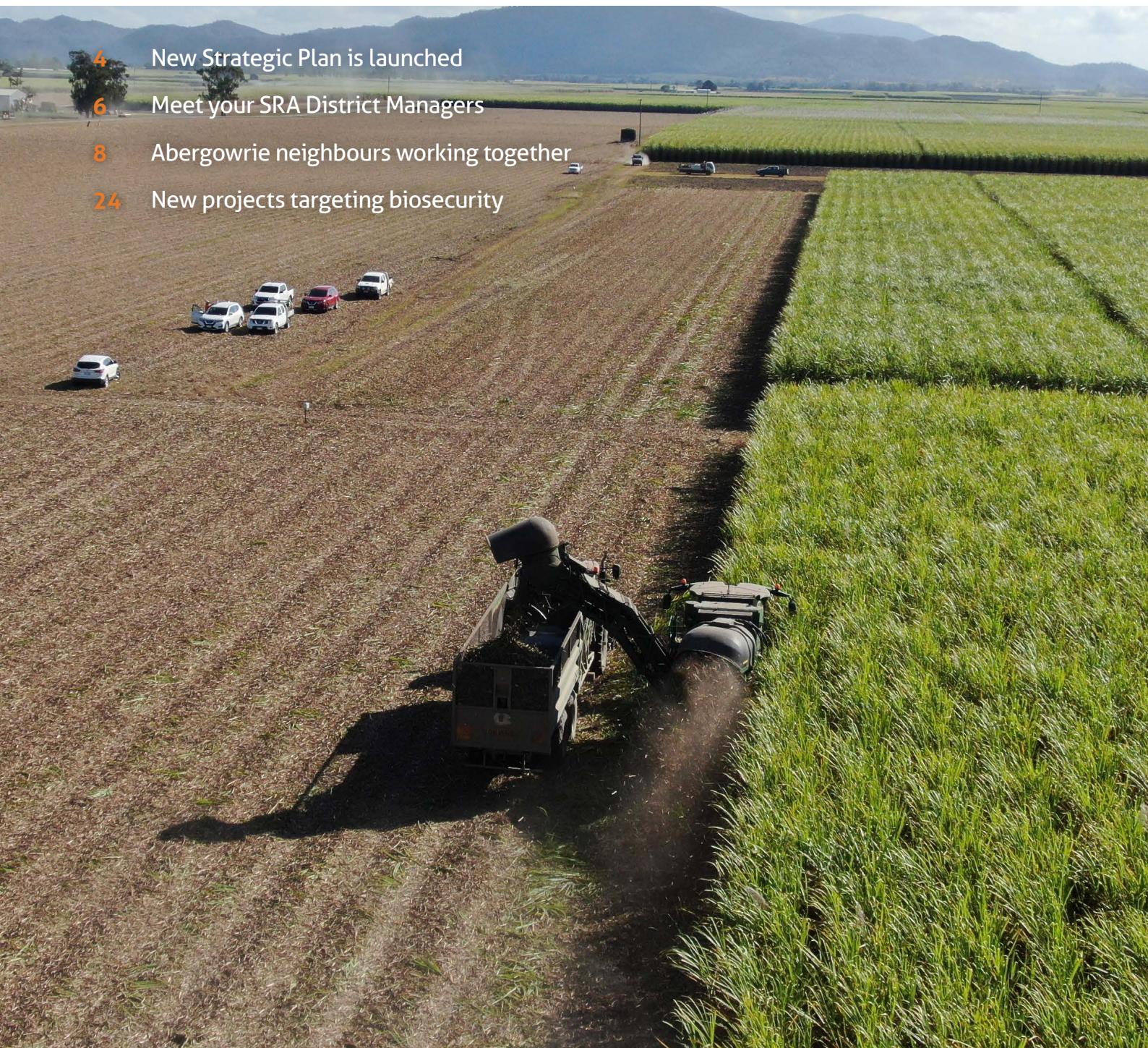


# Caneconnection

**Spring 2021**

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(Cover page) Harvesting loss demonstration trials in Mackay.

Design: Yolanda Van Wijk, SRA.

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# WELCOME TO THE SPRING 2021 EDITION OF *Caneconnection*

**Welcome to the Spring 2021 edition of CaneConnection.**

**This is an active time in the industry, with the harvest and crush in full swing. This busy time in the farming and milling cycle is mirrored in the activity that has been occurring within SRA.**

In recent months, we have accelerated the transformation of our organisation, finalised a new Statutory Funding Contract, and launched the new Strategic Plan 2021–2026, all while continuing to deliver the research and services so critical to industry.

The Strategic Plan is a cornerstone of your industry-owned company, and I invite you to read the overview on pages 4 and 5, and access the entire plan from our website.

A key part of the new plan and our organisational model is the Industry Services business unit. Some of you will have met new team members in person, but for those who haven't, we introduce them on pages 6 and 7.

A number of new research investment decisions have recently been finalised and some are introduced in this edition. We have listened to your feedback and have endeavoured to make these explanations simple yet useful. There is also more information available about most projects on our website.

Biosecurity plays a critical role in the sustainability of our industry, so it is a focus for several new research investments. Where possible, we endeavour to build on research from other crops, maximising the value of your levy. We also look at the general biosecurity obligation and what it means for you on page 10 and 11.

The important work of the Variety Development team has resulted in new variety releases that are announced on pages 20 and 21. A critical aspect of developing new varieties is screening for disease resistance. The disease rating system developed last year is explained on pages 14 and 15.

You can also read the final update on the Cane to Creek 2.0 Legge Rd Growers Group, and the latest on work related to nematodes, and the Southern Sugar Solutions project.

As the new Head of Industry Communications and Marketing at SRA, I welcome any feedback you have about CaneConnection and any of our communications channels. (cweis@sugarresearch.com.au)

**Cathy Weis**

**Head of Industry Communications and Marketing**

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# RESEARCH INFORMATION AT YOUR FINGERTIPS

**O**ver the last six months, SRA has been making a series of improvements to its online library of research reports and information.

This library, known as the SRA elibrary, is available via the SRA website or directly via [elibrary.sugarresearch.com.au](http://elibrary.sugarresearch.com.au).

The elibrary brings together a comprehensive resource of industry research into one publicly accessible location.

## WHAT IS IN THE eLIBRARY

The elibrary is intended to provide much more scientific detail than the SRA website. Within the SRA website you will generally find our publications, videos, and information sheets related to growing and milling research. The elibrary is a much more in-depth resource that looks closely at research results and findings, spanning a long period.

It provides full-text access to more than 500 research reports and electronic publications authored by SRA researchers and staff or sponsored by SRA, along with many historic publications related to work undertaken or invested by BSES and the Sugar Research and Development Corporation (SRDC).

## HOW TO USE IT

The site has a powerful search function that allows users to pinpoint a range of topics, covering the a to z of research from 'accelerated acidification' to 'zinc deficiency'. You can search by subject, author, publication date, or communities and collections, which covers publications such as final reports from completed research projects.

Using the search function, you can enter a key word or words and get a one page summary and, then, if you want further

information, another click will give you a complete report.

If you are a researcher, you can access the full scientific report and other reports on the same or similar topic or research theme. ■

## Questions and comments

We are always looking to improve and refine the SRA elibrary. If you have comments about specific aspects of the elibrary that need improvement, please contact SRA Membership and Elibrary Administrator, Amber Shingleton, at [ashingleton@sugarresearch.com.au](mailto:ashingleton@sugarresearch.com.au) or (07) 3331 3312.

# SRA'S STRATEGIC PLAN 2021–2026 LAUNCHED

**SRA's new five-year Strategic Plan was launched on 1 July, marking an exciting new era of sugarcane research.**

SRA CEO Roslyn Baker said the Strategic Plan 2021–2026 had been developed with extensive consultation and feedback over the last 18 months culminating in a new plan built on five specific pillars of value.

These pillars are: strong foundations, a high-performing research portfolio, translation expertise, world-class sugarcane varieties, and commercial benefits and rewards.

"By focusing on these five strategic pillars, we have created a new direction for SRA that puts the company in the best possible position to deliver on our new vision," she said.

SRA's new vision is to be: A trusted partner, shaping the future prosperity of the Australian sugarcane industry and regional communities through innovation and ingenuity.

"This plan represents the biggest transformation of SRA since the company began operations in 2013," Ms Baker said.

"Our plan is a growth strategy for research and development for the sugar industry. We are focused on delivering immediate value by providing valuable industry services, while also ensuring long-term sustainability and outcomes through re-invigorating the research investment portfolio and focusing on potential commercial opportunities."

SRA's new strategy will:

- support a portfolio approach to investment in research, development and adoption to ensure a balance of investments that address both the current-day productivity and sustainability constraints for the industry, while anticipating the future opportunities and challenges ahead
- leverage SRA's internal research capability and regional footprint to increase the awareness and use of research knowledge to improve regional productivity and sustainability, facilitate regional collaboration and partnerships, and boost co-investment opportunities
- continue to evolve and modernise our world-class sugarcane variety development program to meet the current and future needs of the industry
- strategically invest in innovative crop protection that uses new science and technology so that the Australian sugarcane industry can lead the world, and exceed community expectations, in protecting our precious natural environment.

Ms Baker said she was grateful for the industry support and guidance for the development of the plan, as well as strong support from the SRA staff and Board.

"We have reshaped SRA to deliver the best bang for the buck when it comes to

the investment that our government and industry stakeholders make in SRA," she said. "We have also aligned our new plan strongly with the innovation agendas being targeted by the Australian and Queensland Governments.

"We look forward to talking with all of SRA's partners and investors in coming weeks and months about our new strategic direction and how we can all work together to achieve the best possible outcomes for the industry."

As a part of the reshaping of SRA and to support the achievement of the Strategic Plan, two new key leadership positions were created with these positions being filled in late July.

Duncan Ferguson was appointed as Executive Manager, Commercial Development and Astrid Hughes as Head of Strategy, Insights and Investor Relations.

The new position of Executive Manager, Commercial Development plays a crucial role in the new strategic direction of SRA and will help SRA capitalise upon commercial opportunities from new and existing research.

Ms Baker said Duncan Ferguson came to the role with a strong track record of commercialising research and development in a range of sectors, including formerly working with BSES from 2010 to 2013.

Most recently, he worked as the Director, Company Creation with

CSIRO and has also worked for CSIRO as commercialisation manager for the Agriculture and Food division.

The new position of Head of Strategy, Insights and Investor Relations is also a crucial new role to help deliver upon our corporate reporting requirements, maintain SRA's strategic focus, and build relationships with key investment partners and government agencies.

"We are excited to have Astrid Hughes join the team. For the last 14 years, Astrid worked at Horticulture Innovation Australia (HIA) in a range of roles, including most recently as their Strategic Investment Plan Transformation Lead," Ms Baker said. "The addition of Astrid to the team strengthens SRA's focus on strategy and stakeholder engagement."

Another key element of the reshaping of SRA has been the formation of the Industry Services business unit. To find out more about its role as the key link between SRA and industry, and to meet some members of the team, turn to page six of this edition of CaneConnection. ■



*Read the full Strategic Plan online by scanning your smartphone camera over the QR code.*



# GET TO KNOW INDUSTRY SERVICES

**I**ndustry Services is the new business unit at SRA whose purpose is to be the link between SRA and the industry – including growers, millers and service providers.

By bringing together specialist research skills with engagement expertise, the Industry Services team is focused on converting research and development investment into tangible benefits at the farm and mill.

The team will do this by building strong relationships across industry, developing an SRA-wide understanding of district level productivity gaps and risks, and applying existing research to generate productivity gains and manage risks to production.

The Industry Services team has been structured and staffed to achieve these outcomes.

Meet some of the team, including those who are new to SRA and those who have moved from other roles at SRA:

## **Executive Manager, Industry Services, Hywel Cook:**

Hywel leads the business unit to deliver relevant and valued industry services and achieve industry productivity targets. He has over 30 years' experience in the sugar industry across all aspects of production, both in Australia and overseas, including roles at MSF Sugar and Queensland Sugar Limited.

A centrepiece of the Industry Services business unit is the investment in five District Managers and a small number of support staff. This team will work closely with the resources of the business unit, and across the rest of SRA, to develop and deliver district productivity improvement plans (in partnership with other providers).

The District Managers will build partnerships with local providers to synchronise activities and eliminate duplication. They will also work with

internal and external scientific experts to drive local adoption of research and innovation outcomes.

## **SRA's District Managers are:**

### **Southern Region + NSW and Rocky Point District Manager, Lisa Devereaux:**

Lisa has a diverse set of skills, from beekeeping and flying drones to business development and project management, all built on her knowledge and early work as a science researcher.

Her experience in grant funding and management of research projects will ensure that the requirements of the Southern, NSW and Rocky Point District are addressed through the development and implementation of the district productivity plan.

### **Central District Manager, Dylan Wedel:**

Dylan is a cane farmer with a passion for problem solving and innovation. His career has previously been centred around the coal mining industry holding a variety of technical and operational roles where the focus was safety and productivity.

Dylan's background as an engineer has given him the skills to critically analyse and optimise systems for maximum profit. As District Manager, Dylan will be assisting the local industry to improve productivity and profitability.

### **Burdekin District Manager, Terry Granshaw:**

Terry is well known in the Burdekin region, having worked for Burdekin Productivity Services for the last six years. He grew up on the family farm at Dalbeg and has 25 plus years of experience in all aspects of sugarcane farming from planting, right through to contract harvesting. Terry has experimented with different farming systems and harvesting procedures during that time. He is also well versed in farm data recording, GPS setup and use, irrigation and spray application practices.

## **Herbert District Manager (and Agricultural Machinery Specialist), Phil Patane:**

As well as being the District Manager for the Herbert, Phil is SRA's Agricultural Machinery Specialist and has a strong focus on minimising harvesting losses, improving machine performance and increasing field efficiency. Phil graduated with a Bachelor of Agricultural Science degree from the University of Queensland. He has led several harvesting forums, demonstrations and large-scale trials from Mossman to Harwood (NSW). Phil was the co-author of the SRA Harvest Best Practice manual and has authored and co-authored several Australian Society of Sugar Cane Technologists (ASSCT) papers focusing on improving yield through harvesting practice change and machine modifications. Phil currently leads a project maximising cane recovery through development of a harvesting decision-support tool.

## **Far North District Manager, Gavin Rodman:**

Based at SRA's Meringa Station, Gavin has been the extension leader on a number of adoption-focused projects, developed in response to local needs. Through Gavin's previous role as the Adoption Officer – Nutrient Management he was responsible for developing information and tools, providing training and support to growers and industry staff, and working with industry to increase the adoption of best management practices in relation to nutrients.

Supporting the District Managers are the District Delivery Officers: Paul Calcino (Far North), Glen Park (Herbert/Burdekin) and Stephanie Roberts (Central).

Another key element of the Industry Services business unit is the Translational Research team, led by the Manager Translation Research, Barry Salter. A new role at SRA, and falling within this team, is the Environmental Sustainability Scientist whose responsibilities include providing expertise in input efficiencies and environmental sustainability, and delivery of related research outcomes.

**Environmental Sustainability Scientist,  
Cathy Mylrea:**

Cathy has a strong agricultural background coupled with over 20 years' experience in the private sector. She has worked predominantly in natural resource management (NRM), with a strong focus on collaborative partnerships. Most recently she has been the Program Manager for Burnett Mary Regional Group where she provided oversight across a range of programs focused on NRM and sustainable agriculture for the region. She has extensive experience in securing grant funding and management of complex funding programs.

Cathy is based at SRA's Meringa Station.

Staff who deliver SRA's specialised research in relation to weed management, entomology, pathology and agronomy are also now part of the Translational Research team. This includes those with whom industry would already be familiar: Emilie Fillols (Weed Scientist), Pauline Lenancker (Entomologist) Rob Magarey (Pathologist), Kevin Powell (Entomology Leader), and Danielle Skocaj (Agronomist), as well as research project team members Julian Connellan (Enhanced Efficiency Fertiliser Project Lead), Nader Sallam (Project Officer), and Matt Schembri (Project Officer Cane to Creek Mackay Whitsunday).

Also part of Industry Services, and delivering SRA's testing services, is a team of highly experienced scientists including Heidi du Clou (Manager Industry Services Operations), Peimaneh Lee-Steere (Organic Chemist), Chuong Ngo (Disease Diagnostic Leader) and Zofia Ostatek-Boczynski (Inorganic Chemist).

Providing support across Industry Services is a range of skilled technicians: Lucy Gibbs (Pathology Senior Technician), Laura MacGillycuddy (Pathology Senior Technician), Edwina Mills (Technician) Farzana Darain (Technician), Hank Xu (PhD Student), Glen Park (Technician), Skye Shervey (Technician) and James Oldacre (Technician).

The near-infrared (NIR) team of Steve Staunton (NIR Service Leader), Phil Lethbridge (NIR Developer), Andrew Lynch (NIR Chemist) and Joel Simpson (NIR Support Engineer), is also part of the Industry Services Business Unit. ■



**Hywel Cook**  
*Executive Manager, Industry Services*



**Phil Patane**  
*Herbert District Manager (and Agricultural Machinery Specialist)*



**Lisa Devereaux**  
*Southern Region + NSW and Rocky Point District Manager*



**Gavin Rodman**  
*Far North District Manager*



**Dylan Wedel**  
*Central District Manager*



**Cathy Mylrea**  
*Environmental Sustainability Scientist*



**Terry Granshaw**  
*Burdekin District Manager*



(Above) The Legge Road Growers Group including Ian Kemp (3rd from left) meet with Chris Sterling (formerly of SRA, far left) and Hannah van Houweninge (formerly of SRA, centre) at the final meeting to wrap up the local chapter of the Cane to Creek 2.0 project



(Above) Ian Kemp and Remo Pietrobon collecting water samples for testing

# ABERGOWRIE NEIGHBOURS WORKING TOGETHER ON CANE TO CREEK 2.0

**W**hen SRA began the Cane to Creek 2.0 project in the Herbert two years ago, the Abergowrie catchment was identified by a local working group as an important place to focus. Braemeadows local Ian Kemp heard about the project and, thinking it was something he would like to get involved in, promptly contacted Hannah Van Houweninge, then SRA technician and Herbert Cane to Creek Project Leader.

Hannah met with Ian, Cane to Creek Project Leader Belinda Billing and a few of Ian's neighbours: Alan Robino, Remo Pietrobon and Sam Vecchio, who explained that they were interested in understanding the impact of their wetlands on nitrogen leaving their farms in run-off and drainage water. The enthusiasm of the group was infectious, and the SRA team agreed that a monitoring and engagement program for the 'Legges Road Group' was a fantastic idea.

"Because we [the Legges Road Group] are at the bottom end of the Herbert catchment we were concerned about nitrogen and phosphorus loss, so a few of us talked about getting together and

doing some work with the Cane to Creek project to help us understand what is happening in our wetlands and creeks," Ian explained.

A monitoring plan was devised with the group, and Ian was taught sampling techniques to help Hannah and ensure samples were taken at important times.

"I think Ian's passion and drive to understand his wetland is really encouraging and I hope that he can continue to be a spokesperson among his peers," explained Hannah.

In 2020 a herbicide demonstration was run on Ian's farm, with a rainfall simulation and monitoring for efficacy of chemicals. The work included looking at the environmental and efficacy outcomes of a new herbicide on the market compared to those currently available.

The work reinforced the message, 'Less on, less off' and the importance of low and efficient application rates for pre-emergent weed control. This is information the growers have been able to take on board, helping them make informed decisions about herbicide selection.

Over time the group has grown and, as the project ended in June, they now have two years of data that indicates the wetlands the growers have constructed and continue to maintain are helping to reduce nitrogen levels leaving their farms. They have also learned that there are points in the wetland and drainage network where dissolved inorganic nitrogen (DIN) levels entering the system are higher, and therefore may be an opportunity for additional treatment.

The Legges Road Group want to continue learning about how they can farm sustainably and profitably in the sensitive Great Barrier Reef catchment and are working to become involved in new projects starting in their area.

"We would like to continue to expand our knowledge and get more involved in the water quality conversation," said Ian. ■



Cane to Creek 2.0 is funded by a partnership between the Australian Government's Reef Trust, the Great Barrier Reef Foundation with support from SRA.

# Q240<sup>®</sup> CONTINUES TO RISE IN POPULARITY

**A**n analysis of the 2020 sugarcane crop has shown that Q208<sup>®</sup> continues to be the most widely grown variety in Australia, as it has been since 2008, representing 25% of the crop and a slight reduction (-0.9%) from 2019.

It is still the number one variety in Qld by 0.8 % and in NSW by 20%.

Q240<sup>®</sup>, Q208<sup>®</sup>'s closest rival, continued its rapid rise in popularity in both Qld (23.6%) and NSW (14.3%) and is still the second most widely grown variety in Australia (23%).

There was very little change in the other varieties making up the top five in Qld: Q183<sup>®</sup> (10.9%), KQ228<sup>®</sup> (9.8%) and Q232<sup>®</sup> (5.2%).

In NSW, Q232<sup>®</sup> (10.3%) remained in third place, followed by Q183<sup>®</sup> (9.5%) in fourth and KQ228<sup>®</sup> (3.8%) in fifth place. The top five varieties grown in Australia account for 73.8 % of the total crop.

In the Burdekin and Southern regions, Q240<sup>®</sup> continued its dominance as the number one variety representing 39.5% and 37.7% of the crop, respectively. Q208<sup>®</sup> remained the most popular variety in the North (33.3%), Herbert (30.2%), and Central (29.2%), although there was a slight decrease from the 2019 crop as Q240<sup>®</sup> became more widely grown in these regions.

Q208<sup>®</sup> is also the dominant variety in NSW (34.3%), where it decreased by 1.3% in 2020.

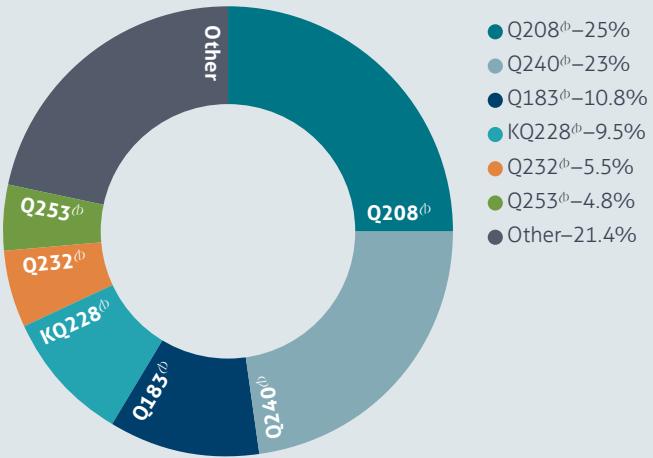
In the Northern region, Q200<sup>®</sup> (14.6%) was the next most widely grown variety after Q208<sup>®</sup>, and Q253<sup>®</sup> (10%) moved into third place with an increase of 4.3% from 2019.

Q253<sup>®</sup> (15.2%) continued its rapid rise in the Herbert region in 2020, up from 10.3% in 2019, followed by Q232<sup>®</sup> (9.5%) and Q240<sup>®</sup> (8.2%).

The three varieties that dominated the Burdekin for many years, KQ228<sup>®</sup> (21.6%), Q183<sup>®</sup> (15.8%), and Q208<sup>®</sup> (11.6%), made a major contribution to the crop but Q183<sup>®</sup> and Q208<sup>®</sup> continued to decrease in importance as Q240<sup>®</sup> increased (39.5%).

In the Central region, Q240<sup>®</sup> continued to increase in popularity up to 25.3% in 2020, and Q183<sup>®</sup> remained steady at 19.3%.

Varieties to look out for in coming years that continued to show significant increases in tonnes harvested in 2020 are: Northern – Q253<sup>®</sup>; Herbert – Q253<sup>®</sup>, SRA5<sup>®</sup> and Q250<sup>®</sup>; Burdekin – Q232<sup>®</sup>; Central – SRA9<sup>®</sup>, SRA21; Southern – Q252<sup>®</sup>; NSW – Q254<sup>®</sup>, SRA2<sup>®</sup>. ■



# SUGARCANE BIOSECURITY- WE ALL HAVE A ROLE TO PLAY

**E**veryone has the responsibility for the risks posed by pests, weeds, and diseases. We all have a role to play in safeguarding Australia from exotic and established pests and diseases.

## WHAT IS A GENERAL BIOSECURITY OBLIGATION OR GENERAL BIOSECURITY DUTY?

The Biosecurity Act (2016) (Qld) and Biosecurity Act (2015) (NSW) mean that everyone must take reasonable steps to ensure that they do not spread a pest, weed seed, disease, or contaminants, and that everyone has a responsibility to report unusual events that might be related to biosecurity. An example of a way of meeting your general biosecurity obligation/duty is to only plant sugarcane varieties that meet the local minimum disease resistance standards and that are recommended by your Regional Variety Committee. You are not expected to know everything about all biosecurity risks, but you are expected to know about risks associated with your work or day-to-day activities in the sugar industry.

## WHAT IS SUGARCANE MACHINERY AND EQUIPMENT?

Any machinery and equipment (appliances) that have been used on a sugarcane farm, including but not limited to:

- harvesters and haul-outs
- planters (billet or stick)
- cultivation equipment
- spray equipment
- other cropping equipment such as a legume planter or harvester.

## MOVEMENT OF SUGARCANE MACHINERY AND EQUIPMENT

There are movement restrictions across all Queensland (Qld) Biosecurity Zones (BZs) and the New South Wales (NSW) and Qld State borders. All appliances moving between sugarcane BZs MUST:

- be FREE of cane trash and soil
- be inspected by an authorised inspection person (cane productivity services) who will issue a Plant Health Assurance Certificate (PHAC)
- be accompanied during transportation by the PHAC.

The receiving cane productivity service must be notified before the appliance is moved.

## MOVEMENT BETWEEN QLD AND NSW

Contact Biosecurity Queensland (BQ) or NSW Department of Primary Industries (DPI) for a biosecurity certificate before moving appliances into either state.

## MOVEMENT WITHIN QLD (BETWEEN BIOSECURITY ZONES)

### • CONTACT YOUR LOCAL AUTHORISED INSPECTION OFFICER

You must contact the local cane productivity services to request an inspection from an authorised inspection officer before moving the appliance.

### • ALL APPLIANCES MUST BE FREE OF TRASH AND SOIL

The authorised inspection officer will decide when gear has been cleaned to standard.

### • FINAL INSPECTION

The equipment must be inspected by an authorised inspection person who will issue a PHAC which must accompany the equipment during transport.

### • WHO GETS NOTIFIED?

The receiving cane productivity services must be notified if sugarcane equipment is entering their zone.

## WHAT IS SUGARCANE PLANT MATERIAL?

Sugarcane plant material includes:

- stalks
- leaves
- billets
- tissue cultured plantlets
- potted plants.

## MOVEMENT OF SUGARCANE PLANT MATERIAL

### MOVEMENT BETWEEN QLD AND NSW

Contact BQ or NSW DPI for a biosecurity certificate before moving sugarcane plant material into either state.

### MOVEMENT BETWEEN SUGARCANE BIOSECURITY ZONES

There are movement restrictions across all Qld BZs and the NSW and Qld State borders. The movement of sugarcane plant material:

- that is produced and moved by SRA under the SRA plant breeding and clean planting scheme (SRA Scheme) for sugarcane may move into and within Qld without restriction
- from NSW (i.e., non-SRA Scheme plant material) requires a biosecurity certificate issued by NSW DPI
- from a Qld BZ to another BZ (i.e., non-SRA Scheme plant material) requires a biosecurity certificate issued by BQ
- from Qld into NSW requires a permit from NSW DPI and certificate from BQ
- from the Far Northern BZ is restricted. A biosecurity instrument permit from BQ is required.

*Note: Dried sugarcane trash may be moved into and within Qld without restriction.*

*To apply for a biosecurity instrument permit, contact the BQ Customer Service Centre 13 25 23.*

## REPORT ANYTHING UNUSUAL (LOCAL CPS, SRA, OR BQ ON 13 25 23 OR THE EXOTIC PLANT PEST HOTLINE ON 1800 084 881)

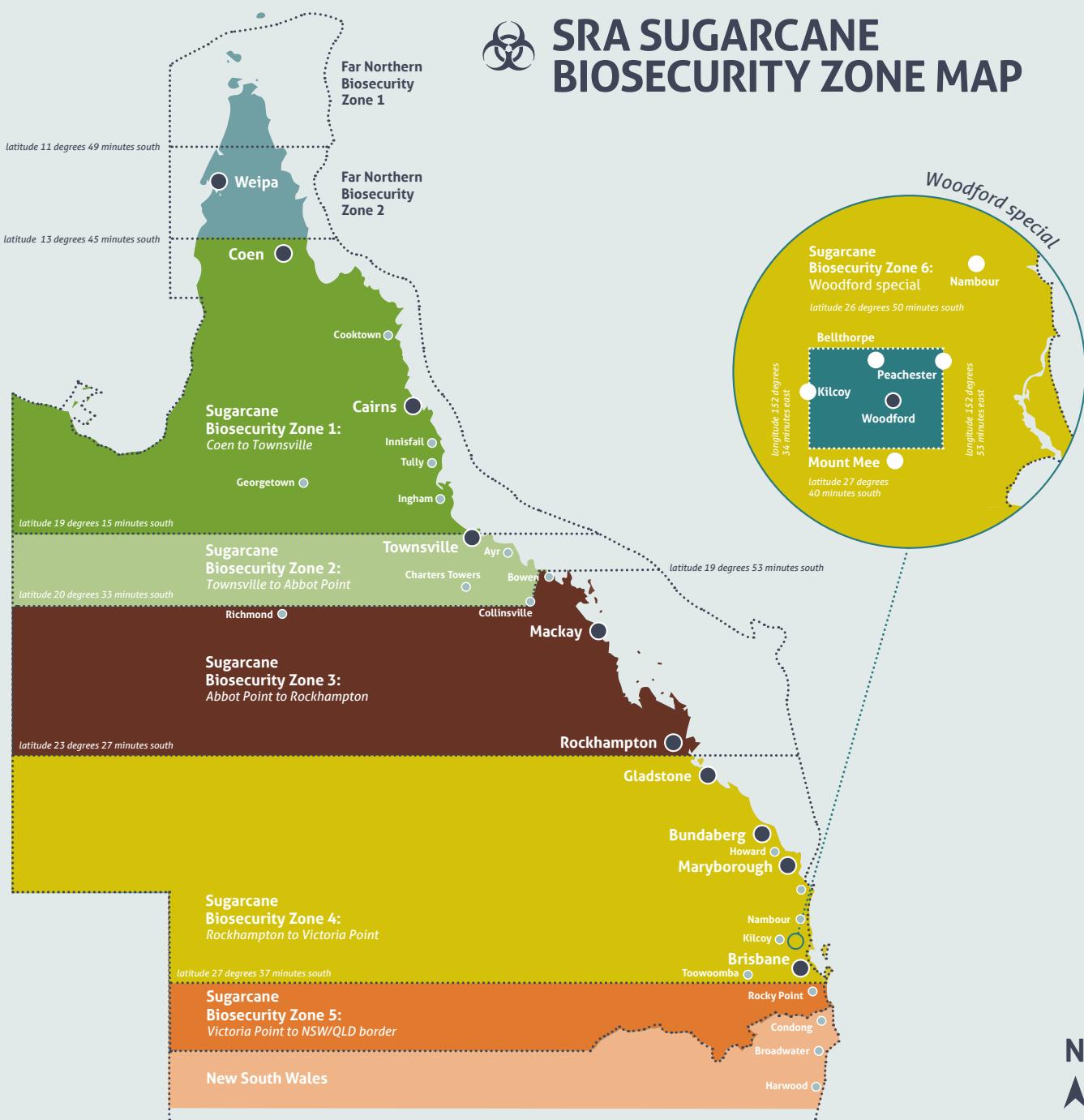
Report:

- anyone moving equipment or sugarcane plant material between the zones without a biosecurity certificate
- any sugarcane plant material that has an unusual appearance or growth. ■

*Developed by the Sugar Industry Biosecurity Committee: Cane Productivity Services, Canegrowers, SRA, Biosecurity Queensland, Australian Cane Farmers Association, Sunshine Sugar and Australian Sugar Milling Council.*



# SRA SUGARCANE BIOSECURITY ZONE MAP



SUGARCANE BIOSECURITY ZONE	MILL AREAS WITHIN THIS ZONE
Far Northern Zones 1 & 2	-
1 - Northern	Mossman, Tableland, Mulgrave, South Johnstone, Tully, Macknade, Victoria
2 - Burdekin	Invicta, Pioneer, Kalamia, Inkerman
3 - Central	Proserpine, Farleigh, Marian, Racecourse, Plane Creek
4 - Southern	Bingera, Milaquin, Isis, Maryborough
5 - Southern	Rocky Point
6 - SRA Woodforth Pathology Farm	Woodford
New South Wales	Condong, Broadwater, Harwood

# SRA PLAYS A PART IN DROUGHT RESILIENCE

No matter where you live, managing drought is a fact of life for most Australians. To help farmers and communities become better prepared for and resilient to the impacts of drought, the Commonwealth Department of Agriculture, Water and the Environment established the \$5 billion Future Drought Fund in late 2019.

The fund invests in a range of programs to help farmers and communities with the economic, environmental and social impacts of drought.

Following the launch of the fund, eight foundational programs began in 2020. One of these programs, Drought Resilience Research and Adoption, involved the establishment of eight Drought Resilience Adoption and Innovation Hubs. SRA is a partner in two of the hubs, the Tropical North Queensland Hub, based in Cairns, and the Southern Queensland and Northern New South Wales Hub headquartered

in Toowoomba. Initially, four years of funding has been committed to the hubs. The hubs bring together a range of partner organisations to collaborate and co-design innovative projects with farmers across diverse commodities and communities to deliver what is needed in their regions.

Despite the sugarcane industry being largely located in higher rainfall areas of Australia, our industry faces a suite of problems based on water availability (especially in rainfed areas), climate prediction, water use efficiency, on-farm costs of water and energy. SRA is well placed to contribute its expertise in sugarcane irrigation, seasonal climate forecasting, research translation, farming systems, nutrient management and precision agriculture to the hubs' research.

The Southern Qld/Northern NSW Hub is led by the University of Southern Queensland.



Visit the Future Drought Fund website page for more information about the fund and the eight foundational programs.

The Australian Government will contribute \$10 million over four years through the Future Drought Fund. Hub partners will provide co-contributions of \$10.8 million over four years.

The Tropical North Queensland Hub is led by James Cook University.

The Australian Government will contribute \$8 million over 4 years through the Future Drought Fund. Hub partners will provide co-contributions of \$18.5 million over 4 years.

SRA will be providing in-kind contributions to the hubs including technical, administrative and research support as well as use of its stations for demonstrations and trials.

Updates on new programs and details about specific hub projects will be provided when available. ■



#### NEW RESEARCH INVESTMENT

# LIFE CYCLE ANALYSIS PROJECT NOW UNDER WAY

**PROJECT CODE:** 2020/001

**R&D PROVIDER:** INTEGRITY AG AND ENVIRONMENT PTY LTD

**CHIEF INVESTIGATOR:** STEPHEN WIEDEMANN

New work has recently commenced to provide the Australian sugarcane industry with valuable information on an environmental risk assessment and overall life cycle assessment (LCA) covering the raw sugar manufacturing value chain.

This project came about following extensive industry consultation, and by a competitive tender process run by SRA. The project recently commenced and will operate over two stages to March 2023:

#### **Stage 1: Environmental risk assessment of the sugarcane value chain**

#### **Stage 2: Life Cycle Assessment of raw sugar manufacturing (cradle to processor gate)**

In stage one, the project will undertake a study to identify current and possible future risks to the Australian sugar industry of not undertaking a raw sugar environmental LCA. The review focuses on key risks, some of which include:

- market regulation and trade restrictions
- foregone price premiums or penalty for non-compliance
- government regulation, tariffs, and lack of government support
- failure to tell a broader sustainability narrative of the industry's environmental performance.

In stage two, the aim is to develop a detailed understanding of the environmental performance of the Australian sugar industry's products and business operations. The study will require a detailed quantification of the environmental impacts along the raw sugar value chain.

The LCA outputs are expected to help the industry better understand, benchmark, and improve its environmental contribution to human health, environment, ecosystem quality and resource use (including waste management).

The findings of the assessment will be used by SRA to consult with industry and inform efforts to minimise environmental impacts and exploit opportunities for improving resource use efficiency, support diversification, influence policy and improve social licence to operate. ■

# SRA'S IMPROVED DISEASE RATING SYSTEM

By Dr George Piperidis, Variety Development Manager, Central

Disease screening of varieties in the selection program is an important part of the decision-making process for advancement of clones through the program and release of new varieties to industry. For many years, disease ratings were given on a 1-to-9 scale based on the recommended International Society of Sugarcane Technologists method for assigning disease resistance ratings. This 1-to-9 scale can be further categorised as Resistant (1-3), Intermediate (4-6) and susceptible (7-9). However, this system didn't take into account the precision of the rating for any given clone or variety.

Providing a single number for disease ratings, without any indication of the precision or accuracy of that rating, inevitably led to situations where ratings changed as more resistance data were generated. This was confusing when there was a belief that ratings were fixed and should not change once a rating had been applied. Significant angst was experienced by both industry staff and growers who had relied on a specific rating for a commercial variety.

Disease screening trials are a complex biological system and expression of disease symptoms depends on a range of factors including inherited nature of the clones, age and quality of the planting material, variability in pathogen population, environmental conditions at the time, and quality of inoculum. As more resistance data are generated for each clone, there is a greater level of confidence in the actual resistance of that clone – and the rating precision improves.

In 2019, SRA reviewed the approach for providing disease ratings to address the concerns outlined above. The revised rating system provides a confidence interval instead of a single number for the resistance of each clone. The confidence interval provides an indication of how precisely SRA is able to predict the true resistance of that



(Above) Pachymetra root rot greatly reduces root growth and yields in susceptible varieties.

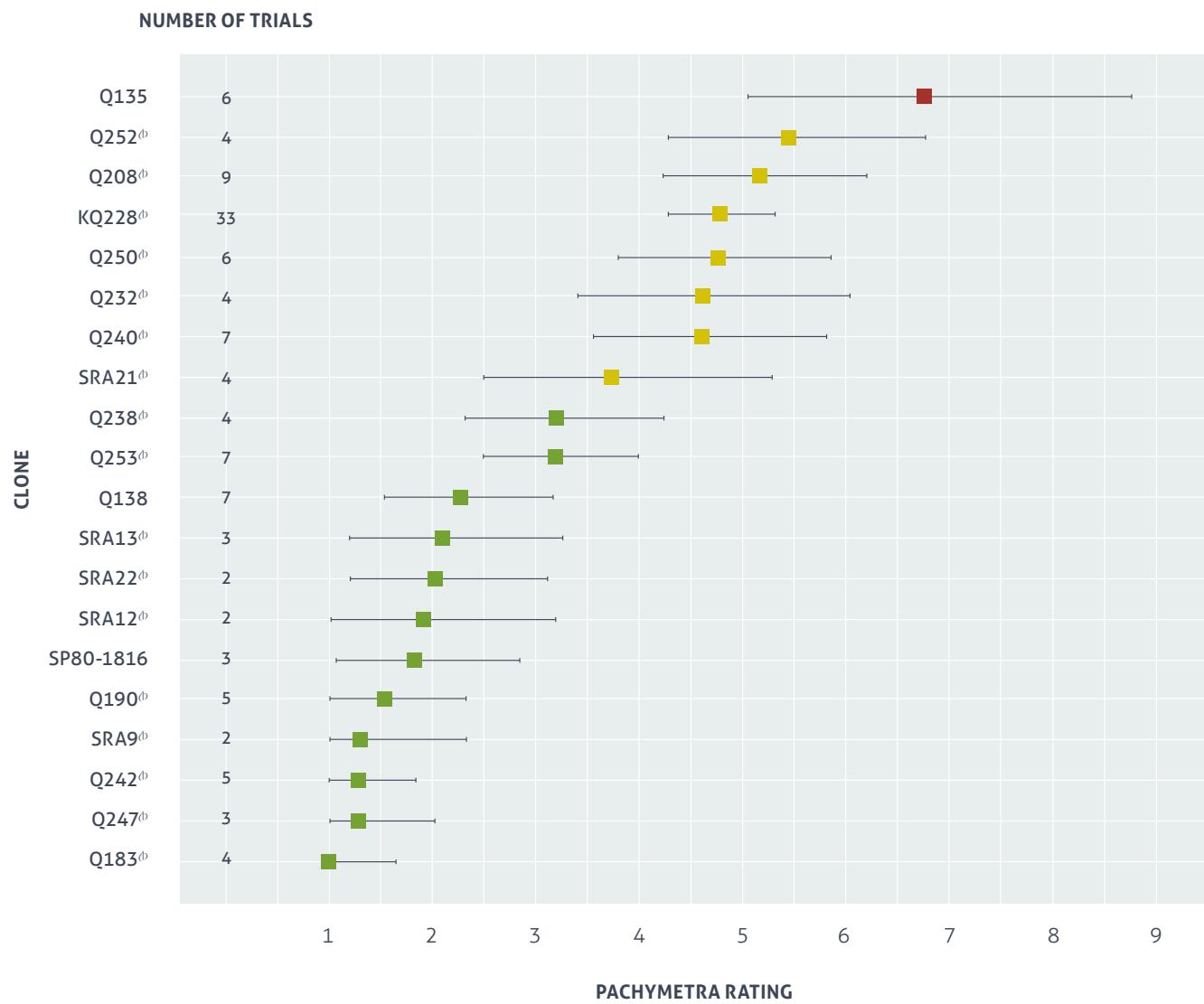
variety. Those viewing the new type of rating then immediately gather the general resistance in each clone and also the precision of that rating. In practical terms the confidence interval can be interpreted by considering if the disease screening was repeated 100 times, then 95 of the results would be within the interval. As more data are generated, the level of precision improves, and the confidence interval becomes narrower.

This improved rating system was introduced at the 2020 Regional Variety Committee meetings and SRA Grower Updates. It was implemented in the 2020 Variety Guides for smut and Pachymetra and has received positive feedback. Disease rating categories are still provided in the Guides but for smut and Pachymetra these rating categories should be considered in the context of the confidence intervals provided. The ratings of clones with broad confidence intervals should be held lightly until the rating becomes more precise (as more resistance trial data are generated for that variety).

In some cases, the general disease rating for a variety will change as more tests are conducted. For example, the Pachymetra rating for Q253<sup>d</sup> was initially Intermediate, but as more tests were conducted its rating was revised to Resistant with a confidence interval from 2.5 to 4.0. Similarly, the Pachymetra rating for Q250<sup>d</sup> has been revised from Intermediate-Susceptible to Intermediate with a confidence interval from 3.8 to 5.8, and Q226<sup>d</sup> has been revised from Intermediate-Resistant to Intermediate-Susceptible with a confidence interval from 4.3 to 7.3.

The improved rating system provides a realistic view of how well we can predict the actual disease resistance for that variety, given the data on-hand. SRA will continue working towards providing the best available disease ratings information to assist growers in making informed decisions on variety choices. ■

## SUGARCANE SMUT SYMPTOMS ON SUGARCANE



### FURTHER INFORMATION ON DISEASE RATINGS CONTACT:

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**References**  
 Bhuiyan, S. A., Deomano, E., Stringer, J., Magarey, R., Eglinton, J., Wei, X., and Piperidis, G. 2020. Development of a new variety rating system for sugarcane smut using improved statistical methods. *Proc. Aust. Soc. Sugar Cane Technol.* 42: 223–228.

# NEMATODES UNDER THE SPOTLIGHT

By Dr Shamsul Bhuiyan and Dr Jason Eglinton, SRA

**N**ematodes are minute, eel-shaped worms which live in all soils. They may be classified as either free-living or plant-parasitic.

**Nematodes have been known to cause crop losses in sugarcane. Whereas they were once considered only a pest in coarse textured sandy soils, it is now recognised that nematodes are responsible for widespread yield losses across all sugarcane districts in Queensland.**

**SRA is focused on research that will provide information and solutions for industry in relation to nematodes.**

**More information about nematodes is available in the information sheet on the SRA website: [sugarresearch.com.au/sugar\\_files/2017/02/Nematodes-IS13040.pdf](http://sugarresearch.com.au/sugar_files/2017/02/Nematodes-IS13040.pdf)**

## Introducing resistance

A new research trial has commenced at SRA's Woodford pathology farm to screen >150 progeny for root lesion nematode (*Pratylenchus zeae*).

The progeny originated from a cross between an elite sugarcane variety and a wild relative, *Saccharum spontaneum*, that is highly resistant to nematodes. The results showed that the resistance was

successfully transmitted from the wild relative. The best progeny will be planted as parents in the Meringa photoperiod facility and used in crossing next year.

All sugarcane varieties tested to date are susceptible to this nematode, and the new work is part of the process to introduce resistance into future varieties.

As this plant breeding initiative progresses, further updates will be provided.

## Nematode update in Ingham

Earlier this year, SRA's Plant Pathologist Dr Shamsul Bhuiyan attended the 'Walk and Talk' event organised by Herbert Cane Productivity Services Limited (HCPSL) at the Ingham Showgrounds.

Approximately 100 cane growers attended the day-long program that covered a range of topics including SRA's new varieties and variety management, use of pesticides, soil health, and use of mill mud and ash to improve soil health.

Shamsul presented the recent nematode survey results from 56 locations across six cane productivity zones.

The results show that approximately 73% of the sugarcane fields surveyed had medium (484 nematodes/200 g soil) to high (1137 nematodes/200 g soil)

counts of root-lesion (*Pratylenchus spp*) nematodes. This information adds to the growing evidence that nematodes are a major production constraint, and availability of control options could generate significant value.

A nematode community analysis was undertaken to determine the soil health of each surveyed sugarcane farm. Analyses revealed low maturity indices (MI and MI2-5) (<3.5) in all farms surveyed, which was indicative of low soil food web maturity and persistent use of chemical fertiliser. Soil food-web indices and metabolic footprints indices also indicated perturbation of sugarcane soil and a farming system dominated by herbivorous nematodes.

The nematode survey demonstrated that nematode community analysis can be used as indicators of soil health for the sugar industry as well as a monitoring tool to determine the effects of management practices. This approach could be used to monitor progress in a range of soil health improvement programs.

## Nematode research wraps up

SRA has undertaken various research projects related to nematodes. One such project, 'Development of commercial



(Bottom left) Dr Shamsul Bhuiyan presenting the nematode survey results at the 'Walk and Talk' event at Ingham Show Ground.  
(Middle) Symptoms of root lesion  
(Bottom right) Root-knot nematodes (right) on sugarcane roots



Read the full report on the screening for root-knot and root-lesion nematode resistance in sugarcane by scanning your smartphone camera over the QR code.



Read the full report on the development of commercial molecular biological assays for improved sugarcane soil health and productivity by scanning your smartphone camera over the QR code.

molecular biological assays for improved sugarcane soil health and productivity' is complete and the final report is now available on the SRA eLibrary.

The project has shown that DNA tests for *Pachymetra chaunorhiza*, *Pratylenchus zeae* and *Meloidogyne* nematode species can successfully quantify nematodes in soil.

The research also confirmed the importance of a sampling strategy and storage for obtaining representative data.

The research involved processing soil samples from soil health projects, plant breeding selection trials and industry samples being sent to the Tully soil assay laboratory. DNA assays for mycorrhizae and free-living nematodes (used to assess soil biological health) developed for other industries were found to be potentially useful for monitoring progress in sugarcane industry soil health improvement programs.

This project also discovered a new species of lesion nematode in the Australian sugarcane industry, *Pratylenchus parazeae*. The pathogenicity and prevalence of the new lesion nematode species is yet to be determined.

SRA acknowledges the funding contribution of the South Australian

Research and Development Institute towards this research.

The final report is available on the SRA eLibrary.

Another research project focusing on nematodes was also recently completed. Dr Karen Aitken (CSIRO) submitted the final report of the SRA-funded project 'A high throughput method for screening for root-knot and root lesion nematode resistance in sugarcane'.

The current method to determine susceptibility or resistance of sugarcane to nematodes takes up to 16 weeks to obtain a result. The research was aimed at developing a new screening method to reduce the screening time to three weeks to determine if a clone is resistant to or susceptible to root-knot and root lesion nematodes.

This outcome of the research was a proof-of-concept that suggested the new method has the potential to reduce the cost of screening for nematode resistance and to increase the number of sugarcane clones that can be screened in a year.

More research is warranted to determine if the new screening method developed in this project could potentially speed up the breeding process by enabling larger

numbers of clones to be screened thus increasing the chance of success.

SRA acknowledges the funding contribution of the CSIRO towards this research.

The final report for this project is available on the SRA eLibrary.

It is believed that yield losses from nematodes across all sugarcane soils in Australia are as high as 10% (plant) and 7% (ratoon). This results in an economic cost to the industry of around \$82 M per year. SRA will continue to pursue research that will address this significant industry challenge. ■



## NEW RESEARCH INVESTMENT

# MAXIMISING CANE RECOVERY THROUGH DEVELOPMENT OF A HARVESTING DECISION- SUPPORT TOOL

### IMPLEMENTATION OF NEW TECHNOLOGIES TO INCREASE THE INDUSTRY'S PROFITABILITY

This project is developing a Harvesting Predictive Tool (HPT) that will be supported by an integrated demonstration campaign. Through the life of the project, and through the long-term legacy of the HPT, this project will create an enduring positive impact for the Australian sugarcane industry and its surrounding regional communities. The demonstration campaigns will validate the benefits of Harvesting Best Practice (HBP) to assure growers and harvesting contractors of the increase in sugarcane yield and revenue from improved harvesting practices. The purpose of this investment, in conjunction with the demonstration campaign, is to develop a grower-friendly decision support tool that applies the latest research findings, incorporates economic outcomes, and encourages adoption of HBP.

### OBJECTIVE

The Australian sugarcane industry faces challenges in the form of competing land use from other crops and development activities. Industry profit margins are also under pressure, making it critical that the industry improves revenue and sustainability through increasing sugarcane yield. Significant opportunities to capture additional sugar yield from the paddock are available to the industry. The work of producing the best crop prior

to harvest has already been done by the grower – this project investment focuses on reducing cane loss during harvesting leading to:

- an increase in cane yield of 5 tonnes per hectare and 700 kg of sugar per hectare each year, with an estimated industry revenue increase of \$69.3 million by 2030
- an increase in productivity per hectare by approximately 5%, contributing to improved supply of cane to mills and improved mill viability.

As well as benefits for growers, harvesters and millers, reducing cane loss will have significant benefits for the wider sugarcane industry and surrounding communities. The increase in yield per hectare could mean higher demand for harvesting operators, in turn improving employment opportunities and regional economic activity.

### IMPLEMENTATION

This new project, which is relevant to all green cane regions and has recently commenced, will involve all industry sectors, with the aim of increasing the adoption of harvesting practices.

Using harvesting data collected through years of previous research trials, combined with in-depth economic data collected and analysed by economists at the Queensland Department of Agriculture and Fisheries, the outcome

will be to balance cane loss and cane quality.

Critically, the project investigators recognise that practice change presents different risks and rewards for different sectors in the value chain. Through the HPT, industry will have access to information that will allow those benefits to be shared equitably with contracts structured to incentivise practices that are mutually beneficial.

The project, which runs from 2021-2023, will focus on:

- the 30% of growers who supply 70% of the cane
- group and peer-to-peer learning
- the HPT
- demonstrating the economic benefits of HBP.

### PROGRAM INVESTMENT

The project is funded through Sugar Research Australia and the Queensland Department of Agriculture and Fisheries over three years to develop the HPT and conduct demonstration campaigns for validation.

If the project helps achieve increased adoption of improved harvesting practices by 40% during the life of the project (from 2021–2023), this would add 480,000 tonnes to the crop annually, worth at least \$34.4m to the industry at current sugar prices.



## SCALABILITY

The program will allow industry to use the HPT in conjunction with cane loss monitors currently available on the market. Setting guidelines with the HPT and monitoring the benefits from practice change through cane loss monitors will improve harvester efficiency and increase yield of both cane and sugar.

## INDICATORS OF PROJECT SUCCESS

- Use of the HPT
- Measured performance and compliance against optimum practice parameters
- Evidence of changed payment arrangements
- Increased grower involvement in operational aspects of harvesting
- Millers adapting harvesting pressures and time frames to facilitate harvesting best practices, realising productivity gains in factory operation and increased revenue in higher tonnage throughput. ■

## MORE INFORMATION



Investigating losses from green and burnt cane harvesting conditions – ASSCT journal article



Cost assessment of the adoption of harvesting best practice (HBP) – ASSCT journal article



Economic evaluation of sugarcane harvesting best practice (HBP) – ASSCT journal article



Adoption of practices to mitigate harvest losses – Final Report

### VALUE CREATION AT A GLANCE (TARGETS BY 2030)



1.2 million tonnes of cane



164,000 tonnes of sugar



\$69.3 million in revenue

*Increasing the viability of the Australian sugarcane industry without horizontal expansion.*



# NEW VARIETIES RELEASED

The single largest research and development investment made by SRA on behalf of the sugarcane industry is in the production of new varieties.

Investments span research into new breeding technology and trait development, through to evaluation of potential new varieties under local best agronomic management on commercial farms to generate performance data for release and adoption decisions.

Each year, the process begins with 100,000 seedlings of potential new varieties. Plant numbers are narrowed down over successive years of testing to a handful of candidates considered for release.

Early generation selection trials are conducted at the five regional SRA farms and more than 60 trials testing advanced candidates are conducted on commercial farms from Mossman to Condong.

SRA extends its appreciation to growers who host these trials and provide an important contribution to industry development.

Commercial release decisions are made through Regional Variety Committees which balance milling perspectives, grower imperatives, and biosecurity obligations in considering the performance data of potential new varieties generated by SRA.

In 2021, five new varieties were approved for release.

**In NSW, SRA34** (QS09-7888) is to have a limited release to growers in the Condong mill area, purely as a one-year variety. SRA34 has above average CCS with good tonnes. However, it performed poorly as a two-year variety. SRA34 has resistance to Fiji leaf gall, leaf scald, mosaic, Pachymetra, with intermediate resistance to smut and red rot.

**SRA35** (QC04-402) has shown exceptional productivity as a two-year variety in Broadwater and Harwood, with a consistent productivity advantage of 10 tonnes of cane per hectare (TCH) when compared with standard varieties in the two-year production system. SRA35 has an average of 0.3 units CCS above established standard varieties and has resistance to Fiji leaf gall, leaf scald, mosaic and red rot with intermediate resistance to smut and Pachymetra.

**In the Southern Region** growers and millers have access to a new sugarcane variety developed jointly by Wilmar Sugar Australia and SRA. SRA's Southern Region Variety Development Manager Roy Parfitt said the variety was tested in early-stage trials in the Wilmar program before progressing to advanced testing in the SRA Burdekin selection program. Based on this performance, **SRAW33** was included in advanced trials in the southern region in 2016 and 2018.

"SRAW33 has shown an advantage of 5 TCH and 0.6 units of CCS compared with standard varieties. SRAW33 has also been very consistent, with CCS above the average of the standards in 14 of the 15 harvests and 11 of these were statistically significant," Mr Parfitt said.

SRAW33 is resistant to Fiji leaf gall, leaf scald, mosaic and smut, with intermediate resistance to Pachymetra. The variety will be available for distribution to growers for planting in 2022.

Maryborough Cane Productivity Services' Tony McDermott said new variety SRAW33 was looking good and ahead of other clones planted in an advanced plot on Isaac Schmidt's farm.

In an advanced plot on Darryl Rapley's farm near Childers, SRAW33 is also impressing with growth, but Darryl noted, "SRAW33 did show phytotoxic

(Pokkah Boeng-like) symptoms after a mild herbicide application but has subsequently grown out of these".

**In the Herbert, SRA31** (QC05-1281) was released. SRA's Herbert Variety Development Manager Dr Fengduo Hu explained the cane yield of SRA31 is similar to or slightly lower than commercial standards but demonstrated high CCS across the wet and dry zones of the Herbert district. High CCS in early harvested trials suggests SRA31 has the potential to fill an important role in the district. SRA31 is resistant to smut, leaf scald and Pachymetra, offering a strong disease resistance profile. SRA31 will be available to growers in 2022 through Herbert Cane Productivity Services Ltd distribution plots and significant tissue culture orders have also been received.

**In the Burdekin and beyond, SRA32** (QS09-8404) has the potential to be a significant new variety. SRA32 was originally identified in response to a request from Mitr Phol Sugar for a variety suited to the MSF Sugar Tableland Mill's business model and it was selected for commercial trials based on limited data.

SRA32 has now also completed testing in Burdekin Final Assessment Trials with cane yield of 16 TCH. SRA Burdekin Variety Development Manager Dr Xianming Wei said results were above the average of the standards in 19 of the 20 harvests and 13 of these were statistically significant. This is a consistent yield advantage. SRA Far North Variety Development Manager Dr Felicity Atkin said similar trial results have been achieved in the Northern Region.

SRA32 has lower CCS than established varieties, averaging 0.8 units below the standards. However, the high yield potential of SRA32 means that the variety offers an advantage in terms of

sugar per hectare. The difference in CCS varies with harvest date and crop age so there are opportunities to maximise CCS from SRA32 through management practices. The commercial trial results from the Tablelands have exceeded expectations for productivity and CCS.

SRA32 is resistant to leaf scald, mosaic and Pachymetra. It is rated intermediate in reaction to smut, and in Burdekin observation trials the infection levels have been higher than Q208<sup>®</sup> and KQ228<sup>®</sup> but significantly lower than SRA8. Growers are advised that planting into high smut risk situations should be avoided.

SRA and Burdekin Productivity Services are co-investing to provide SRA32 to growers earlier than would be possible through the conventional propagation procedure. Tissue culture is being used for the first time in the Burdekin to rapidly produce enough SRA32 plantlets to establish a one-hectare clean seed plot in 2021, providing growers with retail access one year ahead of the normal schedule. Tissue culture is also being used to fast track the establishment of SRA32 strip trials at Rocky Point and Innisfail.

More information on the performance of new and established sugarcane varieties is available in the 2021/22 SRA Variety Guides on the SRA website.

The deadline for tissue culture deliveries in Spring 2022 is 15 November 2021. Please contact your local productivity services company or Dr Clair Bolton (07 3331 3374) for more information. ■

(Top right) Neil Halpin (DAF) and Ken Bird (DAF) assessing the pigeon pea crop.

(Middle) Soil sampling being undertaken as part of the trials.

(Bottom right) Large numbers of growers and industry representatives attended field days held as part of the project.

# GROWING A STRONGER CANE AND GRAIN CONNECTION

**G**rowers in the Southern region have embraced grain legume rotations to improve the sustainability of their farming systems. Not only have grain legume fallows been shown to increase cane productivity, they also offer income diversification as well as reduced input costs to the subsequent sugarcane crop through legume nitrogen fixation and a suite of other soil health benefits.

Because of these benefits there has been significant sugar industry support for the development of the grain legume industry in the southern region.

In support of grain production in sugar-based farming systems, the Grains Research and Development Corporation (GRDC) and the Department of Agriculture and Fisheries (DAF) co-funded a Grower Solutions Project to address productivity constraints associated with growing grain legumes in sugar-based farming systems of the Coastal Burnett.

To maximise the value to industry of this research, an additional project, Southern Sugar Solutions—co-funded by SRA and led by DAF—began in parallel to the GRDC project. The purpose of Southern Sugar Solutions was to capture treatment effects from the grain cropping system on the subsequent cane crop as a way of capturing whole farming system benefits.

The project, which ran from 2017 to late-2020, actively involved growers, advisors and agronomists in the research process, from ideas generation and trial design, right through to data capture and delivery of results and learnings. Annual meetings and bus tours were conducted, and the progress of the trials updated through a social media group. The final results will be communicated at meetings in the Bundaberg, Childers and Maryborough later in the season.

Three sugarcane trial sites were established following the legume trials initiated under the GRDC project. The three trials demonstrated the following:

## Carbon

The carbon trial evaluated whether the addition of organic matter (cane trash, mill-mud and biochar), and the placement of this organic matter (surface-incorporated or slotted at depth) would improve the productivity of grain legumes (peanut and soybean) and the subsequent cane crop. This trial was conducted on a marginal soil (yellow dermosol) with low water and nutrient holding capacity.

## Findings

The carbon trial identified the addition of organic matter had no impact on the productivity of the grain legume crop or any individual cane crop. However, analysis of the cumulative sugar yield (plant + R1 + R2) demonstrated an 8.9% increase in sugar yield was achieved through the application of mill-mud/ash blend. This productivity response was potentially due to addressing available silicon levels at this site.

## Fallow management

The fallow management trial was established to determine the 'best' legume crop to be grown in rotation with sugarcane. This stemmed from growers reporting much higher sugarcane productivity (10t/ha) following variety Kairi peanuts compared to variety Holt. Similarly, the consensus among growers is that there is better cane productivity following peanuts, compared to soybean. The trial assessed which fallow crop option had the best economic, soil health and soil nutritional effects. A range of fallow options—peanuts (two varieties), soybeans (two varieties), mungbeans (two

varieties), pigeon pea and a bare fallow—were compared to the cane monoculture.

## Findings

The fallow management trial demonstrated that peanuts and soybean are valuable rotations in sugarcane farming systems in terms of boosting grower profitability and the productivity of the subsequent sugarcane crop. This trial also highlighted the potential of pigeon pea as a future rotation crop. Interestingly, there was no evidence that sugarcane productivity was better after peanuts relative to soybean. This result differs from local grower belief.

This one field trial has highlighted that whilst Red Caloona cowpea was the 'best' legume, in terms of nitrogen contribution, that this did not translate to the 'best' cane productivity or the 'best' profitability. Whilst the peanut rotation provided the 'best' profitability (cumulative gross margin), by the first ratoon Sunrise Pigeon pea provided the 'best' sugarcane yield.

Comparing the impact of rotation options on the cumulative production of cane and sugar for the plant and R1 crops demonstrates that the monoculture has the lowest productivity.

The cumulative gross margin analysis of rotation option, plant cane and R1 combined demonstrates that peanut rotation provides the highest gross margin of \$4,645/ha, which was significantly better than Sunrise pigeon pea \$3,151/ha and soybean of \$2,7650/ha. The peanut, pigeon pea and soybean cumulative gross margins were significantly better than all the other options. Rotational options such as mungbean, cowpea and bare fallow were not statistically economically different to the continuous monoculture cane option.

## Sulfonylurea (SU) herbicide trial in soybean rotations

The SU trial was implemented to determine whether the herbicide use strategy employed in the soybean-cropping phase would have any impact on the subsequent sugarcane crop.

### Findings

Data from this one field trial suggests that application of currently registered herbicides in the soybean cropping phase has no impact on the productivity of the subsequent sugarcane crop.

However, this trial demonstrated a large difference in the productivity of the subsequent sugarcane crop. The rotation with soybean variety Kuranda resulted in significantly less cane, sugar and dry matter production when compared to a rotation with soybean variety A6785. Further experimentation is required to determine the repeatability of this result, and if repeated, determination of the causal agent.

### Wrap-up

An independent survey was conducted to assess the relevance of the project in terms of helping growers to improve their yields and rotation of crops. It was widely agreed that the project had exposed farmers to new and better ideas and demonstrated how to build a more sustainable system where a rotation of sugarcane and legumes is critical.

The strong links between the GRDC and DAF co-funded Grower Solutions project and the SRA Southern Sugar Solutions project has developed synergies, economies and maximised benefits to growers. SRA will continue to seek cross-RDC opportunities wherever possible to ensure that our levy payers gain the maximum benefit from targeted research. ■



Read the full report on the Sugar Solutions Project by scanning your smartphone camera over the QR code.



SRA acknowledges the funding contribution from the Department of Agriculture and Fisheries towards this research activity.



# BIOSECURITY – WHAT PROJECTS AND ACTIONS ARE UNDERWAY

**C**OVID-19 has shone a spotlight on biosecurity. For SRA, sugarcane biosecurity has been a core part of the work we have done since the establishment of the Bureau of Sugar Research Stations in 1900.

There are currently six research projects underway specifically focusing on the detection, prevention, and management of pest and disease incursions. In this edition, we share details of three new projects.

Building on previous research, the projects have been structured to deliver innovative, cost-effective outcomes for industry that address known biosecurity threats.

In addition to the research investments in biosecurity projects, key SRA staff are actively involved in critical collaborative programs tackling various elements of biosecurity.

The Federal Government's Agricultural Innovation Agenda includes the four priority areas of Trade and Market Access, Climate, Biosecurity and Digital Agriculture. Investment in these priority areas will be largely administered through the newly-created Agricultural Innovation Australia (AIA), whose members include the 15 Rural Research and Development Corporations (RDCs) in Australia.

The Department of Agriculture, Water and the Environment recently commissioned CSIRO to take the lead in establishing an investment plan for biosecurity, and this has involved consultation with all RDCs to identify a list of the top priorities for investment in biosecurity. SRA have been represented in this process by Research Mission Manager, Dr Stephen Mudge. This investment plan was submitted to the Department in late August, with full investment plans due in late 2021.

For a complete list of all current projects, see the inside back cover of this edition. Details about all our research investments are available on the SRA website.

**Project title:** Environmental DNA technologies and predictive modelling for rapid detection and identification of sugarcane priority pests and diseases

**Principal R & D provider:** EnviroDNA Pty Ltd

**Chief Investigator:** Dr Andrew Weeks

**Project number:** 2020/007

## Project summary:

Biosecurity planning and surveillance is important for the ongoing profitability and sustainability of the sugarcane industry.

Existing biosecurity surveillance is based on trapping pests or in-field identification of diseases by specialist entomologists and pathologists.

All organisms shed their DNA into the environment and this environmental DNA (eDNA) can reveal their recent presence even when the pest is no longer present. In-field DNA-based identification can be done without the need for specialist entomologists and pathologists.

Using eDNA technology increases the chances of detection before an incursion becomes established. There are multiple recent examples of eDNA technology being successfully used to detect pests in a range of crops.

To ensure that the eDNA surveillance is as cost-effective as possible, sophisticated forecasting is incorporated to identify the areas that are most at risk of pest incursions.

The combination of forecasting and eDNA testing will improve the speed, efficiency, cost-effectiveness and accuracy of biosecurity surveillance.

Expected outcomes for the industry include:

- access to technology and tools that will improve surveillance
- faster detection of pest incursions increases the chance of eradication or cost-effective management
- early detection will reduce the need for chemical control, so will reduce potential environmental impacts and pesticide resistance.

*SRA acknowledges the funding contribution of the Queensland Department of Agriculture and Fisheries towards this research activity.*

**Project title:** Transformational crop protection – Innovative RNAi biopesticides for management of sugarcane root feeding pests

**Principal R & D provider:** The University of Queensland

**Chief Investigator:** Professor Neena Mitter

**Project number:** 2020/008

## Project summary:

Current crop protection strategies rely on plant genetic resistance and pesticides. Toxicity both in terms of human health and the environment, lack of specificity, and the development of resistance, persistence of residues and run-off into waterways are major issues with the use of chemical pesticides.

Transformative RNA based biopesticides or 'RNA vaccines' for plants as a sustainable biological crop protection platform without the need for genetic modification is gaining momentum across the globe. This involves topical application of pest specific double stranded RNA (dsRNA) as the key trigger molecule of RNA interference. On its own RNA is inherently unstable, and therefore requires optimisation to improve its persistence and performance for industry relevant applications.

The University of Queensland has developed a transformational platform using clay nano-particles as carriers of bioactive RNA molecules targeting specific pests or pathogens, which provides stability, rain-fastness, and slow and sustained release of the biological active molecules to afford an extended window of protection.

Greyback canegrub is a major pest throughout Australian sugarcane growing regions and a significant constraint for about 50% of growers. Existing control measures for cane grubs are limited to imidacloprid use and there is no insecticide registered for soldier fly. The current project aims to deliver a proof-of-concept for delivering RNA biopesticides as an innovative non-GM, non-toxic, ecologically safe topical application for the control of canegrubs as serious pests of sugarcane. It will involve identification of the best target genes for RNAi based biopesticides for both cane grubs and soldier fly and testing the RNAi based biopesticides in feeding assays and glasshouse-based efficacy trials against canegrubs.

Expected outcomes for the industry include:

- transformational alternatives to chemical pesticides
- Australian-owned, non-GM, non-toxic easy-to-adopt biopesticides developed to proof-of-concept stage for canegrubs
- translation potential to target other pests and diseases of sugarcane.

*SRA acknowledges the funding contribution of the Queensland Department of Agriculture and Fisheries towards this research activity.*

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**Project title: Pre-commercial development, testing and validation of RSD LAMP assay for sugar mill roll-out.**

**Principal R & D provider: The University of Queensland**

**Chief Investigator: Professor Jimmy Botella**

**Project number: 2021/002**

**Project summary:**

Ratoon Stunting Disease (RSD) is a significant disease limiting sugarcane profitability in the Australian industry. In some regions, it is estimated that up to 30% of crops may be diseased, but a lack of external symptoms means that it often goes unnoticed. Reliable detection is further complicated by the fact that the presence of the pathogen (*Leifsonia xyli* subspecies *xyli*; "Lxx") is highly variable between and within stalks. Effective methods for RSD detection are therefore critical. For logistical reasons, disease detection is typically limited to planting material and very little information on RSD presence in commercial crops is available.

After harvesting, batches of cane, 'rakes' are transported to the sugar mill and crushed to release the sugar-containing juice.

This juice represents a pooled sample of hundreds of stalks from a particular field, and each of these rakes has associated information including cane variety, age and location. Detection of the RSD pathogen in pooled juice samples from every rake of cane entering the mill therefore represent an opportunity to avoid the issue of variability between stalks and plants, and directly link RSD status with crop locations. This project is undertaking pre-commercial testing of this approach, utilising a molecular assay for Lxx and LAMP technology.

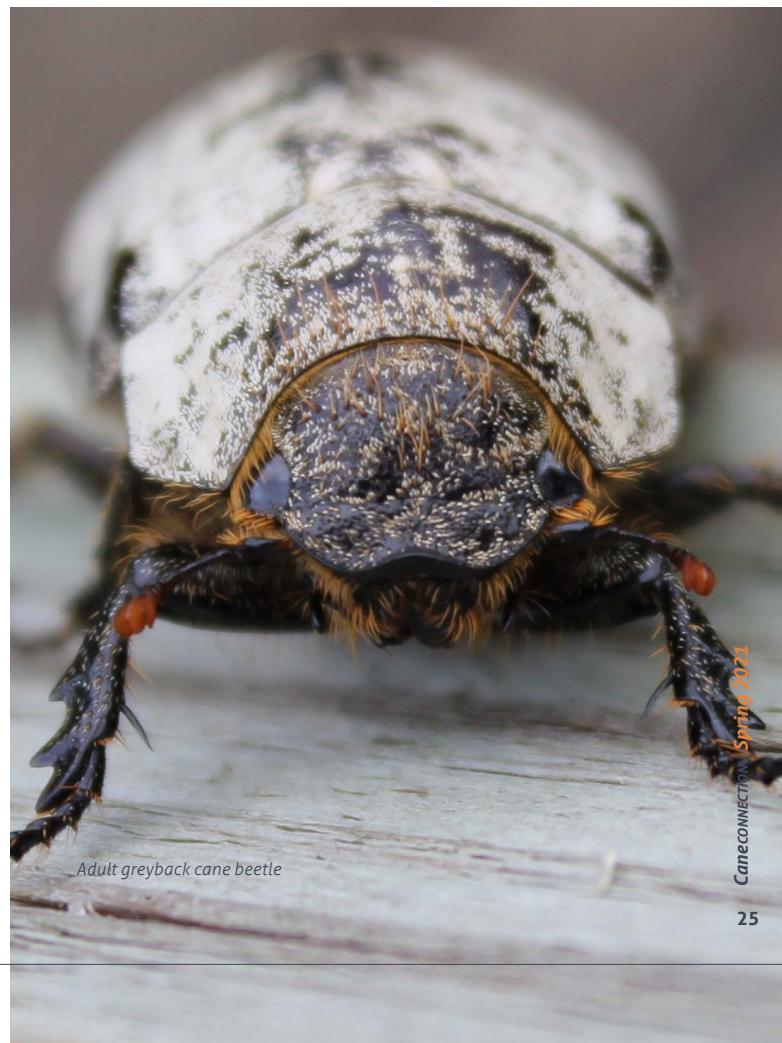
LAMP (Loop-mediated isothermal amplification) is a single-tube technique for the amplification of DNA and a low-cost alternative to detect certain diseases.

Expected outcomes for the industry include:

- for each mill that adopts this assay, it will provide an assessment of RSD levels in every commercial cane field within the corresponding mill area. This will provide a much greater understanding of the true incidence of this disease across the industry
- feedback provided from the mill to the grower, particularly when RSD is detected, will encourage growers to adopt the recommended guidelines for controlling RSD and will help growers decide whether to replant or ratoon for the following season.

These outcomes will lead to better management of RSD, and reduced yield losses as a result of the disease.

*SRA acknowledges the funding contribution of the Queensland Department of Agriculture and Fisheries towards this research activity.*



Adult greyback cane beetle

## RESEARCH PROJECT INVESTMENTS

PROJECT IDENTIFIER	TITLE	CHIEF INVESTIGATOR	RESEARCH AGENCY	END DATE
<b>↗ Research Mission 1: Continuous improvement in farming and milling profitability</b>				
2017/002	Implementing and validating genomic selection in SRA breeding programs to accelerate improvements in yield, commercial cane sugar, and other key traits	Ben Hayes	UQ	1/07/2022
2017/007	Investigations to mitigate the effects of juice degradation in factory evaporators on sugar recovery and quality, corrosion and effluent organic loading	Darryn Rackemann	QUT	1/03/2022
2018/003	Implementation of root system diagnostics to deliver a field-based measure for root health.	Johann Pierre	CSIRO	1/08/2021
2018/005	Genetic analysis and marker delivery for sugarcane breeding	Karen Aitken	CSIRO	30/06/2022
2019/002	Validating high-throughput phenomics technologies for sugarcane clonal selection	Sijesh Natarajan	SRA	30/09/2022
2019/004	Harvester losses assessment by real-time Machine Vision Systems	Cheryl McCarthy	USQ	1/01/2022
2019/005	Strategies to minimise impacts of processing existing soft cane varieties, and industry cost/benefit analysis	Floren Plaza	QUT	1/05/2021
2019/007	Eliminating roll arcing	Geoff Kent	QUT	1/08/2022
2019/901	Smarter Irrigation for Profit Phase 2	Multiple	CRDC	30/06/2022
2019/903	Australian sugar industry soil health benchmarking in the Central region of Qld - increasing profit and transforming soil health practices through competitive industry research, extension and adoption.	Farmacist	Zoe Eagger	31/10/2021
2019/904	Australian sugarcane industry soil health benchmarking in the Wet Tropics region of QLD - increasing profit and transforming soil health practices through cooperative industry research, extension and adoption	Charissa Rixon	TRAP Services	31/10/2021
2020/003	Maximising cane recovery through the development of a harvesting decision-support tool	Phil Patane	SRA	1/06/2023
2020/005	E-network for rail-based cane transport systems	Evangelos Themelios	Advisian Pty Ltd	30/06/2023
2020/009	Survey of Australian sugar cane farm business performance 2020–21 and 2021–22	Vernon Topp	ABARES	31/10/2021
2020/202	Improving pan stage performance by on-line monitoring of C seed grainings using the ITECA Crystobserver	Ashley Curran	Sunshine Sugar/QUT	1/05/2022
2021/002	Pre-commercial development, testing and validation of RSD LAMP assay for sugar mill roll-out	Prof Jimmy Botella	The University of Queensland	30/06/2022

	<b>Research Mission 2: Position the industry to stay ahead of climate, environmental and biosecurity threats</b>			
2017/809	Modern diagnostics for a safer Australian Sugar Industry	Nicole Thompson	SRA	30/06/2022
2018/010	Moth Borers – how are we going to manage them when they arrive?	Kevin Powell	SRA	1/08/2021
2020/002	Developing an integrated device for on-farm detection of sugarcane diseases	Muhammad Shiddiky	Griffith University	30/04/2023
2020/004	Beyond imidacloprid - chemical and biorational alternatives for managing canegrubs	Kevin Powell	SRA	1/02/2024
2020/007	Environmental DNA technologies and predictive modelling for rapid detection and identification of sugarcane priority pests and diseases	Andrew Weeks	EnviroDNA Pty Ltd	1/06/2024
2020/008	Transformational crop protection – Innovative RNAi bipesticides for management of sugarcane root feeding pests	Prof Neena Mitter	The University of Queensland	30/06/2024

	<b>Research Mission 3: Capitalise on changing consumer preferences, and the growing bio and green economies to develop diversification opportunities</b>			
2019/902	Biorefineries for profit - phase 2 (RR&D4P round 4)	Ian O'Hara	QUT	1/06/2022
2020/010	Sugarcane industry strategy and roadmap	John Sheehy	Pottinger Co	1/03/2022
2020/014	Sugar industry diversification opportunities investigation	Michael Wallis	Procom Consultants Pty Ltd	1/11/2021

PROJECT IDENTIFIER	TITLE	CHIEF INVESTIGATOR	RESEARCH AGENCY	END DATE
 <b>Research Mission 4: Position the Australian sugarcane industry as leaders in profitability, environmental sustainability and resource-use efficiency</b>				
2016/807	Support of cane farmer trials of enhanced efficiency fertilisers in the catchments of the Great Barrier Reef.	Julian Connellan	SRA	30/06/2022
2017/004	SIX EASY STEPS - continuing perspectives in time and space	Bernard Schroeder	USQ	1/02/2022
2017/008	Keeping our chemicals in their place - in the field	Emilie Fillols	SRA	1/07/2021
2019/803	Complete nutrient management planning for the Russell-Mulgrave and Lower Barron catchments	Cathy Mylrea	SRA	31/03/2022
2020/001	Environmental Risk Assessment & Life Cycle Assessment of the Raw Sugar Manufacturing	Stephen Weidermann	Integrity Ag	1/03/2023
2020/017	A common approach to sector-level greenhouse gas accounting for Australian sugarcane	Kate Ricketts	CSIRO	30/07/2022
2020/802	Mackay Whitsunday Cane to Creek	Matt Schembri	SRA	31/10/2023
2020/803	On ground testing and modelling of the effectiveness of Enhanced Efficiency Fertilisers in the Wet Tropics catchments of the Great Barrier Reef	Julian Connellan	SRA	30/06/2022
2020/804	Reducing herbicide usage on sugarcane farms in reef catchment areas with precise robotic weed control	Mostafa Rahimi Azghadi	JCU	31/08/2022
2020/805	Increasing industry productivity and profitability through transformational, whole of systems sugarcane approaches that deliver water quality benefits	Cathy Mylrea	SRA	30/06/2024

 <b>Research Mission 5: Support the development of an adaptable, professional, commercial and entrepreneurial industry and research community</b>				
2018/015	Sugar milling R&D capability building program	Dr Geoff Kent	QUT	30/09/2023
2018/101	New approaches to quantifying nitrogen fluxes in enhanced efficiency fertilisers in Australian sugarcane soils	Aiden Chin	UQ	1/06/2022
2018/102	Characterizing nitrogen use efficiency in sugarcane	Anoma Ranagalage	UQ	1/06/2022
2019/006	Australian sugar industry training - development of factory training modules - phase 2	David Moller	QUT	30/06/2022
2019/102	Genetic solutions for determining fibre quality traits in sugarcane	Karen Aitken	CSIRO	30/06/2023
2019/402	Enhancing the resilience of sugar canes with photoactive carbon nanodots	Qin Li	Griffith University	1/01/2021
2019/806	Advancing techniques for diagnosis of yellow canopy syndrome	Kevin Powell	SRA	13/04/2023
2020/101	Engineering bacterial enzyme secretion for cellulose utilisation	Dr James Behrendorff (supervisor, QUT); Madeline Smith (student, QUT)	QUT	1/02/2023
2020/402	Early detection of sugarcane diseases via hyperspectral imaging and deep learning	Jun Zhou	Griffith University	1/02/2022



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