi N at seeding with fungicide, and a New Holland header with MacDon swather.

They are currently considering controlled traffic farming (CTF) and variable rate application, with an initial focus on fertiliser and lime.

John said since growing GM canola in 2010, the brassica crop has gone from a break crop to become profitable in its own right.

"The introduction of GM has definitely stepped up the profitability of canola, making it on par with wheat in terms of gross returns at our farm," he concluded.

SCENIC RIM DAIRY FARMERS STAY AFLOAT WITH SMART INVESTMENTS

AS PROFIT MARGINS CONTINUE TO TIGHTEN IN THE DAIRY INDUSTRY, FARMERS LIKE STEVE AND SHARON JERVIS AT INNISPLAIN IN THE SCENIC RIM REGION OF QUEENSLAND ARE BECOMING SMARTER WITH THEIR INVESTMENTS.

Steve said the key to running their lean but successful 700-cow operation was to gradually add improvements based on industry best practice.

“While there’s nothing wrong with jumping in early, we like to see what trends are working in the industry and slowly incorporate things when needed, because we can’t afford to make mistakes,” he said.

Threats to the bottom line, which vary year to year, include milk price, labour overheads, feed costs, weed burdens, unnecessary capital expenditure and drought.

One of their most successful recent ventures was to introduce imidazolinone-tolerant (IT) corn, which addressed feed cost and security as well as the weed burden.

The system is based on varieties bred with imidazolinone tolerance. This allows use of Lightning, the registered BASF product for use in the Clearfield system. It allows for treatment of both broadleaf and grass weeds in-crop.

The Clearfield package includes an herbicide tolerant variety, the herbicide itself and a product stewardship program.

“We’ve always been on TMR [total mixed rations] on this property and have been growing corn for 18 years, but recently due to the nutgrass issues, we needed IT. The technology gives us the same, if not better yields as the non-Clearfield crops, and allows us to tackle weeds,” Steve said.

They feed out 4000 tonnes of corn silage per year, peaking at 5000t, with the number of hectares under the pivoting lateral irrigation system changing each season depending on their needs.

Last season Steve and Sharon planted PAC 606IT and PAC 727IT in October and harvested in May.“The 606 was naturally more mature, but you can’t always rely on CRM because variables like temperature and rainfall change this. Yields here max out at 70t/ha in ideal seasons and we were happy to get 55t/ha in a good year like 2015-16,” Steve said.

“We get the best result when we utilise the correct the amount fertiliser, have decent falls and prepare the ground. Due to good rain last year, we didn’t have to irrigate as much as usual,” he added.

Another upgrade at the farm, this time to reduce labour overheads, was to buy their own harvester, a Claas 890 Jaguar forage harvester with a Kemper Champion 445 front.

“The initial outlay for the machine is big but we can harvest whenever we want now. There’s no wait time. The processor chops the cob into easily digestible portions and is ensiled until we need to feed it out,” Steve said.

Future upgrades include adding automated elements to the rotary milking setup and adding to the silage pits.

“I’d like to add more automation including auto teat sprays and milk diagnostics. Pinpointing accuracy with the iodine on teats and measuring milk quality would save time and money,” concluded Steve.

“The initial outlay for the machine is big but we can harvest whenever we want now. There’s no wait time. The processor chops the cob into easily digestible portions and is ensiled until we need to feed it out.”

Steve Jervis

NEW RESEARCH MAY HELP PREVENT BANANA ARMAGEDDON

Researchers at the University of California, Davis, and in the Netherlands have discovered how a group of three closely related fungal pathogens have evolved into a lethal threat to the world's bananas, whilst an international consortium led by scientists from Wageningen UR (University and Research Centre) has unravelled the DNA of the fungus that causes black Sigatoka disease in bananas.

The recently published findings provide leads for increasing the sustainability of banana cultivation, for instance through the development of a resistant banana plant.

The Sigatoka group of fungi

The Sigatoka disease complex is a cluster of three closely related fungi – yellow sigatoka (Pseudocercospora musae), eumusae leaf spot (Pseudocercospora eumusae) and black sigatoka (Pseudocercospora fijiensis) – which emerged in quick succession during the last century as destructive pathogens on banana.

Yellow sigatoka was the first of the three to be recorded on banana, although eumusae leaf spot and black sigatoka are now the most devastating, with black sigatoka posing the greatest constraint to banana production worldwide. Black sigatoka is air-borne and affects the leaves of banana plants in small and large-scale plantations, and without chemical control it results in huge yield losses. The disease also reduces the quality of the fruit, causing premature ripening.

The Cavendish banana, the most commonly grown banana variety worldwide, is especially susceptible to the black Sigatoka fungus. Because Cavendish banana plants are genetically uniform, a disease capable of killing one plant could kill them all.

DNA sequence offers possibilities for disease control

Gert Kema, Professor in Tropical Phytopathology at Wageningen University and banana expert explained, "Black Sigatoka has a huge social, ecological and economic impact worldwide. Thanks to the sequencing of the DNA of the Pseudocercospora fungus we are now gaining a greater insight into the interaction between the fungus and the banana plant. This provides us with leads for increasing the sustainability of banana cultivation, making it better for the environment, the local population and the economy. For example, the insights offer us opportunities to develop a banana plant that is suitable for production and export, and which is also resistant against black Sigatoka."

This fresh understanding of the DNA of the black Sigatoka fungus is also providing new information that is useful in the development of more effective and, hopefully, less environmentally unfriendly crop protection products. This could reduce the amount of fungicide spraying which, in turn, would improve the quality of life of the people working in the plantations and those who live in the immediate surroundings.

Bananas and the disease threat

The banana is the world's leading fruit crop and ranks fourth as a global staple food, with 140 million tons of bananas produced annually in subtropical and tropical regions. Bananas, however, are prone to many diseases that can severely reduce production, posing a threat to global food security.

The fruit also suffers from an 'image problem', giving consumers the impression that it is and always will be readily available, UC Davis molecular plant pathologist Ioannis Stergiopoulos said. In reality, the global banana industry could be wiped out in just five to 10 years by fast-advancing fungal diseases. Already, the Sigatoka disease complex can reduce banana yields by 50-70%, if not controlled.

Managing the disease requires multiple applications of fungicide per year, which is prohibitively expensive for smallholder farmers, who consequently are left to the mercy of the disease.

Probing the genomes for solutions

"We have discovered that the two more destructive pathogens share a pattern of parallel changes in their core metabolic pathways that enables them to exploit more efficiently the nutrient resources available in banana," said Ioannis, who along with bioinformatician Ti-Cheng Chang, led the effort to sequence and analyse the fungal genomes of eumusae leaf spot and yellow sigatoka, comparing their findings with the previously sequenced black sigatoka genome sequence.

They discovered that eumusae leaf spot and black sigatoka become more lethal to banana plants not just by shutting down the plant's immune system but also by adapting their metabolism to better match that of the host plants, allowing them to more efficiently acquire and assimilate nutrients from the host.

"Now, for the first time, we understand the genomic basis of the evolution of virulence in these fungal diseases, thus giving us an opportunity for intervention," Ioannis said.

NEW SOIL WETTING TECHNOLOGIES SET TO BENEFIT GRAIN GROWERS

Australian grain producers are set to gain from improved water efficiency as a five year research collaboration reaches final stages.

The research outcome includes a new range of wetting agents to significantly improve water infiltration in the soil, reducing run-off losses and increasing the extent of moisture retention, as well as new diagnostic soil test provides enhanced reliability to user decisions based on soil characteristics and seasonal moisture expectations.

BASF's Crop Protection Division has licensed new soil wetting technologies co-developed with the Cooperative Research Centre for Polymers (CRCP) to help Australian farmers improve water efficiencies and increase yields.

The wetting agents are applied in a band to the surface soil directly above the seed, concurrently with the seeding operation, where they significantly improve water infiltration in the soil, reducing run-off losses and increasing the extent of moisture retention in the developing root zone.

More than five million hectares of Australian soils used for cropping are susceptible to water repellence. This water repellence causes rainfall run off, poor furrow efficiencies, patchy seed germination, and therefore reduced crop yields.

In 2012, BASF commenced a five-year collaboration with the CRCP to develop a new range of polymers to help farmers better manage water and nutrients in soils.

The collaboration, which also received funding support from the Grains Research and Development Corporation (GRDC), brought together an interdisciplinary team of material researchers, biologists and agricultural scientists from BASF with experts in physical chemistry, soil and plant science, and biophysics from Swinburne University of Technology, University of Western Australia, Commonwealth Scientific and Industrial Research Organisation and the University of New England.

The research was led by Professors Alexander Wissemeier (BASF), David Mainwaring (Swinburne University) and Daniel Murphy (University of Western Australia).

Professor Wissemeier explained that the research included laboratory studies on the effects of wetting agent formulation on the interaction of water with contrasting Australian soil types ranging from severely water repellent through to soils that showed only low water repellence. "This led to the development of a new range of soil wetting agents and a diagnostic soil test, allowing farmers to select the most effective wetting agent based on the properties of their soil," he added.

Professor Mainwaring pointed out, "The soil diagnostic developed in our research provides enhanced reliability to user decisions in the agricultural community based on soil characteristics and seasonal moisture expectations."

The final stages of the collaboration involve further evaluation of the effectiveness of the technology in glasshouse germination trials, using a range of soil types, and field trials currently being conducted at wheat production belts in Western Australia, South Australia and Victoria.

Professor Murphy added, "Throughout the wheat belt production gains can still be made through improved water and nutrient efficiency. The new soil wetting agents will aid farmers by capturing rainfall that is plant-available while the soil diagnostic improves the reliability of the wetting agent selection to soil type. Together this will benefit the Australian grains industry by narrowing the gap between actual and attainable yield."

The CEO of the CRCP, Dr Ian Dagley, summarised the benefits of the collaboration.

"This is yet another example of the great value of the Australian Government's Cooperative Research Centres Programme. It has allowed us to address a major issue for Australian grain producers by assembling the best multidisciplinary team of researchers from across five organisations, and to provide our commercial partner, BASF, with technologies that it can readily make available to interested farmers," he said.

A ‘FITBIT’ FOR PLANTS?

BY AMERICAN SOCIETY OF AGRONOMY

LOW-COST, PORTABLE PLATFORM GAUGES PLANT HEALTH QUICKLY AND EASILY

Plant breeders test their experiments by growing the seeds of their labour. They cross two different plants that have desirable traits. They sow the resulting seeds and evaluate the results, hoping to find a candidate variety that is better than anything currently available.

The ‘laboratory’ is often a paddock with thousands of plants. Farmers have monitored their paddocks and fields for millennia by simply walking among the rows of plants, observing changes over time, and noting which plants do better.

But as plant breeding technology becomes more complicated, farmers and scientists want specific data. They want to know exactly how tall the plants are, or exactly how green the leaves are. In a large test paddock, getting exact numbers means hours or even days of labour for a plant breeder.

Knowing what physical traits a plant has is called phenotyping. Because it is such a labour-intensive process, scientists are working to develop technology that makes phenotyping much easier.

This new tool is called the Phenocart, and it captures essential plant health data.

The Phenocart measures plant vital signs like growth rate and colour, the same way a Fitbit monitors human health signals like blood pressure and physical activity.

In an experiment with thousands of test plots, the Phenocart is a quick way to evaluate plant health. It can also help plant breeders design larger experiments.

“Larger sample size gives you more power,” said Jesse Poland, assistant professor in the Departments of Plant Pathology and Agronomy at Kansas State University in the United States.

“Measuring phenotypes is very labour-intensive, and really limits how big of an experiment we can do,” he added. The new tool will allow for faster measurements and accelerate the breeding process.

The Phenocart is a collection of sensors. The sensors are attached to a repurposed bicycle wheel and handles that a plant breeder can easily push among plants in a field. The Phenocart rapidly collects data as it’s pushed among the plots.

Kansas State University student and phenocart developer Jared Crain collects data using the phenocart in drought stress wheat trials at the Norman E. Borlaug Research Station, Cd. Obregon, Mexico.

Credit: Photo credit Mariano Cossani

“The Phenocart measures plant vital signs like growth rate and colour, the same way a Fitbit monitors human health signals like blood pressure and physical activity.”

Jesse Poland

Scientists can outfit the Phenocart with different sensors depending on what they want to measure. Jesse and his colleagues used a sensor to measure how ‘green’ their plants were.

“The measure of vegetation index or ‘green-ness’ is really the easiest and more straightforward way to measure the overall health status of the plant.” said Jesse.

The team also used a thermometer to check leaf temperature. Leaf temperature is also a good predication for crop yield. A global position system (GPS) pinpoints exactly where the Phenocart measured, which helps the team organise their data. The data is processed by software included in the Phenocart package.

One of the best parts about the Phenocart is that it’s portable. “We really wanted something that we could pack up and take anywhere in the world,” said Jesse.

The research team also focused on making the technology affordable to a broad group. “We’ve got lots of international partnerships, and we want it to make an impact across the global plant breeding community,” Jesse added.

As plant breeding becomes more sophisticated, so does measuring the results of large experiments. The Phenocart is a low-cost, mobile way to gauge the health of thousands of plants quickly and accurately.

NEW GRDC NORTHERN PANEL CHAIR CHAMPIONS ON-FARM INNOVATION

Incoming Grains Research and Development Corporation (GRDC) northern panel chair John Minogue is a firm believer in innovation, and feels effective communication between growers, the research community and the GRDC is the best way to see it continue on-farm.

John describes himself as vertically integrated in the grains industry, being a fifth generation farmer actually implementing research on farm, and also an advisor and an agronomist.

"For many years I've helped take the research message and deliver it to the farmer in an easy to understand and easy to implement way so the grower can undertake practice change on farm," John said.

"I feel this is really a key part of GRDC's business, and with my farming background, as well as my time serving on both the southern and northern panels, I not only understand how the GRDC works, but also have an insight into growers' needs. I'm looking forward to many opportunities of bringing this understanding to and travelling around our region as panel chair, hearing from growers and researchers and being able to communicate their research needs and priorities back to the GRDC," he added.

John was selected for the role as a proven strong leader, and he will be supported by an effective and diverse team in the northern panel.

The GRDC's three regional panels are a key strength of the organisation, playing an important advisory and strategic role in GRDC investments. The regional panels help to ensure that the GRDC investment plan responds to the regional and national priorities of grain growers and the Australian Government, and is aligned with the GRDC's corporate strategies.

"The GRDC northern regional panel is designed to be the conduit of information and insights between the grass-roots industry and the GRDC," John said.

"It plays an important advisory and strategic role in GRDC investments across the research, development and extension (RD&E) spectrum, so it is really worth getting to know your local panel member. The strategic location of panel members ensures that the needs of all growers within the geographic spread of the north are covered and looked after, with local research and extension being a key tenet of the GRDC's strategic plan," he went to explain.

John said the GRDC's new hub and spoke business model will allow for better informed research, as well as improved coordination of RD&E across the region.

"The regional network of R&D nodes at Emerald, Darling Downs and Goondiwindi in Queensland, and Narrabri, Tamworth, Trangie, Condobolin, Wagga Wagga and Yanco in New South Wales vastly increases the scope and resourcing for R&D projects. Each node has a combination of research agronomists and technical staff and the necessary equipment to conduct detailed trials, which vastly increases the scope and resourcing for R&D projects," John said.

"With the panel also sourcing investment and research priorities through channels including GRDC Grower Solutions groups, grains research updates, industry meetings, field days, panel tours and ongoing discussions with researchers and growers, the GRDC's reach is greatly improved. This in turn, improves our return on investment to growers, so I am very excited to be chair at this dynamic time," he added.

As well as his time with the GRDC, John has been named the Central West Conservation Farmer of the Year and has served as a board member of the Lachlan Catchment Management Authority.

From Barmedman, New South Wales, he has a 2000 hectare mixed farming and broadacre cropping operation, as well as runs a consulting firm in West Wyalong, providing agronomy advice to local farmers.

NEW SUGARCANE RESEARCH INVESTMENT TO HELP INCREASE SIZE OF HARVEST

The costly and significant problem of sugarcane harvest losses will receive a major research investment boost, thanks to a new $5.5 million announcement as part of the Commonwealth Government's Rural R&D for Profit Programme.

Losses from mechanical sugarcane harvesting have been conservatively estimated to cost the Australian sugarcane industry $150 million per year.

Deputy Prime Minister and Minister for Agriculture, Barnaby Joyce, recently announced a new project to address this major issue as part of round two of the Rural R&D for Profit Programme.

Dr Ron Swindells is Chairman of Sugar Research Australia (SRA). He said "This project will see SRA, as the industry owned corporation for research and development, collaborate with a range of other organisations to address strategic research and adoption issues relating to harvest losses."

"This is a massive investment in a priority area of research. This investment offers significant potential for gains for our $1.5 billion sugarcane growing and milling industry," he added.

Ron said that the industry already understood that significant amounts of sugar was lost during the mechanical harvesting process, with further issues associated with future ratoon crops of cane, and overall sugar quality.

SRA has identified reducing the losses from mechanical harvesting as one of four priority impact areas of research investment. This new investment will allow SRA to collaboratively address research gaps and work toward the best outcome for the industry.

"We know that the industry could be sharing a greater 'harvest pie'. This research will deliver valuable information about the true size of that pie, and how all sectors of the industry can increase the size of their slice," Ron said.

"Benefits will flow throughout regional communities and economies, which makes this research investment a win for growers, a win for harvester drivers, a win for millers, a win for the community, and a win for industry stakeholders," he added.

Ron said SRA welcomes the commitment from Minister for Agriculture, Barnaby Joyce, and the Federal Government toward this vital sugarcane industry research.

Project collaborators include the Queensland University of Technology, the Queensland Department of Agriculture and Fisheries, Norris ECT, Agtrix, and MSF Sugar. Across the project, investment includes $3.5 million from the Commonwealth and $1.7 million from SRA, with additional contributions from the other collaborators.

NEW RESEARCH WITH GROUP I HERBICIDES

GROUP I MODE OF ACTION HERBICIDES HAVE A LONG HISTORY IN AUSTRALIA.

Group I represent synthetic auxins and have a moderate herbicide resistance risk in Australia. This group includes the phenoxys (such as 2,4-D, MCPA, etc), benzoic acids (such as dicamba), pyridines (such as clopyralid and picloram) and quinoline carboxylic acids.

The registration of Paradigm™ Herbicide with Arylex™ active and ForageMax™ Herbicide with Arylex™ active brought an additional chemical class to Group I, the arylpicolinates.

Arylpicolinates are absorbed through leaves or roots, accumulate in the meristems (growing points of plants) and bind with specific auxin receptors in plants. Binding of Arylex with these auxin receptors triggers the degradation of repressor proteins that normally stabilise auxin-regulated genes in the cell nucleus.

Without the repressor proteins in place, the auxin-regulated genes 'switch-on' inducing a cascade of unregulated growth in susceptible plants within minutes after application. Within hours after application the uncontrolled growth disrupts multiple plant processes causing a loss of normal growth function. Within hours to days, visual symptoms appear and continue to develop leading to death in susceptible species a few weeks after application.

In research shared in June this year at both the International Weed Science Congress in Prague and the International Conference on Plant Growth Substances in Toronto, the uniqueness of the binding-receptor attributes of the arylpicolinates was highlighted.

This work was a collaborative project between Dow AgroSciences and the University of Warwick, United Kingdom. Dr Richard Napier, plant signalling expert and professor in the School of Life Sciences, was the key co-operator who identified these unique differences.

"There is one natural auxin which controls plant growth. There are also many synthetic auxins and these work as herbicides by overpowering the natural system. Our recent work with Dow AgroSciences has shown that not all auxins are equal," said Dr Napier.

"The new arylpicolinates prioritise a different target site than both the natural auxin, and other auxin herbicides, and they bind to this site with high affinity," he added.

Arylex's ability to bind with specific receptors differentiates it from other Group I herbicides. This allows Arylex to control ALS and glyphosate resistant biotypes of susceptible broadleaf weed species, making it an efficient tool for inclusion in herbicide programs to help manage ALS and glyphosate resistance in susceptible weed populations.





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Dr Richard Napier

Arylex’s ability to bind with specific receptors differentiates it from other Group I herbicides. Symptoms of Arylex active are shown here.

Compared to existing Group I herbicides, Arylex offers:

- Unique binding affinity.
- Significantly lower use rates.
- Consistent performance in variable climatic conditions, even cold conditions.
- Rapid degradation in the environment to non-active compounds.
- Low volatility.
- Compatibility with other molecules.

Arylex also has the benefits of:

- Wide application window.
- Complete control of tough weeds within weeks.
- Selectivity based on rapid metabolism in crops.

Arylex active is currently registered in Australia in Paradigm and ForageMax.

Paradigm provides control of a wide range of broadleaf weeds in wheat, barley, triticale and oats. It is broadly compatible with many other agricultural inputs, has a wide application window and short grazing WHP and re-cropping intervals.

ForageMax is registered to control broadleaf weeds in forage rape and turnips. It is also compatible with other agricultural inputs, has a short grazing WHP and established re-cropping intervals.

There will also be two new Arylex based products (Rexade and Pixxaro Herbicides) introduced onto the Australian market in 2017.

Rinskor™ active is another member of the arylpicolinate class is currently being reviewed for registration in Australia. Rinskor will bring farmers a new option for post-emergent control of grasses, broadleaves and sedges in rice and other systems. Rinskor controls most known herbicide-resistant biotypes in the target crops, including ALS, propanil, quinclorac, fenoxaprop and cyhalofop herbicides. As with Arylex, Rinskor has a low use rate and favourable toxicological and environmental profile.

INNOVATIVE PARTNERSHIP TO ENHANCE ONLINE GRAIN TRADING

Technology that makes online grain trading simpler, more secure and more competitive will become available to users of the online grain trading platform igrain under a partnership agreement with NZX Ltd, which owns Profarmer Australia.

igrain.com.au is an online grain trading platform that commenced trading in 2009 and to date has traded more than two million metric tonnes of grain on behalf of thousands of growers. Profarmer Australia provides independent commodity market intelligence including market insight, risk management strategy and pricing technology.

The partnership agreement will see some of Profarmer's market leading technology, including the grain exchange NZX operates, rolled out across the igrain platform. One of the key benefits is automatic matching of bids to offers, which will simplify the transaction process.

"Sellers currently set an indicative price, and they then need to approve sales when bids come in. Through this partnership we're able to offer growers the alternative option of a streamlined sales process where a bid is automatically accepted when the right price is offered," said igrain managing director Tom Roberts.

"It's a quicker, lower-touch approach which means growers will see money in the bank in a shorter time, up to several weeks sooner in some cases," he added.

Inbuilt payment security means sellers can be confident they'll be paid for their grain, which will help open up the online grain trading space to new buyers who may not have a track record in direct grower transactions.

"The system enables settlement within seven days and the grower retains title to the grain until payment is made, so it's a very straightforward and secure way to sell. We also provide insurance for sellers marketing grain ex-farm or into delivered markets. We try to eliminate as much risk for the grower as possible," explained Tom.

Profarmer Australia's general manager Nathan Cattle said the partnership will make it easier for buyers and sellers to connect directly, creating a more transparent market and ultimately a more vibrant online grain trading environment.

"We're enabling growers to put up a parcel of grain at a price they want in an open market, so they'll have access to more potential buyers. And it's good for buyers too because it will be easier for them to search for and buy grain direct from the grower," said Nathan.

"A robust online market place creates more competition to purchase grain at the farmgate, resulting in increased price transparency and ultimately better returns for growers," he added.

Growers will also have access to Profarmer's market insights from within the igrain platform, including bid, offer and trade data, so it will be easier for them to work out the best time to sell and to set the appropriate price for their business.

Tom said the partnership is exciting news for the Australian grain industry.

"igrain is already well known for our great customer relationships and service. Through this partnership we're able to focus even more on our customers while enhancing our technical offering to make online trading a safer, more viable and lucrative option for more growers," he concluded.

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FIRST CROPPING SUCCESS FOR YOUNG FARMER

The future of Australian farming is in good hands if young people such as Alex Linto are at the helm.

Alex's future career in agriculture is off to a brilliant start, with his first canola crop already standing as tall as his shoulders and developing pods for a bumper yield.

The 15 year old from York leased the land and developed the plans and budgets as part of a major project that he hopes will set him up for success next year at the WA College of Agriculture Cunderdin.

On accepting Alex's application to the school, the teachers encouraged him to continue developing his farming skills and experience and record it all along the way, so he arranged to lease some land and set up his own crop. It was a natural progression for Alex, who has been helping his father with agricultural contracting work for years.

"He's always been into farming, he loves it," said Rob Linto. "Alex can already do most things as well as me, if not better."

Monola® 416TT, a specialty oil canola from Nuseed, was chosen for Alex's first crop because of its strong yields, superior returns compared with canola and its ability to help clean up the paddock through the triazine spray.

"We heard about this new seed and it sounded good, especially the $95/t premium, so we decided to trial it on 20 hectares," said Alex.

Monola® is a healthy alternative to other cooking oils and is lower in saturated fat. Nuseed has been developina Monola® varieties for the past 10 years.

The company's latest variety, Monola® 416TT, is an early to early-mid maturing open-pollinated variety with good early vigour, comparing favourably with ATR Stingray.

Alex's crop went in early, on April 1, so it is well advanced for this time of year. "It's just down the road from home so I can check it out as often as I like," he said.

"The crop is looking really good, with lots of pods coming out and it's up to my shoulders, so about 150 cm," Alex added.

While Rob said it didn't grow as big and thick as some other canola crops he's grown in the past, it quickly grew tall enough to block daylight and suppress weeds.

According to Alex, he may have to spray for aphids soon, which will involve contracting a plane to get across the crop. He is also watching for sclerotinia.

Rob believes it's on track to achieve yields of up to 2.5 t/ha, and he's got good reason to watch that yield prediction carefully. "We reckon if Alex gets it to 2.5 t/ha or beyond, he can take the family to Bali," joked Rob.

"In all seriousness, we reckon it's got enough nutrition under it to get to 2.5 t/ha, but it will depend on how the rest of the season goes as well," he added.

As well as starter fertiliser, Alex's crop received 100 kg/ha of sulphate of ammonia and 100 kg/ha of urea.

Hugh Trenorden, Nuseed's Area Sales Manager for northern Western Australia, said the crop was looking great. "Alex has done a great job with our Monola® 416TT so far and if it continues to do well, he'll have a bumper crop. I can't wait to see how it goes at harvest, so I'll be sure to call and check on the final yield." said Hugh.

Hugh said uptake by Western Australia growers was stronger than ever this year, thanks to the yield performance, adaptability and maturity of Monola® 416TT.

When they combined all the data from last year's National Variety Trials and Nuseed's trials, Monola® 416TT produced a gross income of $145/ha higher than ATR Stingray.

"Given the potential for good yields and the guaranteed $95/t premium payment above the market price for canola, a lot of growers were keen to try Monola® for the first time this season," Hugh said.

"Although it is grown the same way as canola, Monola® can offer so much more in terms of healthy profits for growers and a healthier oil for consumers," he added.

For Alex, the focus, determination and hard work put into this his first crop augers well for a successful future in his chosen career.

2016 GROWTH AWARDS NOMINEES ANNOUNCED

From Carnarvon in Western Australia to Griffith in New South Wales and across the Tasman to Katikati in New Zealand, 57 leading agribusiness professionals have been named nominees for the 2016 Syngenta Growth Awards.

The Growth Awards are presented by Syngenta in partnership with Case IH and Fairfax Agricultural Media. They aim to recognise leading agriculture professionals, highlighting their outstanding contributions to the industry across three award categories:

- Productivity
- Sustainability
- Community and People

Territory Head – Australasia for Syngenta, Paul Luxton, said he is inspired by this year's nominees.

"We see outstanding nominees each year, and this year is no exception. We've received an extremely high calibre of nominations from agriculture professionals who are all working to improve not only their own businesses, but the industry as a whole," Paul said.

"There's a strong theme of giving back throughout the nominee list this year, with some dedicating personal time to mentor the next generation. It's uplifting knowing that so many agriculture professionals are working with graduates to secure the future of our industry. We have also seen a number of entrants who are doing great work in researching, developing and implementing new productivity measures, both on farm and in business operations, as well as agronomists who go above and beyond to ensure the wellbeing of their clients," he added.

From the pool of 57 nominations, the first round of judging in August will produce the regional finalists. Following this, regional winners will be chosen based on rigorous selection criteria for each category, and announced in late October. Australasian winners will then be selected by an independent judging panel.

The winners will be announced at the Growth Awards gala dinner in Sydney on 1 December 2016. The winners will then have the opportunity to participate in a study tour to the UK and Europe in 2017.

"The purpose of these awards is to recognise those professionals who are making a great contribution to our industry through leadership, best practice and innovation, and the nominees are certainly doing this," said Paul.

The Growth Awards support the goals of Syngenta's Good Growth Plan, which tackles the challenges of producing more with less, protecting the viability of farmland and promoting prosperous rural communities. Under the plan, Syngenta has made six specific commitments designed to increase crop productivity, improve land fertility, enhance biodiversity, empower smallholders, train farm workers and strive for fair labour conditions across the entire supply chain.

2016 Growth Awards Nominees include:

Adrian Utter - EE Muir & Sons Pty Ltd, SILVAN VIC
Alf Weaver - Elders Ltd, JAMESTOWN SA
Allan Fong - Perfect Produce, PUKEKOHE NZ
Andrew McMahen - Landmark, MANANGATANG VIC
Andy Bates - Bates Ag Consulting Pty Ltd, STREAKY BAY SA
Ashley Keegan - FABAL Wines Pty Ltd, UNLEY SA
Ben Dowling - Dowling Agritech, MOUNT GAMBIER EAST SA
Bill Crabtree - Crabtree Agricultural Consulting, BECKENHAM WA
Brent Wilson - Landmark, AYR QLD
Chad Gencheff - Virginia Nursery, VIRGINIA SA
Clinton Marcon - Marcon Family Farming, BUNDABERG QLD
Colin Arnold - G Arnold & Sons Farming Trust, BERRIGAN NSW
Craig Whiteside - C & A Whiteside, CLINTON NZ
David Braybrook - Research & Development Solutions, WONGA PARK VIC
David Cameron - Farmanco Management Consultants Pty Ltd, MOORA WA
David Crowley - Delta Agribusiness, YOUNG NSW
Dean Salvestro - Warrawidgee Station Pty ltd, BENEREMBAH NSW
Duc Nguyen - Nguyen & Huynh, CARNARVON WA
Duncan Young - JT Young & Sons, BEVERLEY WA
Gareth Goodsir - Yealands Estate, BLENHEIM NZ
Geoff Fosbery - ConsultAg, NORTHAM WA
Graeme Callaghan - Delta Agribusiness Coonamble, COONAMBLE NSW
Howard Clarke - Advance Agriculture Ltd, GORE NZ
James Dickson - GroLink Nursery, WERRIBEE SOUTH VIC
Jim Cronin - Landmark, FORBES NSW
Kain Richardson - R & L Richardson, NEWLYN VIC
Michael Fels - Halcyon Downs, ESPERANCE WA
Michael Nixon - Riverlodge Assets, NORTH PLANTATIONS WA
Michael Sperling - I.V, I.M & R.M Sperling, CHINCHILLA QLD
Mike Gordon - Pukekohe Growers Supplies, PUKEKOHE NZ
Naresh Singh - D'VineRipe Pty Ltd, VIRGINIA SA
Neville Arentz - Landmark, MANANGATANG VIC
Nick Williams - Cates Grain and Seed Ltd, ASHBURTON NZ
Nigel Corish - Yambocully Pty Ltd, GOONDIWINDI QLD
Niki Curtis - South East Premium Wheat Growers Association, ESPERANCE WA
Paul Grech - Grech Farms - Comma, THERESA PARK NSW
Paul Keevers - Tableland Fertilizers, MAREEBA QLD
Peter Boutsalis - Waite Diagnostics Department of Plant Sciences, PROSPECT SA
Peter O'Connor - Oxton Park, HARDEN NSW
Peter Watts - Muirfield Golf Club Ltd, NORTH ROCKS NSW
Randall & Julie Wilksch - Wilksch Agriculture, YEELANNA SA
Ray and Connie Taylor - Taylor Family Produce, AMIENS QLD
Raymond Bowan - Fallgate Farm, GERALDINE NZ
Richard Daniel - Northern Grower Alliance, HARLAXTON QLD
Richard Porter - Peracto Pty Ltd, NEWTON SA
Rob Harrod - Elders Ltd, ALBURY NSW
Rob Long - B & W Rural Pty Ltd, MOREE NSW
Robert Hinrichsen - Kalfresh Pty Ltd, KALBAR QLD
Simon Andreoli - BGA Agriservices Pty Ltd, BUNDABERG QLD
Simon Chapman - NQ Fresh, GUMLU QLD
Simon Severin - Agritech Rural Pty Ltd, HORSHAM VIC
Stuart Greenhill - Greenhill Bros, NORTHDOWN TAS
Stuart Millwood - Roberts Ltd, LAUNCESTON TAS
Tayah Ryan - Fruitfed Supplies, KATIKATI NZ
Tommy Le - EE Muir & Sons Pty Ltd, GLENORE GROVE QLD
Tony Single - Tigah P/L, COONAMBLE NSW
Trent Sosso - Rombola Family Farms, GRIFFITH NSW
Trevor & Wendy Cross - Cross Family Farms PTY LTD, BUNDABERG QLD

CROP BREEDING NOT KEEPING PACE WITH CLIMATE CHANGE

CROP YIELDS WILL FALL WITHIN THE NEXT DECADE DUE TO CLIMATE CHANGE UNLESS IMMEDIATE ACTION IS TAKEN TO SPEED UP THE INTRODUCTION OF NEW AND IMPROVED VARIETIES, EXPERTS HAVE WARNED.

The research, led by the University of Leeds in the United Kingdom, and published recently in the journal Nature Climate Change, focuses on maize in Africa but the underlying processes affect crops across the tropics.

Study lead author Professor Andy Challinor, from the Priestley International Centre for Climate at the University of Leeds said that in Africa, gradually rising temperatures and more droughts and heatwaves caused by climate change will have an impact on maize.

"We looked in particular at the effect of temperature on crop durations, which is the length of time between planting and harvesting. Higher temperatures mean shorter durations and hence less time to accumulate biomass and yield," said Professor Challinor.

It takes anywhere between 10 and 30 years to breed a new crop variety and have it adopted by farmers. The rate at which temperatures are increasing across the tropics means that by the time the crop is in the field it is being grown in warmer temperatures that it was developed in.

By looking at a range of data on farming, regulatory policy, markets and technologies, the researchers developed average, best and worst case scenarios for current crop breeding systems.

The researchers found that crop duration will become significantly shorter by as early as 2018 in some locations and by 2031 in the majority of maize growing regions in Africa. Only the most optimistic assessment , in which farming, policy, markets and technology all combine to make new varieties in 10 years , showed crops staying matched to temperatures between now and 2050.

The research team, comprising experts in agriculture, climate and social science, looked at the options for ensuring that crops can be developed and delivered to the field more quickly. These options range from improved biochemical screening techniques to more socially-centred measures, such as improving government policies on breeding trials and farmers' access to markets.

Dr Andy Jarvis, from CIAT (International Centre for Tropical Agriculture) said, "Investment in agricultural research to develop and disseminate new seed technologies is one of the best investments we can make for climate adaptation. Climate funds could be used to help the world's farmers stay several steps ahead of climate change, with major benefits for global food security."

The researchers have also proposed an alternative plan - to use global climate models to determine future temperatures, then heat greenhouses to those temperatures and develop new crop varieties there.

"The challenge here is in knowing what future emissions will be and ensuring that climate models can produce accurate enough information on future temperatures based on those emissions," said Professor Challinor.

"At the Priestley Centre, researchers are working on these challenges by improving climate models and targeting their use directly at solving such problems," he concluded.

TO TREE OR NOT TO TREE

Many farmers look at the way tea trees pop up randomly and abundantly in their paddocks and imagine themselves converting the entire expanse of scrub into oil.

“Obviously to make tea tree oil production work as a business requires far greater research and planning,” said Tony Larkman, CEO of the Australian Tea Tree Oil Industry Association (ATTIA).

“Like anyone planning to enter an industry, prospective growers need to understand the costs associated with establishing a plantation and have a plan for how they will manage harvesting and distilling,” he explained. It begins with having the right land.

The bulk of Australian tea tree oil is produced in one of three major growing regions: Port Macquarie on the Mid North Coast of New South Wales, the Northern Rivers of New South Wales and the Atherton Tablelands in Far North Queensland (although many of the coastal areas in between may also be suitable). Prospective growers can visit the Rural Industry Research and Development Corporation’s (RIRDC) farmdiversity.com.au website to check whether their property is located within a recommended growing zone.

“A smaller plantation is viable if you have ready access to contract harvest and distillation services but for a stand-alone plantation with its own infrastructure, you’ll need at least 50 hectares of plantation, probably closer to 100 to have a truly viable operation.” said Tony.

He added, “Although trees have the potential to remain productive for up to 35 years, I’d recommend budgeting for a tree lifespan of between 15 and 20 years.”

Tea trees typically take between three and four years to reach full production.

According to figures provided on RIRDC’s farmdiversity.com.au, selective breeding programs have helped to lift potential productivity from 148 kilograms per hectare to about 250 kilograms per hectare over the past two decades.

Trees can be planted at a density of 33,000-35,000 trees per hectare and cost approximately $10,000 dollars per hectare to plant out.

The high start-up cost means that most tea tree oil producers start with a smaller area and use contract harvesters and distillers. Just over a dozen producers focus solely on tea tree oil production while the majority of producers adopt mixed farming systems, combining smaller-scale plantations with livestock production.

“If you want to produce the oil yourself, you are also going to need specialised harvesting equipment and your own distillery which, depending on the model you use, could cost upwards of $1 million in addition to your planting and harvesting costs,” explained Tony.

Finally, one of the most challenging aspects of successfully establishing a new plantation is understanding the marketplace, which is carefully balanced.

Robert Dyason has been producing pure tea tree oil as part of a mixed farming operation that includes forestry and cattle grazing on his property near Casino, New South Wales, since 1979. He has committed 144 hectares to tea tree oil production and says it represents one of the most profitable operations of his business.

“There is no single piece of advice I could offer for achieving success but you need to make sure you can secure a long-term and reliable market, otherwise you will waste a lot of money establishing an expensive crop that can’t easily be removed,” said Robert.

The industry has experienced some difficulties in the past with institutional investors oversupplying the market and driving the oil price below the cost of production.

“I’m confident that tea tree oil industry can continue to grow, but people have to do their homework to understand what they’re in for,” said Tony.

RIRDC has developed www.farmdiversity.com.au to serve as a launching pad for farmers and agronomists interested in pursuing a new farming enterprise, including tea tree oil production, by entering either their postcode or the name of the crop or livestock they are interested in.

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