Spotlight
ON COTTON R&D

SPRING 2022

Conference record says we're Here for Good

Looking closely to the north

Positive outcomes for native vegetation

CRDC

Dr Ian Taylor

In the Spotlight

It goes without saying that the return of the Australian Cotton Conference was a resounding success and we hope everyone has returned home safely.

It was a huge three days with a record crowd, showcasing Australian cotton, its people, and the research, development and extension (RD&E) involved in creating and sustaining such a dynamic, vibrant industry. It was a pleasure for me and the CRDC team to catch up with old friends and make new ones, with first time attendee numbers in the hundreds this year. Among these were many young faces, no better represented than through our Future Cotton Leaders past and present, who are quickly putting their stamp on the industry.

The theme of the conference was 'Here for Good' with presentations and panel topics structured around the industry's PLANET. PEOPLE. PADDOCK. Sustainability Framework, underpinned by CRDC's RD&E. We are pleased to bring you the highlights from conference in this edition of *Spotlight*.

The 2022 conference marked two major milestones for cotton industry organisations – our congratulations to Cotton Australia on reaching 50 years of service to the industry, and to CottonInfo on celebrating its 10th anniversary. It was at the 2012 conference that CRDC, Cotton Australia and CSD announced the partnership of what has become an enduring and successful model of R&D extension. In this edition, we bring you some of the many CottonInfo achievements and activities to celebrate, and focus in on two of our Regional Extension Officers to hear their thoughts. In our next edition, we'll bring you more on both the Cotton Australia anniversary, and that of CottonInfo.

Those who attended conference will recognise some of the names and faces that we feature in this edition, as we take a closer look at cotton developments in northern Australia. CRDC supported a contingent of WA, NT and Far North Qld growers and agronomists to attend the conference to be a part of a discussion panel, and their session was one of the most well-attended on the program. As an industry built on sharing information and experience, there was a great deal of interest from attendees to see how crop managers in the north are overcoming conditions not experienced in southern regions.

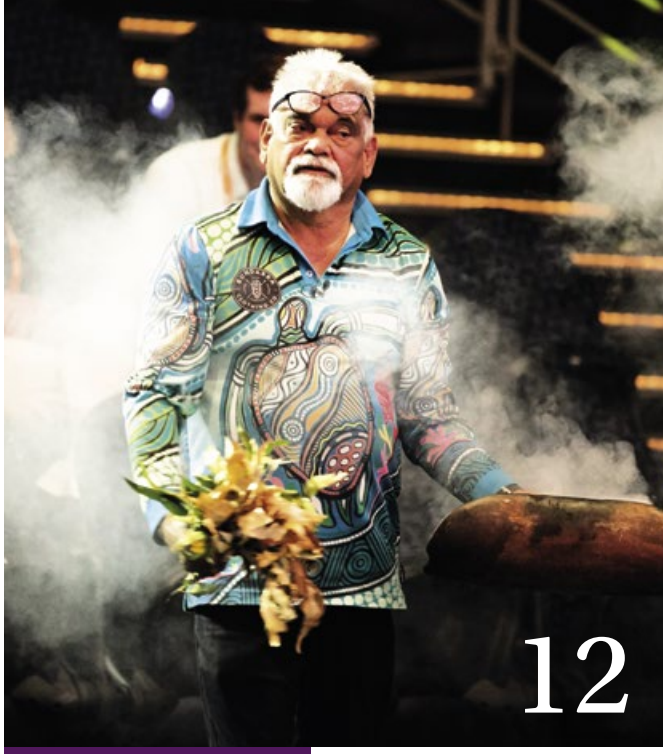
The support of southern growers, consultants and researchers and the sharing of industry knowledge and expertise is pivotal to the expansion of the industry, as while climatic conditions are different, core values and practices remain the same. This includes managing crops according to *my*BMP and industry resistance management plans. In this edition we take a look at how CRDC is creating specific management strategies for northern growers, increasing the capacity in the region, and ensuring that the development of the northern cotton industry is done sustainably, underpinned by RD&E and the adoption of best practice.

While on the topic of sustainability, in this edition we've also included an article on land conversion and the impact it has not only environmentally, but in the context of native vegetation management as a market access issue. CRDC and Cotton Australia are working to be at the forefront of related global developments in an attempt to make them relevant to the Australian cotton industry, rather than wait for northern hemisphere policies to be imposed on us.

It's a crucial time, both on-farm and off. On behalf of CRDC, we wish everyone the best for the 2022-23 season that is now rapidly upon us.

Dr Ian Taylor
CRDC Executive Director

CRDC acknowledges Australia's Indigenous people as the traditional custodians of our country, and recognises their continuing connection to lands, waters and culture. We pay our respect to Elders past, present and emerging, and extend that respect to all Indigenous people.



Spring 2022

Spotlight is brought to you by Australia's cotton growers and the Australian Government through the publisher Cotton Research & Development Corporation (CRDC). CRDC is a research and development partnership between the Australian cotton industry and the Australian Government.

CRDC
COTTON RESEARCH AND DEVELOPMENT CORPORATION

Cotton Research and Development Corporation
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Our vision: A globally competitive and responsible cotton industry.
Our mission: To invest in RD&E for the world-leading Australian cotton industry.

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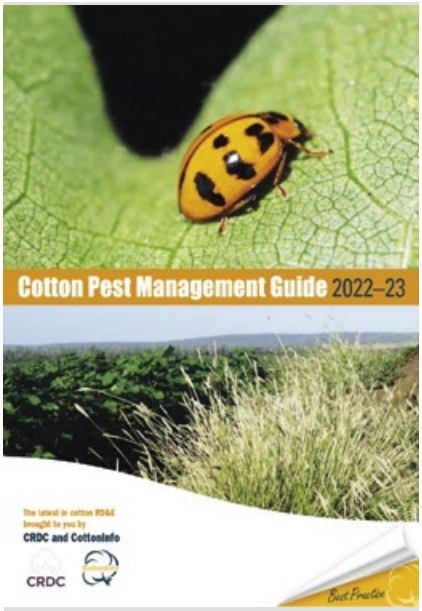
ON THE COVER:
Down Innovation Alley – David Lord of AgriFutures' growAG, CRDC Executive Director Dr Ian Taylor and Regrow Ag's Dr Anastasia Volkova at the 2022 Australian Cotton Conference.

Want to see more of Spotlight?

This edition can be viewed online at: www.crdc.com.au

COTTON NEWS

FEATURES



Cotton Pest Management Guide now out!

GROWERS and advisors now have access to the 2022 Cotton Pest Management Guide, produced in partnership with CRDC and CottonInfo.

This annual publication features the latest research and extension information on pests, disease and weeds, including annual updates to the Insecticide Resistance Management Strategy and Herbicide Resistance Management Strategy.

This year's edition features updates to the herbicide mode of action classification system, which has recently changed from letters to numbers. This edition includes both systems to help readers with the transition. The team has also added additional images to the sections on beneficial insects, key weeds and diseases to help with in-field identification. A full report on the CRDC-supported 2021-22 disease surveys across NSW and Qld is also included.

For more
www.cottoninfo.com.au/publications/cotton-pest-management-guide

Four of the five 2022 award recipients Jess Strauch, Nick Gillingham, Dr Oliver Knox and Bruce Connolly with Chris Lehmann Trust representative Jess Lehmann, Cotton Australia Chair Nigel Burnett, CSD's James Quinn, AgriRisk's Dee McCallum, Bayer's Mark Dawson, and ADAMA's Stuart Moncrieff.

Their time to shine

THE 2022 Australian Cotton Conference has once again finished up with a celebration of the industry's people at the industry gala awards dinner on the closing evening.

With around 1100 in attendance at the Gold Coast Convention Centre, Nick Gillingham from Sundown Pastoral Company's 'Keytah' in the Gwydir Valley was named Bayer Cotton Grower of the Year, while Northern Territory-based grower Bruce Connolly of Tipperary Station took home the AgriRisk High Achiever award.

The ADAMA Chris Lehmann Trust Young Cotton Achiever went to Jessica Strauch from Goondiwindi, who was also a part of the 2022 Future Cotton Leaders cohort (see story page 14).

In the field of R&D, the winner of the Cotton Seed Distributors Researcher of the Year went to soil scientist Dr Oliver Knox who is the University of New England's Associate Professor of Soil Systems Biology and CottonInfo Technical Lead for Soil Health.

Among judges for the Grower of the Year are the previous year's winner, who was Tony Quigley from Trangie. Tony said Keytah had a track record for investing in research via owners David and Danielle Statham; are *my*BMP Level 3 certified; and apply and share their learnings, which improves the industry as a whole.

Australia's cotton scientists are arguably the best in the world, with Australian growers now the most productive and sustainable thanks in part to the quality of R&D. Researcher of the Year Oliver has been integral in developing a new framework for soil health as a part of the industry's Sustainability Framework, PLANET. PEOPLE. PADDOCK. and is taking the research lead on cotton circularity. With an ability to communicate science in a generally amusing and unique way, Oliver took soil health to the masses with the Soil Your Undies soil health campaign.

"These awards help to capture and promote the breadth of science the cotton industry is involved in and I think it is fantastic the industry continues to recognise and reward this," Oliver said.

"I know as a young scientist in Narrabri I used to see the CSD awards in so many offices and covet one for myself one day.

"Having now got one, it is awesome, and it has made me reflect on all the people who have helped me get to where I am today and are still guiding me into the future. Collaboration across organisations and the industry has been essential in this.

"So to all the upcoming researchers out there I'd say never be afraid to ask anyone for help or advice and build those networks."

The Incitec Pivot Fertilisers Service to the Cotton Industry awardee was Bernie George, currently the Water Services and Compliance Manager at Australian Food & Fibre.

"Bernie has been delivering excellence in service to the industry through various high-profile roles for over 30 years including Cotton Australia Board Chairman, and as a member of the National Irrigators Council and NSW Irrigators Council," Cotton Australia's Adam Kay said.

"His contribution has been immense, and this recognition is well deserved."

Minister makes beeline for cotton

ROSS and Leanne Burnett's farm at Emerald in Central Queensland (Gayiri country) was the first on-farm visit for the new Federal Minister for Agriculture, Fisheries and Forestry the Hon. Senator Murray Watt.

The Minister, himself a Queenslander, travelled to Central Queensland just six days after being sworn in as Minister to also visit the local saleyards, Emerald cotton gin and agtech developer SwarmFarm Robotics.

"I've spent a lot of time in Central Queensland – one of the country's most productive agricultural regions – and I wanted to return there to kickstart my term as Agriculture Minister," he said.

Along with Ross, who is a CRDC Director, the Minister met with Cotton Australia Chair and cotton grower Nigel Burnett, Cotton Australia CEO Adam Kay, representatives from the National Farmers' Federation and other local cotton growers, including Nuffield farming scholar Renee Anderson and Australian Rural Leadership Program participant Aaron Kiely. With harvest in full swing, the Minister was given an insight and appreciation of the pointy end of cotton growing.

"To have the Minister here just after being appointed was very much appreciated," Ross said.

"Harvest is a great time to visit to view production in full swing, and we of course took Minister Watt for a drive in the picker."

Ross says he explained the benefits of research, development and extension (RD&E), the strengths of CRDC and the unique relationship with Cotton Australia.

"He really wanted to listen to us rather than speak or be engaged with the media," Ross said.

"He really took the time to listen to growers. From our conversations it was clear that he is aware of the positive aspects of Australian cotton production.

"Our world class R&D and high level of grower uptake of that R&D is one aspect we discussed, along with our sustainability focus and world-leading production standards. He was approachable and I'm really happy we've built a good rapport so early in his term. We had a great opportunity, and we made the most of it."

"It created a buzz across the industry, positivity and a sense of cooperation"

ASHLEIGH DWAN

CRDC Director Ross Burnett and new Federal Minister for Agriculture, Fisheries and Forestry, Senator Murray Watt at the Burnett's farm at Emerald in Central Queensland.

The Minister said his immediate focus is on helping producers overcome mounting input and supply chain challenges, while also positioning the sector to seize the massive opportunities arising from increased efforts to tackle climate change.

"Rising costs and access to farm labour and imported machinery will continue to challenge many Australian farm businesses," he said.

"We understand this and that's why I've identified these issues as key priorities for me, as the new Minister."

CRDC Executive Director Dr Ian Taylor said this engagement with the cotton industry as the start of his tenure created optimism in the industry.

"It certainly created a buzz across the industry and brought positivity and a sense of cooperation," Ian said.

"We look forward to building a strong working relationship with the Minister and continuing to work closely with the Department as we deliver major outcomes and impacts through our world-leading cotton RD&E."

Nigel Burnett said he was looking forward to working with the Minister on issues of importance to growers.

"The Minister has shown he is willing to engage directly with stakeholders, and he said himself he wants to listen, learn and collaborate – and that's great news for farmers everywhere," Nigel said.

Tipperary cotton manager Bruce Connolly with CRDC Directors Peta Slack-Smith, Dr Gary Fitt, Prof Les Copeland, Richard Haire (Chair), Dr Danielle Kennedy, Rosemary Richards (Deputy Chair), and Tipperary Group Manager David Connolly during the board visit to the NT.

RUTH REDFERN

Focus on growing a sustainable industry

Gaining a better understanding of the needs of a burgeoning cotton industry was the impetus behind a CRDC visit to Northern Australia in mid-May.

The CRDC board of directors and senior managers visited growers, farms, researchers and facilities across three states. In far north Qld, they visited Sundown Pastoral Company's 'St Ronans', on the Atherton Tablelands (Gugu-Badhun country), and in the NT, 'Tipperary Station' near Katherine (Jawoyn country). In WA, the group visited Kununurra (Miriwoong country) and the Ord Irrigation Scheme to meet with Kimberley Agricultural Investments' Jim Engelke and Luke McKay, along with Steve Buster at Mat Stott's 'Mambijim Farm' and Fritz Bolten, 'Oasis Farms'.

The visit at Kununurra included meeting with CRDC-supported PhD student Sharna Holman and CottonInfo Integrated Pest Mangement Technical Lead, Dr Paul Grundy (see story page 33).

Directors and staff also attended the NT Farmers' Food Futures Regional Roadshow at Katherine. A diverse range of presentations, including from CRDC's own Senior R&D Manager Susan Maas, focused on 'northern myths, opportunities and realities' across established and emerging plant sectors in the NT.

CRDC Executive Director Dr Ian Taylor, who participated in the WA leg of the trip, said he was most impressed by the enthusiasm and dedication of growers viewing the potential of cotton in northern Australia.

"Growers aren't just thinking about growing the crop, they want to ensure that cotton's footprint is sustainable, and that environmental impact is minimised throughout its introduction and emergence," Ian said.

"Growers are keen for the industry to learn from them with respect to indigenous engagement to ensure that the indigenous community benefits from the introduction of cotton into northern Australia.

"Critically, northern growers really understand the importance of stewardship of our Bt technology and minimising resistance development in *Spodoptera litura,* and raised these concerns directly with the CRDC Board," he said.

"Interestingly, they also see cotton seed as valuable as lint, as seed is very high in protein and considered vital to supporting intensification of the cattle industry in northern regions."

Ian said the Board and R&D Managers agree the most immediate challenges in terms of delivery of R&D and extension in the north are to support the development of a sustainable cotton industry, to ensure resource needs are met, and to ensure that we work with the local community to address environmental and social concerns.

"Meeting with growers who are very experienced in growing cotton, albeit in southern regions, offers a particular insight into what RD&E works and what doesn't in those systems.

"Meeting newer growers gives us another point of view on what is needed, particularly in extension, and they offer a new perspective because they are more used to working with the northern climate, growing other crops.

"So we've got to look at RD&E investments in the north that will work across all experience levels and locations – it's a big area between the Atherton Tablelands and the Kimberley, and while the tropics do share conditions that make RD&E applicable across the north, each region has its own peculiarities.

"Our CRDC Senior R&D Manager Susan Maas is on a short-term secondment with the Northern Australia Cooperative Research Centre (CRCNA), lending her extensive experience in project development and management as a part of the CRCNA Cotton, Grains, Cattle RD&E initiative.

"We met with CRCNA's Anne Stuzner, NT Department of Industry, Tourism and Trade researchers, and the Northern Australia Crop Research Alliance.

"This involvement will ensure RD&E works across the three industries, and across Northern Australia, for beneficial outcomes."

For more
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Putting people in the right places

A vital link between the southern and northern cotton industries will be forged as CRDC Senior R&D Manager Susan Maas joins the Cooperative Research Centre for Developing Northern Australia (CRCNA) for a part-time six-month secondment.

MELANIE JENSON

CRDC will ramp up cotton R&D capability in the north, with Senior R&D Manager Susan Maas undertaking a secondment with the CRCNA.

Susan had already been working closely with the CRCNA team since 2019 on the CRDC-supported *Potential for Broadacre Cropping in the NT* project. This project focused on the development of a viable broadacre system in the NT, including cotton and peanuts, through the collation of historical broadacre cropping data, natural resource information and an understanding of market opportunities.

In her secondment to CRCNA, Susan will be helping deliver the *Cotton, Grains and Cattle* (CGC) initiative, which comes at a time of increased production in these areas, along with the building of a cotton gin at Katherine in the NT.

CRDC is a partner in CGC, the biggest RD&E program the CRCNA has instituted. Its four key themes are: sustainable, adaptable cropping systems; enhanced cattle production systems enabled by cropping; workforce and skills development; and improving water use and quality and environmental compliance.

"I'm really looking forward to working with CRCNA and the grain and cattle industries to work out how best to integrate cotton into these farming systems," Susan said.

"We are also focused on cotton seed availability in the north with the advent of ginning there and how that can best be harnessed for the cattle industry.

"I've already been speaking with a lot of producers in the far north, who are really keen for knowledge and information.

"This opportunity will allow me more time to work across the cropping and cattle industries in the north and better understand the broader systems and industry development challenges."

The CRCNA extended its CGC investment program to northern Qld in May this year. CRCNA CEO Anne Stünzner said the extension of the RD&E initiative, initially launched in WA and the NT in March, will see a focus on supporting graziers and farmers on intensified cattle and feed production systems.

Far North Qld cattleman and grain grower Brad Jonsson is in his second year of growing cotton. He's already been speaking with Susan regularly, in her role leading CRDC's northern Australia RD&E investments. His family is making the move to cotton as their traditional corn and sorghum markets dry up, and they're growing enough now to supply their own feedlot. The family also grows avocadoes.

"Susan is fantastic, she is a credit to the industry," Brad said.

"It's awesome to have a link with the wider cotton industry through Susan.

"She's so knowledgeable and easy to deal with, I speak to her a lot. It will be great for everyone to have her up here working with this project.

"The beauty of the cotton industry is it's going to benefit everyone, especially if we can grow enough cotton up here to justify a gin."

NT grower Bruce Connolly of Tipperary Station echoed Brad's words about having already been working with Susan in her role at CRDC.

"We know Susan and really find her easy to work with.

"It's terrific to get support from Susan via CRDC, it's great news for the industry here."

Anne Stünzner says the emergence of a cotton industry in Northern Australia is an evolution of existing irrigated annual and dryland cropping and provides opportunities for a new way of approaching agricultural systems.

"Our CGC program aims to maximise the productivity of cropping and beef production farming systems, with consideration for the best use of water and land resources in a long-term, sustainable way," she said.

For more
CRCNA
www.crcna.com.au

CRDC's Dr Ian Taylor talks about BioClay – an entirely new method of pest control – on ABC's Landline.

Sharing the BioClay breakthrough

CRDC Executive Director Dr Ian Taylor put cotton R&D in the spotlight as a guest on ABC's *Landline* speaking about a breakthrough product for the cotton and other plant industries.

CRDC is a partner in the development of BioClay™, which works like a vaccine and has proven effective in making cotton plants immune to the effects of silverleaf whitefly. Amazingly, it is also being developed to fight diseases such as verticillium wilt.

BioClay works by using double stranded RNA (dsRNA) in a clay-based biodegradable spray solution. dsRNA has two strands and resembles the well-known DNA double helix. The clay-based solution binds the dsRNA, releasing it slowly once applied to the plant to fight various pests with longer protection periods in the same way a vaccine works in humans. It is safe for people and the environment.

BioClay was developed by the University of Queensland's Qld Alliance for Agriculture and Food Innovation (QAAFI) and the Australian Institute for Bioengineering and Nanotechnology (AIBN) with support from CRDC, Hort Innovation and Nufarm. It continues its development through the Australian Research Council (ARC) Hub for Sustainable Crop Protection, led by the University of Queensland in collaboration with 15 partners, including CRDC, Hort Innovation and fellow research and development corporations (RDCs) GRDC and Wine Australia, and Nufarm.

BioClay has the capacity to result in reduced chemical inputs, increased crop productivity, improved green credentials and sustainability, and improved market access, all of which will contribute to a more profitable and competitive food and agribusiness sector.

Ian was interviewed along with Cotton Australia Chair and Emerald (Gayiri country) cotton grower Nigel Burnett and research lead for BioClay, Professor Neena Mitter from the University of Queensland.

"This is a great story about the power of collaboration, of innovation leading to real-world impact, and of our commitment to world-leading sustainability," Ian said.

"We're proud of the role CRDC has played in supporting the creation of this ground-breaking product.

"It's such an important story to tell and it's proof of our commitment to reduce pesticide use by supporting R&D to explore and create alternative, sustainable forms of pest control.

"Better Cotton has a target for its growers to phase out highly hazardous pesticides (HHP), and the Australian industry's Sustainability Framework is also committed to phase out the use of some HHPs in coming years, while preserving and strengthening our integrated pest management system.

"To do this, we need options for our growers, and BioClay is clear representation of what can be achieved when we make commitments to find better ways to manage pests."

Work is also underway by the research team to develop BioClay for Verticillium wilt, which would also be a game-changer for the cotton industry.

"Research is helping us develop entirely new ways to protect our crops," Ian said.

"BioClay represents a new way of thinking in how we approach our plant breeding and farming systems. Products like BioClay may become a more useful basis for technology to control an even greater range of pests and diseases."

For more

ABC Landline

https://www.abc.net.au/news/rural/programs/landline/2022-06-12/eyes-on-the-flies:-developing-alternatives-to/13926166

Novel biopesticide on the horizon

A new plant-based compound for combating common insect pests in cotton, horticulture and broadacre crops has been developed with support from CRDC.

The novel biopesticide compound could revolutionise not just cotton pest control, but the global agricultural pesticides market. In partnership with Western Sydney University (WSU), CRDC has uncovered a plant extract which shows tremendous promise in lab tests and an in early field trials in controlling common crop insect pests.

WSU looked at about 250 plant species – both native and exotic – and tested around 450 extracts for insecticidal activity against key pest species. Successful extracts were then tested for off-target traits such as impacts on beneficial insect species and phytotoxic effects on the crop.

What has emerged is a commercially cultivable native plant compound code-named N68 which shows excellent insecticidal activity in controlling cotton aphids as well as good activity on whitefly, thrips, two spotted mites, olive lace bug, diamondback moth, and Queensland fruit fly. The compound also has favourable off-target traits – low phytotoxicity, low impact on non-target organisms and a low eco-toxicological profile.

WSU has already uncovered a simple, safe and economical method for extracting N68 from the plant. The compound gives good insect control at relatively low concentrations and because the compound can be cultivated on a commercial scale to produce and harvest the active metabolites, this increases the chances that it will be a commercially viable product in the future.

Current testing suggests N68 is a new mode of action for insect control and potentially an entirely new tool in the challenge of resistance as it has proven effective against insecticide resistant aphid populations.

The development of N68 is in line with CRDC's commitment to supply growers with additional methods of pest control to strengthen integrated pest management (IPM) systems as they evolve and change, often because of actions outside the industry's control.

LEWIS WILSON

N68 is potentially an entirely new tool in the challenge of resistance: proven effective against insecticide-resistant aphid populations.

The adoption of GM cotton, coupled with the adoption of IPM practices has enabled Australian cotton growers to reduce their use of synthetic pesticides. But as agronomist and CRDC consultant Doug McCollum explained, pest control isn't a 'tick a box' item. From regulatory changes to insect resistance and market pressures from importers and ecologically conscious consumers – the race is on to develop alternatives.

"We also see both long-term and seasonal change in the ecology of cotton fields, where things that were once a major problem fade into the background, but other pests pop up in their place," Doug said.

"CRDC knows we need to keep working in this area – creating Plan Bs that protect our growers into the future."

CRDC recently closed submissions from commercial partners for N68. With the typical research timeline from discovery to commercialisation taking anywhere up to 10 years, the work already undertaken by CRDC and partners significantly shortens that period.

While initiated by CRDC to find additional insect control options for cotton, this compound has a much broader application with non-cotton pest species such as the diamondback moth. This broadens N68's market potential from Australian cotton to cotton, vegetable and broadacre crops worldwide.

Investing in research to create novel, biological pesticides is a part of CRDC's longer-term plan to help reduce reliance on pesticides.

For more

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Could your newly cleared land become a stranded asset?

Producing food and fibre has often required changing native ecosystems: clearing trees, converting pasture to cropland, or improving pastures for grazing.

And while this change of land use often has positive outcomes, such as increased economic activity, increasingly, the negative impacts of land conversion are coming under the spotlight. According to cotton's sustainability consultant Chris Cosgrove, deforestation is a major contributor of greenhouse gas emissions – as it eliminates the potential for those trees to be a carbon sink and puts significant pressure on habitats and species extinction.

"As a result, governments and corporations are rapidly developing responses aimed at eliminating deforestation and/or land conversion in food and fibre supply chains," Chris said.

"Just as government and corporate action on climate change has pressured individual businesses right along supply chains to reduce greenhouse gas emissions, in the next couple of years we are likely to see much more pressure on industries and individual businesses to avoid any further loss of natural ecosystems.

"This is a rapidly emerging area and many of the main initiatives are still being finalised (see breakout box) but based on areas they all have in common, some very important conclusions can be made." These are:

- Food and fibre manufacturers using the world's major sustainability reporting frameworks will be required to eliminate deforestation from their supply chains, and encouraged to eliminate land conversion (eg. native pastures to grazing or cropping).
- Companies and industries will be encouraged to be 'nature positive' by 2030.
- The baseline year for eliminating deforestation and for being 'nature positive' is likely to be 2020. As an example, guidance being developed for companies who use a Science Based Target (SBT) methodology for setting greenhouse gas targets will be required to use the following statement from April 2023: "[Company X] commits to no deforestation across the value chain throughout the SBT target period, with a cut-off date of 2020."

"So, while the view of many farmers is they are within their rights to clear trees or convert native pastures if they wish – as long as relevant legislation is followed – they need to be aware native vegetation management is about to become a market access issue," Chris said.

"There are still many question marks: just how

many companies will adopt deforestation-free or nature positive goals? How strictly will companies monitor and enforce this? Will other land managers – miners, property developers – be under the same pressure? Will deforestation be the main target, or will any conversion of land from its natural ecosystem state be the goal?

"We don't have the answers for these yet, but it is important growers are aware of these developments so they can decide if this is a threat their business needs to take into consideration when converting land, or if it's an opportunity to embrace."

At the industry level, CRDC is working to be at the forefront of these global developments in an attempt to make them relevant to the Australian cotton industry, rather than wait for northern hemisphere policies to be imposed on it.

Central to this effort is a collaborative project with Natural Resource Management (NRM) Regions Australia to explore a collaborative approach and coordinate work towards regionally-specific native vegetation priorities and targets. CRDC's aim is to develop a pragmatic but robust process that aligns on-farm actions not just to regional priorities, but also to three major emerging global frameworks: the *Post-2020 Biodiversity Framework, Taskforce for Nature Related Financial Disclosures, and Science Based Targets for Nature* (see breakout box).

"This is a complex piece of work which we are currently scoping with NRM Regions Australia," Chris said.

"If this scoping work confirms our approach is feasible, we will consult extensively with growers on what we are proposing."

This work also builds on research delivered in December 2021 into strategies to strengthen biodiversity management on cotton farms. This research recommended the industry focus on revegetation, and to do that it needs to:

- Make grower action easier: set targets, have better access to financial support, and have accurate ways to gauge impacts on biodiversity and productivity.
- Have a coordinated approach: area-wide management, and in partnership with others.

Working with regional bodies to coordinate native vegetation management at a regional level, and to talk the language of global governments and customers by adapting emerging global frameworks, is an important way to address these needs growers are telling CRDC they have.

For more

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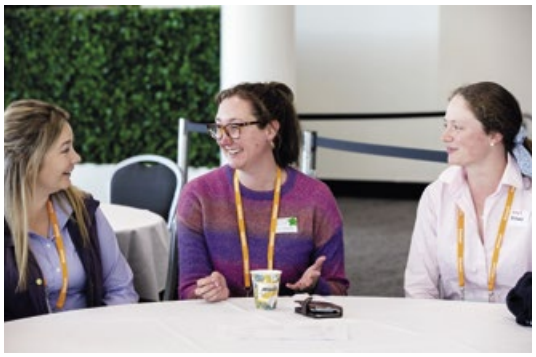
Native vegetation coming under the corporate microscope

Increased global scrutiny on biodiversity and native vegetation impacts is certain – just as increased scrutiny on greenhouse gas emissions is now a reality. A number of international developments are either in the consultation phase or have just been released to drive this message home. These include:

- UN Post-2020 Global Biodiversity Framework. With goals around meeting ecosystem and human needs so humanity can live in harmony with nature. Key draft goals include a net gain of at least five per cent by 2030 in the area and integrity of ecosystems, and at least 15 per cent by 2050. Negotiations in December 2022 aim to finalise this global framework.
- Taskforce on Nature Related Financial Disclosures (TNFD). A methodology for businesses – particularly publicly listed companies and financial institutions – to quantify and report their impact on nature. It builds on the widely used Taskforce on Climate Related Financial Disclosures. The TNFD is currently in draft, and due to be finalised by 2023.
- Science Based Targets for nature (SBTn). Guidance for companies to set targets for nature that align with earth's limits and societal sustainability goals. The SBTn framework is in consultation and aims to be finalised in 2022. For native vegetation, a focus is measuring the extent of land that has been deforested, preserved or restored.
- Science Based Targets initiative (SBTi). A methodology used by many companies to determine their greenhouse gas reduction target. Draft updated SBTi guidance, to be finalised in 2023, requires companies with emissions from food and agriculture in their supply chain to publicly commit to zero deforestation by April 2023. The SBTn framework builds on the SBTi.
- Global Reporting Initiative. A widely used standard for sustainability reporting. A new agriculture standard released in June 2022 asks companies to report target dates to reduce or eliminate natural ecosystem conversion and report the area of land conversion-free or that has been converted.
- 'Nature positive' is a concept that is increasingly being promoted. For example, one of the Global Roundtable for Sustainable Beef's three 2030 global goals is for beef to be nature positive. The concept broadly promotes zero net loss of nature from 2020, net positive by 2030, and recovery by 2050.



Sharna Holman, Dr Nicole McDonald and Mikaela Tilse at the Meet the Researcher morning tea organised by CRDC to connect cotton researchers.

No shortage of inspirational speakers – Kurt Fearnely was a guest at the Bacon and Berocca breakfast.

Co-chair Hamish McIntyre officially opening the conference.

The conference welcomes all ages, with free childing minding on offer.

Steven Bradbury shared the journey of his road to gold and 'that medal', highlighting the role perseverance has in success.

ABOVE: Minjungbal/Mununjali Traditional Owner and Elder of the Yugambeh Language group of people/Bundjalung Nation, Uncle Allan Lena welcomed us all to country.

BELOW: Keynote speaker Lucy Bloom opened the conference, well and truly warming up the packed plenary theatre.

Creating an industry that is here for good

It was a long-overdue get together for the people of the Australian cotton industry when the 2022 Cotton Conference kicked off in August at the Gold Coast Convention and Exhibition Centre.

Evident in a record crowd of nearly 2500, including in excess of 130 speakers and just over 125 exhibitors, the event was a clear reminder that the industry is 'Here for Good': the theme for 2022.

The solidarity, fellowship and high expectations of the industry is a strong as ever if the number of smiling faces, fond handshakes and deep conversation were anything to go by.

The here for good message was woven throughout the speaker line-up and presentations with the sessions themed around PLANET. PEOPLE. PADDOCK from the industry's Sustainability Framework – an idea originating from CRDC's Ruth Redfern. Settling on a speaker line-up is never easy, according to program organiser Guy Roth.

"It is due to the quality and quantity of RD&E being undertaken within the industry, there is so much valuable information it is really hard to narrow down the program – it's a great problem to have," Guy said.

"And with four instead of two years between events, we had a lot to cover!

"We also source a range of incredible speakers from outside the immediate industry, who offer insight into broad issues such as carbon, markets, and global drivers, which was ably led by Olam CEO Sunny Verghese and backed up by some of the county's leading scientists.

"The stellar line-up of academics and international business professionals was led by the industry's own professionals – our growers and agronomists – whose presentations are so popular.

"Cotton is well known across industries for its willingness to share information and skills, and our conference really encompasses that. We have incredibly switched on, innovative operators.

"There is nothing like giving growers and consultants the opportunity to hear from each other as experience counts for a lot in the farming game."

CRDC is one of two foundation sponsors of the conference, with CSD. As part of this support, CRDC offers a $100 discount to growers to attend.

Missed a session?

If you missed a session, made it and loved it so much you'd like a recap, or couldn't make it at all, most presentations are available on the website. Conference images are also available and are free to download and share.
www.australiancottonconference.com.au

"We are committed to seeing the research we support make it into the hands of growers and consultants, so we want to see as many at the conference as possible," CRDC Executive Director Dr Ian Taylor said.

"This year we saw an uptick in younger people attending, which is a positive sign as we've worked hard as an industry to attract the next generation. We also foster leadership and participation through programs we support like the Future Cotton Leaders program with Cotton Australia."

CRDC also supported the inclusion of 'Innovation Alley' into conference, showcasing 12 innovations that will, or are already, deliver an impact for growers. In addition, around half the presenters and panellists were attending conference with CRDC support.

The conference is organised by volunteers, this year led by former Cotton Australia Chair Hamish McIntyre and Australian Cotton Shippers (ACSA) Chair Roger Tomkins, and overseen by ACSA Secretariat Tracey Byrne-Morrison. CRDC is represented on the committee by Executive Manager of Communications, Ruth Redfern.

The committee created a jam-packed three days, with events during program breaks such as the Bacon and Berocca Breakfast featuring Australian of the Year Kurt Fearnley, the Wincott lunch, the Australian By Design Fashion event and an auction for the Yalari program: the chosen charity for this year's conference.

As per usual, the conference opened and closed with inspirational keynote speakers from outside the cotton industry. Dynamic speakers Lucy Bloom and Olympic gold medallist Steven Bradbury kicked everyone into gear on Tuesday morning. On Thursday afternoon, the event closed with humour from cricket commentator Kerry O'Keeffe, followed by insight on regional communities from demographer Bernard Salt.

Future leaders have arrived

If the contingent of graduating Australian Future Cotton Leaders at this year's conference is anything to go by then the future is already here.

The 2022 cohort was well represented in many ways, not least with Jess Strauch taking home the ADAMA Chris Lehmann Trust Young Cotton Achiever of the Year Award.

The future leaders even made their way onto the catwalk in the Australian By Design fashion parade, with Emma Bond's creations on show and Emma taking part in a designer forum.

Three of the 2022 group also took to the podium as conference speakers.

University of Sydney researcher Patrick Fillipi shared his research 'Sensors, data and looking after it all', as part of the #PLANET – Technology for Future Farming session.

New grower of cotton and Far North Queenslander Brad Jonsson shared his experience moving from avocados and horticulture into cotton as part of the #PADDOCK – What's going on up North forum. It was a big call for a newcomer to the industry to speak in front of such a large crowd. However Brad handled it well, with course convenor Jo Eady, past participants and fellow 2022 participant Sam Lee there as moral support.

In his role with CSD, Sam is well known and often speaks to crowds. He was also on stage with his 'Well sown is half grown' presentation in the #PADDOCK – Signs and Symptoms: Ease Your Disease session.

The 2022 Young Achiever of the Year Jess, who is Queensland Cotton's Border Rivers Area Manager, said she was grateful to have been a part of such a great group this year. She said the program had more than met her expectations.

"It gives you a belief in yourself that you can, and the tools that you can learn if you can't," Jess says.

"Because the course focuses on self-development to develop leadership, we've shared a lot with the others in our group.

"I can see now how people become life-long friends as a result of the program, as the networking opportunities are incredible.

"Our group contains such a variety of people and personalities, and we are also geographically and professionally diverse.

"We represented from Far North Queensland to Winton and down to Griffith, and strategically now know and have someone in nearly every field across the industry we can lean on going forward.

"We have confidence in the people that are there with us, to guide, support and mentor us moving forward."

Future Cotton Leaders took centre stage at the 2022 Cotton Industry Awards. Pictured are Young Achiever of the Year Jess Strauch, who was presented with her award by fellow leader Jess Lehmann and sponsor, ADAMA's Stuart Moncrieff. Past graduate Nick Gillingham was also in the spotlight, taking home the Cotton Grower of the Year Award.

Past participants presenting at the conference also included Cotton Australia Chair and grower Nigel Burnett, who was in the first intake 12 years ago, agronomist and farm manager Bill Back, researcher Nicole McDonald, grower Renee Anderson, grower Tom Quigley, CRDC Senior R&D Manager Susan Maas, grower Liz Lobsey, Plant Health Australia's Jess Lehmann and research scientist Katie Broughton.

The leadership program is run by Cotton Australia and CRDC, and delivered by Jo Eady from Ruralscope. The 12-month program runs every two years, with applications open at the start of each Australian Cotton Conference year. The next intake will be in 2024.

For more
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ABOVE: Cotton industry sustainability consultant Chris Cosgrove, CRDC General Manager R&D Investment Allan Williams and CRDC Executive Director Dr Ian Taylor on the panel of the #PLANET #PEOPLE #PADDOCK – 'Are we really here for good?' session.

BELOW: Legendary cricket commentator and self-confessed 'average cricketer' Kerry O'Keeffe helped close the conference speaker lineup with his special brand of humour and insight.

Olam International's Sunny Verghese is always a popular key speaker, sharing his extensive knowledge an experience.

LEFT: Demographer Bernard Salt brought his knowledge and focus to the cotton industry, demystifying current trends and potential future scenarios.

BELOW: Future Cotton Leader and fashion designer Emma Bond with CRDC-supported PhD scientist Demi Sargent, wearing one of Emma's creations.

Country Road featured in this year's Australian By Design fashion show.

Integral people in the organisation and running of the event – Adam Kay, Guy Roth, Hamish McIntyre, Roger Tomkins and Brooke Summers.

ABOVE: Wincott luncheon organisers Alisha Reading, Anna Power, Emily Wilkins, Gail Spargo and Natalie Alderson.

BELOW: Yalari's Waverley Stanley with old school mate from Toowoomba Grammar School Patrick Hilliar.

Forewarned is forearmed:

supporting growers to proactively manage the impacts of extreme climate events

In Australia, the largest drivers of fluctuations in annual agricultural production and income are extreme events and climate variability.

Having the tools to predict such events is now a reality for cotton growers, with new Bureau of Meteorology (BoM) forecasting features.

The features were developed to help growers plan for extreme weather and climate events as part of the Forewarned is Forearmed (FWFA) project, a partnership of government, research and industry sectors funded through the Australian Government's Rural R&D For Profit program. CRDC is a partner in the five-year project, which is led by Meat & Livestock Australia and winds up in December this year.

These new climate, rainfall and extreme temperature forecasts have been developed in response to the growing need for information around unseasonal and extreme weather and climate events. The features aim to build climate resilience and support informed decision making.

Accessible on BoM's Climate Outlook web pages, cotton growers can now find more detail on extreme rainfall and temperature for any location in Australia. Users can zero in on their location to access data on the chance of unseasonal and extreme temperature and rainfall for the weeks, months or seasons ahead.

The project initially developed two climate forecasting features, extreme climate maps and location-based bar charts, which were released in 2021. In June this year, three further features were released. The first of these is a location-based forecast rainfall and temperature time series (climagrams) that offer weekly and monthly forecasts as a time series for any grid point in Australia.

The second new feature, the 'probability of exceedance' feature, can graph the probability of a comprehensive range of rainfall amounts for coming weeks to seasons. The final new feature is rainfall probability maps: the likelihood of exceeding three-day rainfall totals, ranging from 15 to 75mm for the weeks and fortnights ahead.

While the development of these features is a major outcome of the FWFA project, there were other focus areas, including identifying areas for improvement in the performance of seasonal climate forecasts and the development of risk management packages for extreme events.

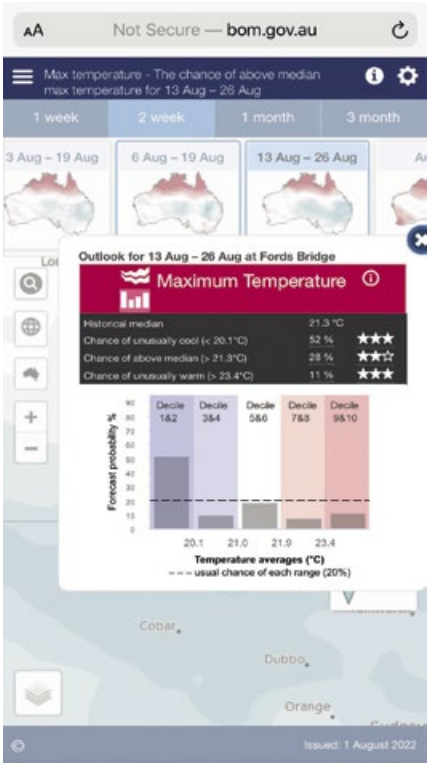
Dr Ann-Maree Graham from the University of Melbourne's Primary Industries Climate Challenges Centre (PICCC) said research partners in the FWFA project have worked with farmers and industry reference groups to ensure the products and project outputs are relevant to their needs.

"We identified the value of distinguishing the magnitude of the seasonal forecast against the average: for example, delineating whether temperatures would be significantly hotter/colder or marginally hotter/colder and similarly, whether the rainfall forecast was significantly wetter/drier or marginally wetter/drier against the long-term average," Ann-Maree said.

The new forecast features encompass this capacity. The reference groups also identified the extreme events of most consequence to their industries, along with the types of decisions required to manage their on-farm risks.

"The on-farm decisions most sensitive to seasonal forecast information are tactical in nature, in contrast with operational short term (weather dependent) or strategic long-term (climatological)," Ann-Maree said.

"The risk management processes for such decision making have been a subject of research in the project."



Growers can drill down to specific data for their exact location with new BoM forecasting tools developed with support from CRDC.

The generic risk product will be available by the end of the project and it is hoped that it, along with the sector-specific information will help growers navigate important management decisions around extreme events.

A webinar showcasing the new features has been recorded and is available online for growers to watch. BoM's Dr Andrew Watkins (Head of Long-Range Forecasts) and Dr Avijeet Ramchurn (Senior Climatologist) along with Dale Grey (Seasonal Risk Agronomist, Agriculture Victoria) introduced and discussed the Forewarned is Forearmed outlooks and new features.

For more

www.piccc.org.au/research/project/FWFA_Forecast_products

www.bom.gov.au/climate/ahead/

A decade of serving the industry

CottonInfo, the Australian cotton industry's joint extension program, is celebrating 10 years of delivering outcomes for the Australian cotton industry.

Officially established at the 2012 Australian Cotton Conference, CottonInfo is a joint initiative of CRDC, CSD and Cotton Australia. It's a unique industry partnership that communicates the outcomes of research, encourages grower adoption of technology and innovation, and improves industry practices.

The team comprises Regional Extension Officers, Technical Leads and *my*BMP experts. This team works across issues including biosecurity, climate, crop nutrition, disease management, energy use efficiency, fibre quality, integrated pest management, natural resource management, pesticide application efficiency, soil health, stewardship, water management and weed control.

CRDC Executive Dr Ian Taylor said the CottonInfo model was something that most other agricultural industries did not have.

"CottonInfo's greatest strength is the collaboration and cooperation between the partner organisations CRDC, CSD and Cotton Australia," Ian said.

"Through CottonInfo, we have a high level of experience in the field with our Technical Leads and Regional Extension Officers.

"These people have built trust and respect with growers and advisors, which is helping to accelerate outcomes for the industry."

In its first decade of operation, CottonInfo has become well-known across the industry and sought after for its information, which includes weekly email newsletters, hard copy publications, a comprehensive website, a YouTube channel with almost three million views, and a podcasting service.

According to industry surveys, 94 per cent of consultants and 90 per cent of growers believe CottonInfo provides useful and credible information.

"The team has had strong continuity of staff who continue to work on innovative ways of improving best practice on farm."

WARWICK WATERS

Darling Downs REO Annabel Twine with Integrated Weed Management Technical Lead Eric Koetz.

Major activities planned for the season ahead include a crop nutrition research tour, multiple soil health workshops, irrigation efficiency toolbox talks and events, assisting growers with early-season pest management strategies, and much more.

Cotton Australia CEO Adam Kay congratulated the CottonInfo team on the milestone and said that one of the biggest achievements of the partnership was its established relationships with growers and advisors.

"The team has had strong continuity of staff who continue to work on innovative ways of improving best practice on farm," Adam said.

"This is especially important in connecting growers with advice in areas of market failure.

"The team has a strong connection with the *my*BMP program and continues to help the industry showcase its very strong credentials around sustainable production."

Managing Director of CSD, Peter Graham, said CottonInfo offered a path to market for innovation and best practice.

"The CottonInfo partnership ensures that industry activities are coordinated and effective," he said.

"It is also a great vehicle for showcasing the excellent work that is occurring within our industry."

For more
www.cottoninfo.com.au

RUTH REDFERN

CottonInfo REO Janelle Montgomery, Trangie cotton grower Tom Quigley and industry irrigation researcher Professor John Hornbuckle.

They've covered some country: CottonInfo 10 years in

It was 10 years ago at the 2012 Australian Cotton Conference that a new way to share world-class research with growers was launched by CRDC, Cotton Seed Distributors (CSD) and Cotton Australia.

Since then, CottonInfo has become a consistent and growing source of information and support for Australian cotton growers. It's also become an important conduit for information to be relayed back to researchers, creating a system of research and development built on grower experience.

As well as connecting growers with research, the team has undertaken various on-farm trials over 10 years, generating valuable data and a clear picture of how research and ideas can be quantified and road tested on-farm. With a talented team of Regional Extension Officers (REO), Technical Leads and *my*BMP experts, it's a unique program led by Program Manager, Warwick Waters.

"Since its launch in 2012, CottonInfo has played a critical role in building the cotton industry's success by connecting growers and consultants with the latest research and development," Warwick said.

"Over 10 years, we've run or contributed to 1300 activities where growers have interacted with research, and have facilitated thousands of conversations with researchers," Warwick said.

"Individually, it equates to more than 20,000 grower and industry interactions generated by CottonInfo.

"Eight out of 10 participants say they have learned something significant and indicated they would make a change in their system as a result."

According to Warwick, change happens when new knowledge is translated to practice.

"If we look at the changes in our production system over the past 10 years we've seen growers average over 18 bales per hectare, which means growers and consultants are really optimising management and setting up their infrastructure to enable them to do that.

"A lot of this is driven by researcher-to-grower, researcher-to-consultant, consultant-to-grower and grower-to-grower learning.

"An example is the widespread interest in bankless systems and irrigation automation technology, sparked back in 2015 by a bus tour our CottonInfo Irrigation Technical Lead – now Gwydir REO – Janelle Montgomery organised for Qld and northern NSW growers to southern NSW.

"This tour connected growers with researchers, other growers, consultants and commercial partners, establishing relationships that continue to this day. And irrigation is being transformed – driven as much by innovative growers who have learnt from

Over the past 10 years, CottonInfo has:

- Built a strong reputation as a trusted information source. 94 per cent of consultants and 90 per cent of growers believe CottonInfo provides useful, credible information.
- Responded to industry threats by raising awareness and sharing best practice responses to pests like silverleaf whitefly, mealybug and fall armyworm.
- Contributed to the industry-wide 2.5 per cent increase in water use efficiency year on year by promoting the latest research on irrigation application efficiency, new sensor technology and automation.
- Supported industry expansion. Over 90 per cent of new growers access CottonInfo information.
- Built a team of 21 people with a combined 350 years of cotton expertise.
- Connected over 20,000 cotton growers and consultants with over 1300 extension activities.
- Facilitated 120,000 visits to the CottonInfo website, with the Australian Cotton Production Manual and the cotton industry's gross margins the most popular pages.
- Produced 240 CottonInfo best practice videos, which have amassed a staggering 2.8 million views on YouTube.
- Supported over 80 farm trials, the collection of over 1000 weed samples, and hundreds of field surveys.
- Imparted critical information to growers and consultants. 85 per cent of those who have interacted with CottonInfo recorded increased knowledge and awareness as a result.

the connections offered by CottonInfo as by major research investments, like the CRDC-led Smarter Irrigation for Profit."

Warwick also singled out the industry's Moisture Manager newsletter and extension of understanding around climate undertaken by Jon Welsh, CottonInfo Climate and Carbon Technical Lead.

"Jon is not just saying to growers 'this is what the models are saying', he has worked closely with growers for many years to give them the ability to understand the models, climate drivers and influences," Warwick said.

"Weather is the greatest influence in farming, so it makes sense to support growers to develop a sound base knowledge on which to make decisions.

"He's done a lot of upskilling and capacity building in cotton: it's the envy of other industries."

At the core of CottonInfo is the partnership between CRDC, CSD, and Cotton Australia, and the relationships the organisation has built with other key bodies, like Crop Consultants Australia.

"Consultants are invaluable in providing feedback on crop management needs," Warwick said.

"In the last five years, one of the key things we've done is involve growers and consultants earlier in projects and trials. We are really trying to increase the impact by better connecting the formal R&D supported through CRDC with the research growers are doing on their own places, and consultants are a critical part of this.

"In the last five years, one of the key things we've done is involve growers and consultants earlier in projects and trials"

"Consultants are an important source of feedback on research and extension opportunities, helping us provide insight for researchers and to connect them with interested growers."

This is one of the key drivers for a cross-industry project which cotton is heavily involved in. Led by Hort Innovation, the project looks at ways extension teams can work with research projects to increase their impact.

"Improving the integration of extension into research is the goal, and one of the key findings is the importance of involving end users – growers and consultants – right from the start," Warwick said.

Ground truthing research is a core element of CottonInfo's role. The team have run long term on-farm trials, including measuring nitrogen use efficiency, monitoring nutrient movement through irrigation water, assessing the impact of mirids, and determing the impact of early season retention on yield.

The team also have a role in managing industry threats, with REOs involved in annual disease surveys, collecting weed samples to monitor resistance, and the collection of target insects for resistance monitoring research.

"We are always on-farm collecting samples and helping with surveys, understanding what's going on on-the-ground in the industry and staying on top of potential issues," Warwick said.

"And, if and when the need arises, we are able to move quickly to help."

In 2017, when mealybug moved from Central Queensland (CQ) into the St George and Darling

Downs areas (Waka Waka country) in south-west Queensland, CottonInfo used its grower-to-grower model to bring in experienced growers from CQ who had successfully managed the pest.

"We organised webinars and field days to help growers understand what to expect and what their options were," Warwick said.

"We produced videos of how to clean machinery to help stop the spread and ramped up our Come Clean. Go Clean. and biosecurity messaging and we brought in the experts: knowledgeable growers, consultants and researchers.

"This is a great example of how our CottonInfo network gives us the capacity to move quickly as issues arise across the industry, with a cache of experience and R&D at our disposal.

"We can rapidly share information across the industry and are always standing by to help."

RUTH REDFERN

Running on-farm trials across cotton growing regions has been a key focus since CottonInfo's inception. The first trials were focused on nitrogen use efficiency.

Making the most of regional links with Grassroots Grants

CottonInfo Regional Extension Officers and Technical Leads have been heavily involved in helping cotton grower associations (CGAs) develop and manage proposals through CRDC's Grassroots Grants program. The program has been a favoured route for the CottonInfo team to help growers tailor regionally-specific action on the ground. Small grants – up to $10,000 – are available to CGAs through the program for short-term projects.

With support from the CottonInfo team, issues explored and trials run through the Grassroots Grants program include investigating timing of last irrigation, cover crop options, black root rot management, nitrogen inhibitors, area wide management groups and fact-finding missions. There have been field days to upskill growers in on-farm technology options and use, climate workshops, the purchase of machinery for trials and programs for schools and students. A Grassroots Grant was recently used to bring northern growers and prospective ones to southern regions to gain a greater picture of the industry.

CottonInfo Program Manager Warwick Waters says the CottonInfo team's connections with local growers mean they're perfectly placed to help get on-farm research underway, bring in experts for field days, or provide training and skill building.

"The Grassroots Grants have been very effective as a vehicle to work with local CGAs and drill down into very regionally-specific issues," Warwick said.

"Having Technical Leads on hand helps us tailor trials and adds scientific rigour to our work, leading to outcomes we can trust.

Since the Grassroots Grants program began in 2011 CRDC has provided over $777,000 in support to 89 projects across the cotton growing valleys.

"CottonInfo plans to create a situation where growers have the tools to run on-farm research, which they do nearly every day during the season anyway, as they deal with changing conditions in terms of climate, pests and disease.

"Grassroots Grants is a fantastic program that fills an important role in managing issues that may crop up, road testing R&D in the regions and keeping the research relevant on-farm."

Applications for the Grassroots Grant program open annually on July 1, and close November 30. Applications are open to CGAs for specific programs and are reviewed on a first-in first-served basis. Once the funds have been fully allocated, no further projects will be approved.

Interested applicants must read the program's guidelines and return a completed application form to CRDC via research@crdc.com.au. Applications should include a timeline, accurate costings, the likely learning outcomes, and the overall benefits of the project for the industry.

For more
www.crdc.com.au/growers/community-grower-support

Always taking the practical approach

As a cotton grower and agronomist, Amanda Thomas has naturally always wanted to see research that is easily transferable and relevant on farm.

RUTH REDFERN

Amanda Thomas says as an REO "we understand the projects, and we also understand growers".

In her other role as the Macquarie Valley Regional Extension Officer (REO) for CottonInfo, Amanda has been able to make that a reality for others.

Amanda is an original member of the CottonInfo team, so she has been creating regionally specific data and management systems for growers in her region for 10 years.

"I get the research and then give it to the growers and ground truth it," she says.

"Together, we get a good feel for how and where the research fits in a profitable and sustainable farming system.

"We come up with lists of things that are great about it, or that are lacking or not working and then we work closely with the researchers to tweak these.

"It's called action participatory research. There is not a lot of point to research if it doesn't fill a gap."

CottonInfo's goal is to have a two-way street between the growers and the R&D community, so it's always provided a direct conduit from the field back to the researchers. But how it achieves this has changed over the years.

"Through CRDC's research and development, and now also the CSD Richard Williams Initiative, the value is put on grower and consultant input," Amanda said.

"We look to growers and consultants to inform research priorities and put them into practice across the valleys.

"I might have insight as a cotton grower, but I always look at how the research fits on the farm as an extension person.It has to have regional application, for example.

"Having said that, discoveries or methods developed in one region are often of use to other regions, and the beauty of CottonInfo is that we can easily share right across all regions through our network of REOs."

Amanda said the benefit of 10 years in CottonInfo has been developing relationships with researchers and being able to create a strong two-way connection.

"As REOs, we understand the projects, and we also understand growers," she said.

"We can take research, implement it and then gather local data for researchers around the outcomes: what worked, how it worked and what doesn't fit the system."

The Macquarie has a strong cotton grower association (CGA) that Amanda works with to better direct R&D, information and alerts. She says a proactive CGA can make all the difference when it comes to R&D addressing regionally-specific issues.

"We have an active CGA with strong grower and industry membership in the valley, which is really important. If you don't have truly representative membership – you can't encourage projects that are important for all growers.

"And that's just as important across the whole industry: making sure all growers and all valleys are represented on the CRDC research panels via Cotton Australia."

Amanda herself sits on CRDC's cotton industry grower priority panels to help ensure R&D projects are aligned with grower needs.

"I feel this process has helped closed a gap between research and growers," Amanda says.

"With all research, it takes time to ground-truth it so it is robust and practical, fits into a grower's system and aligns with broader industry plans."

It's Amanda's ability to tap into local issues and address them that makes her a respected figure in the cotton industry and an effective REO. However, she generally credits growers for that.

"The workshops and field days, information sessions and training are well attended because I listen to and deliver what the growers want," she said.

"As REOs, we need to be both proactive and reactive. While we are always listening to growers and responding to their needs, we're also proactive in trying to predict when the growers need information and making sure they have it in front of them.

"One of the biggest things I have realised through my time with CottonInfo is that growers and consultants are doing a whole heap of research themselves and learning from each other – so now we can facilitate that even more."

For more

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It's all about the people

They say people don't leave jobs, they leave people, so when the best part of a role is the people you work with, why wouldn't you stay 10 years?

Kieran O'Keefe is an original member of the CottonInfo team of Regional Extension Officers (REOs), who joined the organisation when it was first formed in August 2012. Today, he's still working with cotton growers in the Southern NSW valleys (Wiradjuri country) across the towns of Hillston, Hay, Condobolin, Griffith, Leeton, Coleambally and Whitton and now into the Murray Valley's Jerilderie, Conargo, Finley and Deniliquin. It's an area that's seen a significant growth in cotton growing over the past 10 years.

Kieran says what makes the job so enjoyable is the people he gets to work with on a daily basis.

"It is excellent to work with all parts of the industry – growers, advisors, researchers, industry bodies – to make connections so everyone gets the same message, which to me is what CottonInfo is all about," he said.

"We are involved in and manage extension, trials and demonstrations on farms plus demonstration sites.

"This range of activity means we have a lot of variety every day in our roles and it's really satisfying to have such an input into making our growers the best in the world."

According to Kieran and other long-term CottonInfo team members, the growers are getting younger, and technology is playing an ever-increasing role in everyday crop management and communication.

"I remember when I started at the beginning of 2013, smartphones were not common among growers and industry, now they are the norm, allowing a lot more access for connection with each other and extension.

"It's been a huge aspect of how we get information out and there's a lot more technology involved in growing the crop, with easy access to maps, variable rate applications and yield prediction software for example."

Kieran O'Keeffe has been a familiar face to growers and the industry in Southern NSW for 10 years.

RUTH REDFERN

Kieran said there's been a steady growth in cotton grown in southern NSW, with new growers including first time row croppers.

"Along with this we are also seeing a younger demographic of growers coming into the industry, and from my perspective, they're taking on greater roles of responsibility earlier.

"Working with new growers along with experienced growers gives us variety in our extension and means we really must think about the groups or individuals we are working with and how we tailor information platforms, trials and events.

"It is always a good opportunity when talking with new growers to reiterate information that is relevant to everyone, such as integrated pest management and best practice.

"Our ability at CottonInfo to bring industry experts together and organise advisor and grower-to-grower engagement has been a real plus for effective extension.

"Through bringing growers across regions and from different regions together and working with groups like IREC (Irrigation and Extension Research Committee) and our CGAs we have been able to open minds, facilitate sharing, connect grower networks and create a more cohesive industry."

Improving efficiency across all aspects of a grower's systems is an important and constant aim for the CottonInfo team. Changes in irrigation methods are seeing improved efficiencies in several areas.

"We are seeing more competition for water and higher prices in the southern regions," Kieran said.

"Growers in the south have started to switch to alternative surface layouts for irrigation driven by ease of operation, labour shortages and potential water productivity gains.

"Coupled with automation, these systems changes to irrigation are some of the biggest changes I've seen in my 10 years with CottonInfo.

"Meanwhile, we are still working on ongoing issues in the south, such as disease management. We continue to investigate mitigation strategies for diseases such as black root rot.

"Knowing the calibre of our scientific community and the strong link between research and extension through the CottonInfo system, learning how to manage problem diseases like black root rot, I'm sure that we will one day minimise the impact on production."

For more

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COMMENT: WITH CROP CONSULTANTS AUSTRALIA

Resistance to herbicides, pesticides, and change

The recent cotton season has proven without doubt that a farming system is a complex and sometimes unpredictable game. Just when we think we have the season planned, we are in for another change.

While the recent years of drought may lead us to believe that rain would solve all our worries, none could have expected the season that was.

The seemingly relentless rainfall came at such a rate in some cases that we had little time to react, change course or most of all, plan. Sometimes that is the nature of change. It is unchosen and inevitable. Sometimes however, it is our resisting change that can be the biggest problem of all.

The term resistance can be applied in many contexts in a farming system. Most of us will immediately jump to the ongoing threat of resistance to the key insecticide and pesticide chemistries on which our industry relies.

From a CCA perspective, we have recently been focusing on another aspect, a resistance to doing things differently in the field – the resistance to change and adoption of research.

At the recent Australian Cotton Conference on the Gold Coast, CCA was fortunate to host its own session, exploring some of the main barriers to research adoption within the Australian cotton industry. CCA asked key industry players to share their experience in research adoption and implementation, and how, as an industry, we can best provide return on investment on research.

Dr Paul Horne, Principal Researcher for IPM Technologies in Melbourne and key researcher for the CRDC-supported *Novel Approaches and Strategies to IPM in Australian Cotton* project, spoke of his experiences in other agricultural industries. He highlighted that often, changes in industry practices are often brought about by forced restrictions such as trade embargos or limitations on chemical usage.

“Such changes can occur in no time at all, and it is important that the grower is aware of alternatives,” Paul said.

He says the relationship between a grower and their consultant is an important one and based on his recent research experience in the cotton industry, the consultant is often highly influential in guiding the decision-making process.

A similar sentiment was reflected by WeedSmart’s Paul McIntosh.

Paul is an experienced Queensland-based agronomist and said that there were significant opportunities for the industry to continue the adoption of area-wide management approaches to many of its challenges, including weed management.

He encouraged growers and their advisors to investigate multiple tactics in weed management including the use of residuals, and stopping any survivors setting seed.

“We really need to control these pesky weeds beyond our crop boundaries and to stop them from producing large viable seed numbers,” Paul reiterated.

Outgoing CCA Survey Director Ben Dawson gave a quick snapshot of the trends in chemical use in the Australian cotton crop, which have been tracked over the years through the CRDC-funded CCA Cotton Market Audit.

The data clearly shows a 90 per cent reduction in insecticide use by the industry since 1996 when the introduction of Ingard technology did much of the ‘heavy lifting’ in practice change.

“This figure alone is something that the Australian cotton industry should be very proud of,” Ben said.

Inversely however, the figures showed a strong upward trend in use of herbicides is now evident across the industry as growers battle increasing herbicide resistance to glyphosate.

Ben pointed out that while the industry has a high reliance on glyphosate, over 60 per cent of farms surveyed were implementing alternative non-glyphosate weed control tactics.

In summary, he said that there has been substantial practice change in pest management over quite a short period of time – some chosen, and some imposed.

“There is however a broad recognition that an integrated system of tactics is the best way to manage current and future pest challenges,” he said.

CCA remains committed to maintaining the critical relationships that it holds with all sectors of the Australian cotton industry. This enables the association to provide ongoing professional development to members and ensure that they are kept up to date with relevant research and skills to share with their clients. The diverse nature of cotton growing means that they may not have all of the answers to all of the questions, but the network of fellow consultants and researchers within CCA, can fill in the gaps.

Change may be inevitable, but our response and the outcomes need not be. By sourcing the right group of people to advise and inform decision making, we place ourselves in a better position to achieve not just a solid outcome but a more resilient farming system overall.

For more

www.cropconsultants.com.au

CRDC finding focus in the north

Cotton growing in northern Australia looks to have moved beyond the 'test' stage to a viable industry, which opens up an entirely new area of RD&E to support it.

In the 2021-22 season, 24,000 hectares of cotton were grown in northern Australia, compared to less than 1000 hectares in 2016-17. As a result, CRDC is working with industry and partners to ensure cotton in northern farming systems is sustainable, based on the latest science.

"We have a commitment to cotton in northern Australia underpinned by RD&E and cross-sectoral and industry collaborations to ensure the adoption of best practice," CRDC Executive Director Dr Ian Taylor said.

CRDC already has significant investments in research to support cotton growing in northern Australia.

For many years, CRDC has supported 2017 Cotton Researcher of the Year Steve Yeates to provide science leadership for cotton's development in the north, and is now supporting the next generation of researchers, like Sharna Holman, who is completing her PhD from Kununurra (Miriwoong country). CRDC has been partnering with the CRC for Developing Northern Australia (CRCNA) since 2019, and in April 2022, the CRDC Board signed off on an additional investment of $1 million over three years towards the CRCNA's *Cotton, Grain and Cattle* research project.

Northern Australia has enormous potential as a cotton production region but faces some very different challenges when compared to traditional temperate growing regions. As well as vast distances and differences in climate and soil types, there is significant diversity in the potential production systems and grower experience across the regions. These include diversity in planting dates and level of irrigation.

"It really is the case that cotton has gone beyond test cotton crops in key northern locations such as Katherine (Jawoyn country), Kununurra and the Atherton Tablelands (Mbabaram country)," Ian said.

"With general support through CRDC projects, cotton has now emerged as pillar crop in the development and expansion of farming in northern Australia.

"Growers have proven they can grow economically competitive yields and it is very attractive for a number of reasons: a local source of protein for the cattle industry, its ability to be stored and transported without affecting quality and value, and the presence of forward markets."

The cotton gin at Katherine will be a

Northern Australia offers opportunities for crops such as cotton, and CRDC is working to create an industry that is welcomed due to its sustainability and best practices.

RUTH REDFERN

vital piece of infrastructure and shows a commitment from growers as well.

"While cotton growing has been trialled for varying numbers of years across the different regions, the type of RD&E and industry support required is clearly shifting from the 'potential' to the 'early establishment' phase," Ian said.

For CRDC, the research focus has moved from whether cotton could be grown in northern Australia to what support is required for regional development, including regional adaptation of research for specific climate, soils and systems for each of the diverse northern regions, and a much greater need for local capacity building in best practice.

"There is still a particular gap in the northern dryland system, where the farming system is not yet fully developed nor understood," Ian said.

A growing industry also requires both human and mechanical capacity to sustain it. With one gin under construction in the NT and another slated for WA, it's a big step forward, yet a lot of support industries are still to be established. While agronomy capacity issues are largely being met with the establishment of local offices by a number of resellers, there is a clear lack of capacity in other industry support services including aerial operators, the operation and maintenance of cotton specific machinery and skilled labour.

As a former cotton grower, cotton ginner, marketer and now CRDC Chair, Richard Haire has insight into the industry. He's watched the development of cotton growing across several 'new' regions and says the challenge for RD&E providers is to be ahead of the game but also able to respond quickly to challenges as the industry evolves.

"As a board we have to ensure that CRDC remains contemporary in knowledge and action as the region develops and matures," Richard said.

"We are also very aware of some of the public scrutiny of the industry in these new regions and an important aspect of our investment will be establishing environmental baselines and research.

"Broad based community acceptance is critical to the success of a northern agricultural industry and will depend on environmentally-focused research and establishing benchmarks for sustainability.

"CRDC is in a position to have a significant impact on creating an industry in the north that has all the hallmarks of sustainability and community engagement, through knowledge management, capacity building and systems development."

For more
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Science, experience and data drive decisions for seasoned grower in the north

Steve Buster has grown cotton in the most southern and northern regions of Australia and says of his latest move to manage crops in the Ord, “going from most southerly to most northerly makes it interesting”.

No stranger to cotton, Steve ran the UNE Cotton Production Course in the mid-1990s, before working with NSW DPI at Yanco as an extension officer. Originally growing cotton at Bourke in Western NSW (Wongaibon country), and then the Riverina (Wiradjuri country) he’s grown cotton in about every climate possible.

While he’s spent most of his farming and research life in the southern regions, he’s no stranger to WA and was already exploring the region for cotton growing in the 1990s.

“We did trial work in early to mid-1990s at Broome, and with the idea going north with Ingard we went to ‘Camballin’ on the Fitzroy River,” he said.

This time Steve is working with Riverina-based cotton and mixed cropping farmer Mat Stott, who has purchased land in the Ord Irrigation Scheme near Kununurra (Miriwoong country).

Steve said successfully growing cotton there is a case of dealing with extremes and trying to manage a crop within them.

“An example is the high soil temperature at planting, which averages around 33 degrees in February. It’s also wet, and planting has to be completed quickly, similar to some NT regions,” he said.

The season is short, running for 150 to 155 days from planting to defoliation, which is nearly a month shorter than the Riverina’s already short season.

“It’s certainly interesting up here, dealing with different constraints means planting when the soil is totally saturated and only just able to withstand traffic – which is something you wouldn’t do in other regions, knowing what we know about compaction,” Steve said.

“At planting, with the high soil temperature we have plants out of the ground in three days, and if they’re not up in seven we are looking to replant.

“Down south you don’t bother looking at it at that stage, with emergence generally at least 10 days, usually longer.

“The crop here seems to sprint for three months from planting, then slows down.”

Three seasons in, this year Mat and Steve planted 1000 hectares of cotton, and say they are naturally still learning.

“In terms of management, it gets going and takes off, so issues of canopy growth and crop height are still being worked out,” Steve said.

“When you have 10 node cotton that is 30 to 40

This year’s 1000 hectare crop, under management by Steve Buster.

Steve Buster has taken his scientific and practical knowledge of cotton growing to WA.

centimetres high, you can't put the genie back in the bottle.

"What we need to know is how to anticipate when the crop is going to take off and manage it accordingly."

Planting in February means first squares in March and flowering in April and May, which is an ideal temperature to grow fruit, Steve says.

"However, the crop is very reticent to slow down and can end up at 1.4 to 1.6 metres tall and not cut out because it has had too much early growth.

"With low evaporative stress and balanced vegetative and reproductive growth – all the cues you normally look for that give you the indication that it will slow down – it doesn't want to do that."

Mat and Steve started growing cotton in the Ord in 2020, with a plan for 200 hectares. Then 400mm fell in five days, so they were back three weeks later to replant, and cut back to 150 hectares. The next season saw a large jump, with 600 hectares planted. Steve says its beneficial to grow a larger crop.

"We need to so we can better understand the constraints," he said.

"We used what we learned for the third year and planted 1000 hectares, which was picked mid-August.

"Now we need to work out how to grow it and achieve high enough prices to justify the trip to Dalby, which is where our cotton currently is ginned.

"Having grown cotton in Bourke, the Riverina and now the Ord Valley, I can see similarities to all regions up here, but it certainly has its own peculiarities."

Scaling up in the north

Seemingly simple things can make all the difference when you're in a new industry in a region.

A new scale trailer to weigh trial cotton has been delivered to Northern Australia, thanks to a joint investment by CRDC and Cotton Seed Distributors (CSD). Based at Ordco Cooperative in the Ord Irrigation Scheme, it's for use by any grower or researcher who may need it for trial work.

While it may not seem to be a make-or-break item, Steve Buster, who is managing the crop and undertaking trials at Mat Stott's, says being able to weigh trial cotton on-site is vital.

"In the early days the Australian Cotton Growers Research Association put weigh scales in every region – they're a really important piece of gear for trials," Steve said.

"By being able to weigh trial modules on site and not have the possibility of damage or modules potentially getting lost or confused just gives a lot more security around the results we can analyse.

"Congratulations to CRDC and CSD for making this happen and thanks to Mat for allowing me the freedom to use most of his farm fields for trial work.

"I'm overseeing trials which range from varietal and growth regulant trials to nutrition and fungicide efficacy trials, so to be able to pick that cotton and weigh it is a positive thing for the voracity of the R&D.

"I am fond of the Edwards Deming quote, 'Without data you're just a person with an opinion' which is relevant here."

Leading from the front

Far North Qld has already produced a future leader who is only just into his second year growing cotton, having turned his attention from growing avocados and forage crops to cotton.

Coming from a long history of horticulture across generations in his family, Mt Garnet (Mbabaram country) farmers Brad and Natasha Jonsson are stepping into the cotton industry with plenty of enthusiasm, even after the two most unseasonal years they've ever seen.

They've already hosted field days and formed a local cotton grower association. A field day held on Jonsson's farm in 2021 attracted just over 100 people to hear from CRDC, Cotton Australia, fellow growers and consultants.

This enthusiasm and proactivity saw Brad selected for the 2022 Future Cotton Leaders program, run by Cotton Australia in partnership with CRDC.

"If we can get some good wet seasons, it will blow people's minds the cotton we will grow up here," Brad said.

"The first two seasons we've had growing cotton are the two most extreme seasons we've had in 30 years on our property, which we run with brother and sister-in-law Dean and Emmalee.

"We had 1.4 metres of rain last season and this year the wet season cut off second week of February, so we went from one extreme to the other. A lack of rain in February is not normal for up here: you could bet your bottom dollar it will rain in February."

However, unseasonal conditions haven't dampened Brad's spirit.

"We are facing a few challenges with that abnormally wet first year and abnormally dry second, but I know the potential of what a regular season will bring. We do have the potential to irrigate but would have to put in a lot of infrastructure, which is on the cards down the track."

For most people, growing a new crop in a new region might be daunting, but Brad has been very impressed by how well he has been supported by the cotton industry.

"It's unbelievable, there is no other industry like it when it comes to information sharing," Brad said.

"In horticulture we are all aiming for market share, so it's hard to get the groups together to see what others are doing. The beauty of the cotton industry is that sharing knowledge about how to sustainably grow cotton is only going to benefit everyone."

Brad shared his experiences bringing cotton into his farming system at this year's Australian Cotton Conference.

Brad said that David Statham and farm manager Nick Gillingham of Sundown Pastoral Company had been really helpful providing information and advice. Statham's have purchased 'St Ronans', about 70km as the crow flies from Brad's family farm.

"David and Nick have a lot of experience they are more than happy to share, and other growers I've met have all been more than willing to share what they know and are really supportive.

"Susan Maas from CRDC, Sam Lee from CSD and Matthew Westguard from Bayer have been a great support, as has grower Luke Findley from the Namoi Valley in NSW who has moved up to Julia Creek (Wunumara country).

"Then there's the people in the Future Cotton Leaders program, which was one of the main reasons I applied."

Brad believes with the right systems in place, the Atherton Tablelands are perfect for cotton growing.

"In a normal season we get an inch or so of rain every seven to 10 days," he said.

"We were growing more corn and sorghum to supply the dairy industry, but there are only 50 or 60 dairies here now compared to 220 just 15 years ago.

"Then fall armyworm came in and we started to think about a replacement crop. We have a feedlot, so just grow enough corn for our own needs now."

The feedlot forms part of the Jonsson's

vertically integrated business that sells its own brand of beef, Diamond 4J Beef, and produce in a stand-alone outlet in Cairns, Jonsson's Farm Market.

"Granddad was a potato famer, then he and dad got into cattle and then dad introduced avocados, and I'm now doing that with cotton," Brad said.

"We think cotton is a good fit for us, and the cotton seed is a bonus. We used to use cotton seed, but it got too expensive – now we'll use our own in our feedlot ration."

The Jonsson's grew 650 hectares of cotton this season, with varieties 716, 746, 748 and 606 being trialled. With planting in December and picking in June-July, their cotton is sent to Emerald (Gayiri country) to be ginned, which is around 1000kms.

"We still need some more information about things like fertiliser timing and application, so it will be good to get some trials going up here with CRDC," Brad said.

"We didn't have much insect pressure this year, but if you have crops, you get insects. It's a part of farming."

Future leader

Jumping into the industry boots and all, Brad said he's already learnt a lot from being part of Future Cotton Leaders in terms of leadership skills and learning about himself.

"One of the main reasons I joined was to meet as many people as I can in as short a time as I can," Brad said.

"These people are the future leaders and will be steering the way that cotton goes. As far as leadership skills go it makes me think about decisions I make and nut them out more. The program teaches us how to make decisions, and how they impact others.

"It has been great meeting the others who have been in the industry for a while, we get talking and I have people saying, 'if you are thinking of doing this, ring this person'."

Brad is already showing leadership. He's holding another field day to bring experts to the region to gather with growers and potential growers and as well as being a part of the Far North Qld Sustainable Cropping Group, some 850km away. He's also been instrumental in forming the Far North Qld Cotton Growers Association to provide a focal point for information and assistance.

The icing on the cake for Brad's Future Cotton Leaders experience was attending his first Australian Cotton Conference in August.

"I've been to a lot of conferences but never one like that," Brad said.

"Just the amount of professionalism in the people who were there, if I had a question, the person to answer it was there!

"I have already met quite a few people, but to be able to put faces to names was great.

"I met a lot of growers and have plenty of offers to go down south for a look.

"It gave me the opportunity to get to know people on a more personal level over the week."

Brad said he feels lucky to have been a part of his Future Cotton Leaders group.

"The talent and people in that group are unbelievable, it showed with Jess (Strauch) winning the Young Achiever Award.

"I've made life-long friends being a part of this, and every young person I met at the conference I let them know they should apply – they might have to run two courses now!"

Far North Qld cotton grown under the watchful eye of Brad and his family.

Beyond trialling, cotton has arrived

With a dryland yield of five bales per hectare and good quality, Bruce Connolly's motto of letting the crop tell you what's going on seems to be working.

Bruce oversees the cotton operation at 'Tipperary Station' near Katherine (Jawoyn country) in the Northern Territory, where they're four seasons in and keen to keep cotton as a rotation crop. Their system also includes forage and grain crops along with cattle grazing and feedlotting.

Bruce has a history of cotton growing around Dirranbandi (Kooma country) in south-west Queensland and says farming under wet season conditions is total change.

RUTH REDFERN

RUTH REDFERN

"I started the rain grown system here with a very open mind due to the wet and dry seasons throwing curve balls at me – I was going to let the season dictate how to manage it," Bruce said.

"The first two plantings were in January, but we have moved to early December to make the most of the wet season.

"Planting has such a short optimum window when we start we need to keep going until it's done, pretty much rain, hail or shine.

"We need to get 3000 hectares in in three weeks, because although we can stretch to January 7, we believe anything planted after the first of January will see a yield reduction for each week planted. This is due to the length of time you are getting rain.

The soils under their current crops have a water holding capacity of seven to 10 days.

"We have four months of watering potential then the plant works off stored moisture, and the root system is down by then.

"You could run out of moisture on an average wet season, when the rain stops by end of March. So you really need to make the most of any earlier rain if it peters out early.

"You need to have the foundation right and get it in the ground on time."

A huge learning for Bruce has been the need for a cover crop, whether native grasses, weeds or crops such as millet, as heavy summer storms have the potential to wash out soil beds. He said cover crops also cool surface and soil temperature at planting time.

"We don't wait for it (soil temperature) to come up, we wait for it to go down," he said.

"A positive is rain can also send the insects out of the crop in a really heavy downpour."

"After four seasons it is beyond trialling. We are here now."

The soil ranges from sandy loam to reddish clay. The red clays are proving more suitable.

"It's still a learning curve but nothing we can't handle," Bruce said.

"Every year there are new learnings and this year the big lesson was the positive effect April rain can have on a crop in that country, with really good yield and quality.

"In higher-than-average rainfall, the loamy soils country will be more forgiving.

"And at 400,000 hectares, Tipperary is big enough for us analyse rain pathways across the property and we can potentially plant in those areas."

With a five bale per hectare yield in dryland, the Tipperary team are happy with how varieties are performing. They chose varieties based on trials in the NT and by regional results and by talking with neighbouring growers.

"They are shorter season varieties," Bruce said.

"In 2019-20, we grew 746 and 748 and were happy with them, then this season we grew 606 and 714 and feel there is a better fit, but we have more trial work to come.

"We like to have trials planted side-by-side. It allows comparison, as they've all got different qualities and you can look at them under same growing conditions.

"We can't really settle on one variety yet as we are only four seasons in, and are not closing the door on anything.

"For example, the 606 seems to be a more compact variety under our wet season conditions, while 714 is a taller plant, but with late rain can put a lot of fruit on late in the season."

Bruce says the opening of the gin in Katherine means big things for the north, by cutting freight time and costs enormously and as a local processing plant for seed.

"The seed can stay in the state and go to local graziers without freight as a barrier," he said.

"Cotton and the gin are the biggest thing to happen in farming in the north in the last 50 years.

"The technology surrounding cotton, Bt varieties, combined with the gin and appetite of local growers to grow cotton could see it become a really important, sustainable industry in the future.

"After four seasons it is beyond trialling. We are here now."

LEFT:
Bruce Connolly has overseen four crops at Tipperary Station, and says it is proving itself as a crop in their farming and grazing system.

OPPOSITE PAGE:
Dryland cotton on Tipperary, where several varieties are being grown to determine suitability for certain soils and seasons.

Gin signals an earnest start

Work is well underway on the Northern Territory's first cotton gin near Katherine (Jawoyn country), with the main gin shed built and ginning machinery being stacked in place.

It's scheduled to take cotton in the 2023 season from a region that currently trucks it more than a 6000km round trip to be ginned.

For Tipperary Station and Tipperary Group General Manager David Connolly, that's a difference of around 5500km. David is Chair of the Western Australia Northern Territory Cotton (WANT) partnership, who were instrumental in getting this integral component of the northern cotton industry off the ground.

"It became obvious very quickly that for the northern crop to be viable, processing would have to occur locally," David said.

"After having to cart the crop so far in previous years, the thought of now having a cotton gin just a couple of hundred kilometres away or even 1000kms away from farms will be a game changer for northern growers."

The gin will have the capacity to turn out between 40,000 and 50,000 bales when it kicks into gear next season.

"We know from our own cropping ventures that the freight component of the crop's cost has the potential to make the growing of cotton in the north unviable, but this gin will give northern growers more options and an ability to process their crop closer to their farms," David says.

"This will be instrumental to make the decision to invest in expanding their crop, and it is being built with plans to expand it if and when required.

"For us here at Tipperary, economically it means a huge reduction in expenses and time, an increase in convenience and on another level, the surety we need to plan for the future."

For every bale of cotton produced, around 250kg of cotton seed is removed, which is an attractive statistic to cattle producers in the Top End, currently starved of a locally-produced, high protein plant source.

"One of the main reasons why we started growing cotton was that our livestock business, and others like it in the north, require a cheaper and more efficient protein and energy supplement to be delivered in the dry season," David said.

"We believe cotton seed can be an integral dry season cattle supplement to help maintain body condition scores on breeders.

RUTH REDFERN

David Connolly and CRDC Chair Richard Haire at the Katherine gin in June. Richard's visit was part of a larger CRDC Board tour of North Qld, the NT and WA.

"Pastoralists in Northern Australia spend millions of dollars on breeder supplements and our own intention is to use the cotton seed that we are producing in crop for our cattle, to help reduce our feed costs and help to increase our calving percentages through body score.

"It is my view that access to cotton seed through locally grown and processed cotton will have a significant positive impact for northern cattlemen and current supplement manufacturers and suppliers to our industry.

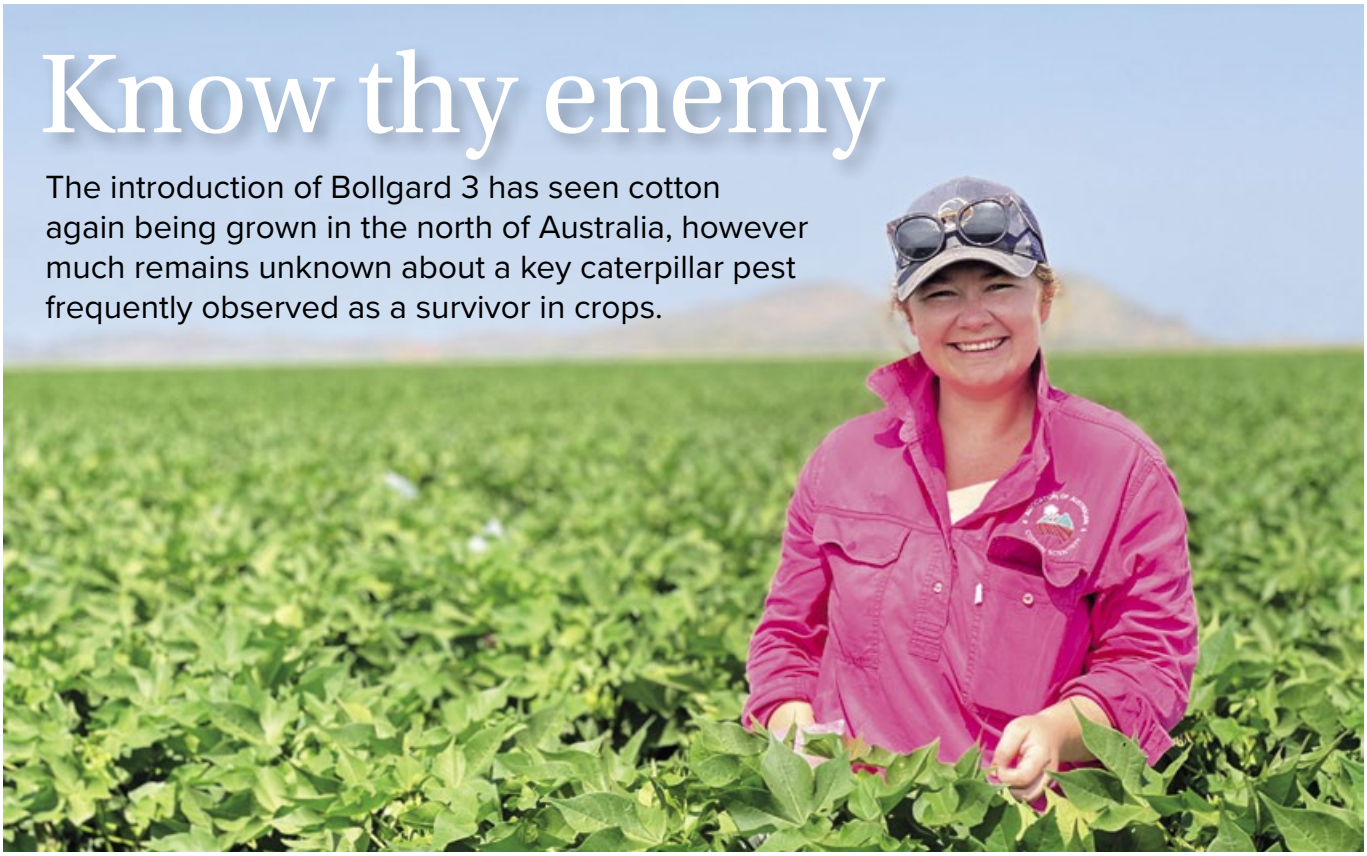
"There are many add on opportunities as a result of the growth of this new sustainable industry in the top end.

"I think we will find export yards will see the advantages in the use of this product as well."

NT cotton is picked from June to August, while Ord cotton is picked from August to October, which also creates unique scenarios for handling and ginning. The threat of module combustion due to high heat and humidity, along with the threat of bushfires – inherent in the Katherine region – are just two of many challenges to be overcome when it comes to farming in the north.

Know thy enemy

The introduction of Bollgard 3 has seen cotton again being grown in the north of Australia, however much remains unknown about a key caterpillar pest frequently observed as a survivor in crops.



PAUL GRUNDY

Cluster caterpillar *(Spodoptera litura)* was a key pest that posed difficulties for production in northern climates in the past when cotton was grown conventionally (non-Bt). While the introduction of Bollgard 3 provides some protection from the pest, larvae survival has been observed during recent seasons in some crops throughout the north.

To develop a better understanding of this pest and the potential risks posed from surviving larvae, CRDC is supporting CottonInfo Biosecurity Technical Lead, Qld DAF's Sharna Holman (pictured) to conduct research that seeks to inform best management of this pest in Bollgard 3 tropical cotton systems.

Sharna has recently returned to Toowoomba after spending four months at Kununurra WA (Miriwoong country) where she undertook a trial program gathering information about the behaviour and damage potential of this pest. The study forms part of Sharna's PhD program, which CRDC is supporting.

"There is very little information known about *Spodoptera litura,* so this season I'm focused on better understanding the pest and its interaction with Bollgard and conventional cotton," Sharna said.

"For example, I'm looking at its feeding behaviours – its movement and feeding patterns – do they prefer leaves or flowers? Are there Bt avoidance behaviours such as altering behaviour to feed on different plant parts?

"I'm looking at whether larvae modify feeding behaviour due to learned experience, or in other words, do Bollgard 3-surviving larvae exhibit different behaviours compared to non-Bt cotton exposed larvae in terms of where they feed on the plant?

"I am also examining the damage potential of larvae flower feeding and to what extent this leads to fruit loss."

As a further measure of control, Sharna is collecting egg masses and larvae from a range of crops to assess the abundance of parasitoids within the farming system and whether these might contribute to meaningful caterpillar mortality. She has so far found different species of larval parasitoids that are naturally occurring in various crops including Bollgard 3, conventional cotton and mung beans.

Sharna is hosted in WA by project collaborators the Department of Primary Industries and Regional Development (DPIRD) at their Kununurra Research Station, which has provided an ideal location for this research with *Spodoptera litura* being routinely common in the local farming system. This removed a challenge faced by many entomological researchers working on pests that can become infrequent in some seasons. Sharna will be returning to Kununurra for further field work in the 2023 and 2024 seasons.

SHARNA HOLMAN

Cluster caterpillar are under the microscope at Kununurra in WA. Larvae survival in Bollgard 3 has been observed during recent seasons in some crops throughout the north.

For more

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Take heed from the south: sticking by an IRMS

Northern Australia is becoming more attractive for cotton growing, taking advantage of wet season rain to grow largely dryland crops.

RUTH REDFERN

Still in its infancy, growers are working hard to find systems and varieties that work with the climate and its variability.

Concurrently, CRDC, scientists and growers are working to develop management strategies for insects and diseases according to the principles of integrated pest management (IPM) and resistance management plans. Northern Australia shares cotton pests such as aphids, Helicoverpa, silverleaf whitefly, and Solenopsis mealybug, yet also has additional pests such as cluster caterpillar (*Spodoptera litura)*.

Regional Insecticide Resistance Management Strategies (IRMS) form an integral part of Australia's IPM system. These strategies are developed based on resistance monitoring data, which is now being gathered in northern Australia to develop a plan specific to tropical cotton production.

"Our knowledge of the pest and the IRMS recommendations are driven by resistance monitoring data – and we don't yet have extensive data for the north," said CRDC Senior R&D Manager Susan Maas.

"It is important to understand however, that the principles of resistance management still apply including preserving beneficials by using thresholds and use of soft/selective insecticides when warranted, rotating modes of action and controlling weed hosts especially volunteer and ratoon cotton.

"At the moment we only have pockets of information taken over a short period of time in scientific terms, however this information, developed in the context of southern learnings, can still be applied in the north."

For example, recent research by NSW DPI's Dr Lisa Bird showed that for the three aphid collections from Kununurra (Miriwoong country) there was 53.5 per cent resistance to dimethoate and 85.1 per cent resistance to pirimicarb.

Lisa said high levels of resistance to these insecticides in aphid populations from north Qld were also reported in the previous year with 65.1 per cent resistance to pirimicarb and 74.7 percent resistance to dimethoate.

"These products will not control aphids in northern Australia and the use of dimethoate for the control of other pests is likely to induce significant aphid flaring," Lisa warns.

"Aphid outbreaks observed over the past three years in north Qld and northern WA are likely to be

the results of dimethoate applications.

"We know from the south that dimethoate use will select catastrophic pirimicarb resistance in aphids, and there is a recommendation to avoid use of pirimicarb and dimethoate in the same field to avoid selection for cross-resistance."

In contrast, aphids tested from northern Australia continue to be fully susceptible to sulfoxaflor, diafenthiuron and neonicotinoid insecticides.

"IRMS advice on how aphids are managed is the same for every established region and also apply in the north. Growers are urged to apply resistance management principles to every spray decision," Lisa said.

Incidental resistance from controlling fall armyworm in crops other than cotton has also been flagged in the IRMS for southern areas, but this equally applies to the north. The arrival, subsequent spread and impact of fall armyworm on grain crops in northern Australia has caused growers to rethink crop choices, with cotton an attractive alternative.

While fall armyworm has not posed a significant threat to cotton, which does not seem to attract significant egg lays, use of insecticides for fall armyworm in other crops may inadvertently select for resistance in cotton pests.

"This is a reminder of the need to apply insecticide resistance management principles to fall armyworm management no matter what the crop," Susan said.

Spodoptera litura is pest found predominantly in northern Australia.

"Spraying to control overlapping generations of *S. litura* is considered to be the main reason for the development of resistance in *H. armigera*, which was significant in the collapse of the cotton industry at Kununurra in the 1960s and 1970s," Susan said.

"While Bollgard 3 is now offering some protection against *S. litura*, CRDC is improving knowledge of this pest through a PhD-supported project."

The project allows Qld DAF scientist and CottonInfo Biosecurity Technical Lead Sharna Holman to spend time in Kununurra during their season to monitor and study *S. litura*.

For more
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Grey mildew found in tropical crops

Farming new crops in new areas can result in a multitude of challenges – from the weather to emerging diseases or a combination of both – as is the case of Ramularia leaf spot (RLS), commonly called grey mildew, recently found in the NT.

RLS is a disease of major importance on cotton fields in Brazil due to its effects on yield and cotton fibre quality. The disease is caused by *Ramulariopsis* (syn. *Ramularia*) *pseudoglycines*.

Qld DAF pathologists Dr Linda Smith and Dr Murray Sharman detected this pathogen on several farms on a recent trip to the NT as part of a fact-finding trip funded by CRDC. It was found to be causing Ramularia leaf spot on cotton in several fields.

"It was causing significant disease in some plants," Linda said.

"Leaves develop necrotic lesions and eventually get fully covered with white mycelium and defoliation can occur."

The pathogen prefers the environmental conditions that are found in the tropical north of Australia, which are similar to those in Brazil, where it became the major disease of cotton in similar climates.

"Excessive nitrogen application also creates favourable conditions," Linda said.

RLS is not a new arrival. It spreads through spores from infected living leaves, debris or rogue cotton, and by wind, water and farm machinery.


LINDA SMITH

The white fungal growth is *R. pseudoglycines*, the pathogen causing Ramularia leaf spot disease.

"We've known of some historical samples from WA, NT and Qld, but that was a long time ago," Linda said.

"The environmental conditions of NT and north Qld are perfect for this pathogen so unfortunately it's likely to be an ongoing issue, and the only way to manage this in-crop is by repeated fungicide applications.

"In Brazil, up to eight fungicide sprays have been required every season to manage it, however, with the development of cotton cultivars with high resistance to RSL, these now play an important part of the disease management program.

"To prevent spreading of the disease, farm hygiene and biosecurity are critical."

For more
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Management of RLS

- Bury infected crop residues
- Cultivate/kill volunteer cotton plants
- Avoid back-to-back cotton (plant a break crop)
- Avoid excessive application of nitrogen
- Consider planting densities and spacings that encourage air flow
- Overseas, this disease is managed with fungicides and planting cotton varieties with high resistance.
- In Australia, there is currently no registered fungicide option, however Cotton Australia is investigating permit options.

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