Sugar Research Australia

Cane Matters

Summer 2024/25

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(Cover page) Wide Bay Pacific consultants Clive Keenan and Malcolm Prowse, with Isis Central Sugar Mill CEO Craig Wood, discussing algae production as a diversification option in the milling sector. (See story Page 20).

Editorial contributions by Sonia Campbell (Editor), Christine Walker, Alisa Cork and Mike Ebner. Design by Eli Lin.

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Queensland Government

Australian Government
Department of Agriculture, Fisheries and Forestry

A MESSAGE *from* **CEO, Mick Bartlett**

As I sit here writing this message, I continue to filter through the plethora of opinions and information delivered to SRA through my visit to the regions over the last month. Sometimes blunt, often supportive but always valuable and constructive, this information will be used to guide the prevailing concerns SRA needs to address on behalf of our stakeholders in the coming years.

It was with great pleasure that SRA and the Queensland DPI announced that $32.6 million will be invested into research to promote sustainability, productivity and profitability in the Australian sugar milling and growing sectors over the next four years. Investment areas include:

- $6 million to create transformational breeding technologies to develop high yielding and disease resistant varieties, and explore the potential for energy cane
- $12.1 million to overcome agronomic production constraints, optimise crop management, and improve the industry's sustainability credentials to maintain market access for Australian sugar
- $6.8 million to develop sustainable management approaches for pests, weeds and pathogens and biosecurity preparedness
- $5.5 million to optimise operations for enhanced milling efficiency and develop opportunities to diversify revenue streams in the bioeconomy
- $2.2 million to increase adoption of available technologies that increase productivity, profitability and sustainability for sugarcane growers, millers, and regional communities.

Each of these projects has the potential to deliver real, quantifiable and executable positive benefits for our Australian milling and growing communities.

It is also important to note that the funding recognises the importance of collaboration, with 50 percent of these projects involving external research partners.

I would like to thank the multitude of industry stakeholders who have given me their time over the past month and sincerely look forward to keeping these open and transparent communications active into the future.

Mick Bartlett
Chief Executive Officer

CEO Mick Bartlett visited Bruce Peterson's farm during a visit to Bundaberg and Isis sugarcane regions.

NEW CEO'S REGIONAL TOUR

New CEO Mick Bartlett has spent his first two months in the role getting to know the industry and its people, visiting all five sugarcane growing districts across Queensland and New South Wales, since mid-October.

Mr Barlett's comprehensive tour has so far included face-to-face meetings with growers, millers, industry representatives and SRA staff. It's also involved on-site demonstrations, farm visits and mill tours across all growing districts including the Far North, North, Burdekin, Central and Southern.

Mr Barlett described the on-the-ground catchups with growers and various other industry stakeholders as very productive and the ideal way to get to know the grassroots concerns and issues for industry.

"It's been a whirlwind start to the role, but a great start. I'm very grateful to those who have taken the time to come along and meet with me, and provide a crucial insight into this exciting industry," Mr Bartlett said.

"The issues and problems identified by millers, growers and industry stakeholders provide SRA with opportunities to address the same.

"It has been fantastic to meet so many driven people who are passionate about the industry and its progress. I'm confident and committed to ensuring SRA plays a positive nexus in the profitability, progression and sustainability of the sugar industry in Australia."

NEW CHAIR ELECTED AT 2024 AGM

The SRA 2024 Annual General Meeting was held on 26 November at The Atrium (UQ), Brisbane, with SRA members also invited to attend the meeting online. One of the agenda items for the AGM was the election of new directors to the Board of SRA.

Former SRA Chair, Rowena McNally, concluded her term at this AGM, opening the way for the election of a new Chair.

The candidates put forward for election at the recommendation of the Director Selection Committee (DSC) – an independent committee whose members are made up of grower and miller representatives – included Rowley Winten, who was re-elected as Director, Mike Barry who was elected Chair of the SRA Board, and Haydn Slattery, also was elected as a new Director.

Mike Barry (Chair)

Mike Barry began his executive career at Boral, holding senior management roles across both the Building Products and Construction Materials divisions. In 2007, he joined MSF Sugar as Chief Executive Officer (CEO) and held that position for 13 years until 2020. After MSF Sugar was acquired by Mitr Phol in 2012, Mike became Chief Operations Officer (COO) and took on the responsibility for the Laos operations and led Mitr Phol's investment into Indonesia. More recently, Mike has been the Chairman of a number of listed and unlisted public and private companies. Mike has a Bachelor of Business from the Queensland University of Technology (QUT) and an MBA from the University of Queensland (UQ).

Haydn Slattery

Haydn Slattery is an experienced operational manager with a technical background in Applied Science. He has held senior roles in Australian and internationally listed businesses, his most recent being an executive role with ASX 300 listed agribusiness, Ridley Corporation. Haydn has 20 years' experience in both sugar milling and refining, in senior roles with CSR (now Wilmar), Mackay Sugar and Mossman Central Mill. Haydn's experience spans 30 years in various industries including agriculture, mining, utilities, and manufacturing, and has held Board positions with several sugar industry joint ventures and agricultural services companies. He is a graduate of the Australian Institute of Company Directors.

2023/24 ANNUAL REPORT RELEASED

SRA's latest Annual Report is filled with information about the impact that SRA's research has on the sugarcane industry and case studies demonstrating the work our researchers are doing in alignment with SRA's Research Missions.

Read the Annual Report and use it as a reference guide for our portfolio balance summary and statutory reporting against key performance indicators.
Now available on the SRA website, hard copies of the Annual Report are also available by emailing communcations@sugarresearch.com.au

SRA Field Operations Leader, Far North, Ken Clarke, is featured on the cover of this year's Annual Report.

NEW GM VARIETY DEVELOPMENT APPOINTED

Following an extensive recruitment process, Sugar Research Australia's newly appointed General Manager – Variety Development, Dr Garry Rosewarne will commence with SRA on 28 January.

Dr Rosewarne joins the company from Agriculture Victoria, where he has served as Research Director – Plant Production Sciences.

He will bring a wealth of plant breeding experience to SRA, having worked both in Australia and abroad throughout his career.

Dr Rosewarne has a list of R&D projects to his name, leading numerous successful plant breeding programs, such as the National Lentil Breeding and Lentil Breeding Infrastructure programs, jointly funded by the Grains Research and Development Corporation (GRDC) and Agriculture Victoria.

In his role as Research Director of Plant Production Sciences, Dr Rosewarne has had oversight of more than 40 staff across the Crop Agronomy, Grains Chemistry and Horticulture programs. In addition, he has led a team of 20 as part of his role in the National Lentil and Field Pea Breeding Program.

Dr Rosewarne has held senior research positions at CSIRO in Canberra, for the International Maize and Wheat Improvement Centre (CIMMYT) in Mexico and China, and currently holds the positions of President of the Pulse Grains Society of Australia, Principal Research Fellow at University of Queensland, and Senior Fellow at University of Melbourne.

Dr Rosewarne is looking forward to joining SRA in Queensland after making the move from Horsham, Victoria in January.

SRA's newly appointed General Manager – Variety Development, Dr Garry Rosewarne will join SRA in January.

NEW SRA WEBSITE

The SRA website has been redeveloped to enable better use for growers, millers and researchers. The refreshed website is responsive which will allow easier use and functionality across all devices including computers, tablets and mobile phones.

Growers will find all their useful resources in the Growers' section with easy access from the specialised menu. Grower resources include information about varieties, nutrient management, farming systems, irrigation, pests, diseases, weed management and biosecurity, as well as useful related Tools, Apps and other resources.

Millers can access specific miller information in the Miller menu including projects, statistics, videos and more.

Researchers will find easy access to useful forms, research projects and other integral research and development information.

The website is also your gateway to learn more about SRA projects and what is happening in our industry.

You can discover local events and webinars and read an array of publications including Variety Guides, District Productivity Plans, *Cane Matters* and valuable manuals, among other handy and informative resources.

We encourage you to visit the website and make continuous use of this important online resource for the Australian sugarcane industry.

Visit: www.sugarresearch.com.au

SRA INDEPENDENT PERFORMANCE REVIEWED

Last November, SRA engaged advisory firm GHD to conduct a comprehensive review of our performance against the Performance Principles outlined in the *Guidelines for Statutory Funding Agreements*, the SRA constitution, and the *Sugar Research and Development Services Act 2013 (Cth)*. This review was in accordance with the Statutory Funding Agreement (SFA) 2021-2031 between Sugar Research Australia (SRA) and the Australian Government's Department of Agriculture, Fisheries and Forestry (DAFF).

GHD undertook a review of SRA's business practices from 2020 to 2023, which included a desktop analysis of over 250 documents, and consultations with 65 internal and external stakeholders. This group included industry and government investors, representative bodies, research delivery partners, and staff.

The review found that SRA met all obligations, with the exception of an issue relating to the Annual Operating Plan 2021-22 not meeting constitutional requirements. It recognised our extensive stakeholder consultation efforts but recommended adopting a more structured, strategic approach with formalised mechanisms for improvement.

The review also called for clearer reporting of investment allocations to Australian Government priorities and greater transparency regarding core and contestable research funding. Additionally, while we collaborate regularly with research partners, the review noted underutilisation of available funding from our key investment partner, the then Queensland Government's Department of Agriculture and Fisheries (DAF), now Department of Primary Industries (DPI).

The review highlighted the recent improvements implemented by the Board to address conflicts of interest and policy gaps. Finally, for monitoring and evaluation, the review found SRA's practices aligned with the Performance Principles and recommended continuing planned improvements.

The Board accepted all 20 recommendations, with two rated as priorities and 18 items recommended for continuous improvement.

At the core of our response is SRA's commitment to deepening engagement with industry and government stakeholders.

SRA acknowledges the concerns highlighted in the review, particularly regarding leadership changes, the need for more structured and visible investment planning and procurement, and governance structures to manage potential conflicts from our dual role as both research investor and provider.

These issues justifiably raise concerns about our capacity to invest in and deliver impactful research for the Australian sugarcane industry. We will endeavour to address these concerns through the actions outlined in the Response Plan and will regularly collect and act on feedback.

SRA would like to thank all growers, milling companies, industry and government representatives, delivery partners, and staff, for their valuable feedback.

We look forward to implementing the Response Plan alongside our strategic and investment plans. In achieving these priorities, we aim to demonstrate our vision to support the sugarcane industry in becoming more competitive, productive, and sustainable through innovative research and product development.

SRA CEO Mick Bartlett (pictured left) is shown around the glasshouse at Meringa by SRA Weed Scientist Emilie Fillols.

STRONG RESPONSE TO PARAQUAT SURVEY

More than 600 growers participated in an on-line SRA paraquat survey, providing feedback on proposed restrictions to the herbicide's use by the Australian Pesticides and Veterinary Medicines Authority (APVMA).

The proposed regulatory changes would prohibit paraquat from being applied in sugarcane; a move that would have significant impacts on sugarcane growers and their businesses.

The APVMA made the proposed regulatory announcement in late July, opening a three-month public consultation phase for industry to provide submissions to the regulator.

During this period, SRA's Weed Scientist Emilie Fillols worked closely with CANEGROWERS, along with other industry organisations and impacted industries to review the APVMA's justification for the restrictions and to formulate an industry response.

The APVMA's proposed recommendations resulted from a health and safety assessment, a residue and trade assessment and an environmental risk assessment. It is their environmental risk assessment which indicated potential impacts on wildlife, which was behind the significant restriction proposed.

Growers were asked for their feedback on the implications of the proposed changes on their farming businesses, via an online survey.

The anonymous responses were aggregated to form part of SRA's submission to the APVMA, which was lodged on 29 October 2024. The submission strongly communicated the consequences of such a decision, including impacts on productivity, cost of production, and the environment. It proposed less stringent restrictions based on new environmental risk thresholds refined by the Australian Environmental Agency during the consultation period.

All submissions received by the APVMA during the consultation period are now being considered by the regulatory body as part of their review. A summary of these submissions and the APVMA's response to them will be included in a Final Review Technical Report.

A final decision by the APVMA is scheduled for public release on 28 February 2025.

The complete results of the SRA grower paraquat survey can be found via the URL link below.
https://sugarresearch.com.au/wp-content/uploads/2024/10/Paraquat-Survey-report.pdf

HAVING YOUR SAY ABOUT SRA

Listening to and understanding the needs and views of growers and milling companies is a priority for SRA. It helps to prioritise investment in research priorities and to identify areas for improved engagement and delivery of research products, as well as letting SRA know how it is performing and where it can improve in general.

During October, an independent research agency, Intuitive Solutions, undertook randomised telephone surveys on SRA's behalf to give growers and representatives from milling companies the opportunity to provide feedback about the organisation and research priorities for future funding.

To protect your privacy, Intuitive Solutions has kept all individual responses anonymous.

SRA will receive only aggregated feedback, with comments anonymised and not attributed to specific individuals.

The full results of the survey will be published on the SRA website in December 2024.

SRA CEO Mick Bartlett (pictured left) with SRA GM Research and Business Development Tinashe Chiurugwi.

SUGARCANE INDUSTRY TO BENEFIT FROM $32.6M RESEARCH AND DEVELOPMENT INJECTION

Up to $32.6 million over four years will be invested in the future of Australia's sugarcane industry with research and development projects set to increase the productivity, profitability and sustainability of the Australian sugarcane industry.

Sugar Research Australia (SRA) and the Queensland Government's Department of Primary Industries (DPI) are investing in a diverse portfolio of novel and strategic research activities.

The new projects will target improved efficiency, competitiveness, sustainability and innovation for Australian sugarcane growers, milling companies, and regional communities.

Funding will be allocated as follows:

- $6 million to create transformational breeding technologies to develop high yielding and disease resistant varieties, and explore the potential for energy cane
- $12.1 million to overcome agronomic production constraints, optimise crop management, and improve the industry's sustainability credentials to maintain market access for Australian sugar
- $6.8 million to develop sustainable management approaches for pests, weeds and pathogens and biosecurity preparedness
- $5.5 million to optimise operations for enhanced milling efficiency and develop opportunities to diversify revenue streams in the bioeconomy
- $2.2 million to increase adoption of available technologies that increase productivity, profitability and sustainability for sugarcane growers, millers, and regional communities

SRA and DPI will make the transformational investment following the conclusion of SRA's 10th Anniversary Research Fund Call, a fund established in November 2023 to commemorate 10 years since the organisation's formation.

SRA CEO Mick Bartlett said the rigorous multi-step approval process for applicants ensured that projects with the strongest potential to deliver real change and positive industry-wide outcomes were successful.

"The calibre of submissions was exemplary and represents the strong scientific standing we have in the sugar industry, particularly within SRA," Mr Bartlett said.

"Each of these projects has the potential to deliver positive change, and whole-of-industry research outcomes capable of being adopted on farm and within the milling sector."

The successful projects cover a broad spectrum of key industry challenges, from agronomy and farming systems, to crop protection, variety development, growing and milling.

Minister for Primary Industries Tony Perrett said the Queensland Government had a long history of supporting research, development and extension (RD&E) activities within the sugarcane industry driving improvements in productivity and profitability.

"We know RD&E is critical to help industry gain improvements in production, leading to longer term prosperity. This helps farmers and also helps local communities," Minister Perrett said.

"Supporting our key agricultural industries, together with industry partners like SRA, helps our farmers solve critical problems and lets them get on with the job of producing the world's best food and fibre.

"These projects will help gain a greater understanding of industry problems, apply and adopt advanced technology, and test and implement cutting-edge farming practices to create a stronger, sustainable industry.

"The Crisafulli Government values this important relationship with SRA in supporting one of Queensland's traditional primary industries and a key pillar in our state's economy."

The projects are a mix of new research, as well as extensions to existing projects that can now be further developed.

SRA opened submissions to its 10th Anniversary Research Fund in November 2023.

More than 160 applications were received, with each submission assessed on its potential to deliver positive adoption outcomes for the Australian sugar industry.

"Our Board is committed to investing in sound research activities that foster successful collaborations and partnerships, but also deliver meaningful outcomes that benefit both our growers and millers," Mr Bartlett said.

"Each of these projects is underpinned by a motivation to drive positive change, that brightens the future for the entire Australian sugarcane industry."

The 10th Anniversary Fund was approved by the SRA Board as additional funding to its existing portfolio of research projects, aligning with SRA Strategic Plan 2021-2026.

Detailed information about each of the approved projects will be published on the SRA website over coming weeks.

CENTRE OF EXCELLENCE WORKSHOPPED AT BRISBANE MEETING OF MILLERS

Australian sugar millers, researchers and SRA personnel gathered in Brisbane in November to discuss the prospect of establishing an Advanced Sugar Manufacturing Centre of Excellence.

The aim of the Centre of Excellence is to improve research, development and extension capabilities, and position the sector to take advantage of advanced manufacturing and diversification opportunities.

The Australian sugar milling industry, with its 21 sugar mills along Queensland's coastline and into northern New South Wales, plays a crucial economic role, contributing $3.7 billion annually to the Queensland economy, and employing almost 20,000 regionally-based staff.

However, the sector faces pressing challenges including profitability, operational inefficiency, workforce shortages and limited opportunities to diversify income.

A Centre of Excellence can address these challenges by securing top researchers, attracting funding and accelerating adoption of new technologies. This will enhance the efficiency and sustainability of today's milling operations, build a skilled workforce and unlock new income streams for the Australian sugar milling industry in the future.

The workshop focused on defining the Centre's strategic priorities, structure, governance and funding models. The aim is to develop a practical roadmap to establish and operate the Centre to benefit all Australian sugar mills.

The next steps will involve developing a comprehensive overview for industry stakeholders and government agencies.

By establishing this Centre of Excellence, the Australian sugar milling industry aims to ensure its short-term profitability and long-term viability.

Pictured below (L-R) - Attendees at the November meeting to discuss the establishment of an Advanced Sugar Manufacturing Centre of Excellence included Jane Trindall, SRA; David Green, Sugar Research Limited; Tinashe Chiurugwi, SRA; Peter Flanders, Mackay Sugar; David Heck, Rocky Point Mill and Paul Benecke, SRA Research Funding Panel.

SRA Entomology Leader Dr Kevin Powell (pictured above far left and right with three local research workers) during a recent visit to Indonesia where he surveyed fire damage to trial plots that have been used to test a range of systemic insecticide products for their efficacy in the control of moth borers. Duplicate trial plots, estalished in Papua New Guinea (pictured centre) were also recently destroyed by fire.

SETBACK FOR INTERNATIONAL MOTH BORER PROJECT

An international research project aimed at protecting the Australian sugarcane industry from one of its biggest biosecurity threats has suffered a major setback, just before final assessments on the trials, with fires destroying crucial trial plots.

Over the past four years, SRA Entomology Leader, Dr Kevin Powell, has established field trials in Papua New Guinea (PNG) and Indonesia, testing selected systemic insecticide products for their efficacy in the control of moth borers.

Moth borers are one of the most destructive pests in sugarcane growing regions of Southeast Asia and the Pacific, including PNG and Indonesia, and have long been considered one of Australia's most significant exotic biosecurity risks.

If Australia was to ever have an incursion of an exotic moth borer, a permit application would need to be submitted to the Australian Pesticides and Veterinary Medicines Authority (APVMA) for the emergency use of a chemical control agent to help manage an outbreak.

To test the efficacy of different chemical formulations, that could be used under an emergency permit, Dr Powell has conducted field trials in PNG and Indonesia applying treatments on plant and ratoon crops for successive seasons. There was one unavoidable disruption due to COVID-19, which prevented Dr Powell from travelling to both countries. However, once international travel resumed, the trials continued.

"We have been trialing different formulations and application procedures for chemicals. One chemical active has shown a lot of promise for the control of at least two species of moth borers – a stem and a top shoot borer," Dr Powell explained.

"In the plant and ratoon crop trials, we conducted damage assessments three months after treatment application, and then returned again at six months to do further sampling.

"This was to look at how much damage the borers had caused and to see how effective the treatments were; and that part of the trial went very smoothly, and we collected a lot of data.

"However, the final part of that work was to see how much impact the borers had had on the final yield of the sugarcane, and how the treatments had affected that yield and final damage. So, we were running duplicate trials in PNG and Indonesia to conduct this work."

On returning to PNG in September to gather the final yield data, Dr Powell discovered the trial plots had been completely destroyed by fire. As a result, no final harvest data could be collected.

"It's disappointing, because what we were trying to do is get enough data to supply to the APVMA for potential emergency use permits, because if these moth borers were to get into the country, we would need to be able to control them very quickly," Dr Powell said.

"We will be able to analyse the initial data collected, which will tell us about the efficacy of the chemicals against the moth borers, but we don't have data on the economic impacts on the final yield."

In another crucial blow, Dr Powell found out, soon after, that two other trial sites had been burnt in a similar fashion in Indonesia. One trial site was completely burnt, however the other was only partially burnt, which meant some yield data could be salvaged.

Once analysed, Dr Powell will present the data to the APVMA and determine whether it is adequate or if more trial work and data is required.

"We will need to analyse the data that we do have, and compare it to previous datasets, because this year we were using different formulations of a chemical previously used, so it was quite a critical year to get that yield data and final damage assessment.

"But this is always one of the challenges of working in other countries, because you can't be there 24/7. The people on the ground in both countries were really devastated, because they have worked on the trials with me for the entire season and we were just coming up to the crucial final assessment.

"It's a critical piece of research work, because if moth borers do arrive in Australia, they could be devastating, and we might get up to 70 percent yield loss if we don't control them quickly and restrict their spread."

Dr Powell said all data collected during the trials would form a final report to be delivered in May 2025. Only after a final analysis is completed, will a decision be made on whether more trials are required.

Project 2018/010 is funded by Sugar Research Australia and the Department of Primary Industries. It is an international research collaboration by SRA, the Indonesian Sugar Research Institute and Ramu Agri Industries in Papua New Guinea (PNG).

Queensland Government

NEW SRA PROJECT TO PROTECT AGAINST FUTURE EXOTIC THREAT - WHITE LEAF DISEASE

Increasing the Australian sugar industry's preparedness for exotic disease threats will be further bolstered by a new international research investment by SRA.

Project 2024/401, 'Proactive preparedness for incursion of Leafhopper Vectors of White Leaf Disease – A major biosecurity threat', is a 12-month project being led by SRA Entomology Leader, Dr Kevin Powell.

White leaf symptoms present in a sugarcane plant in Thailand (September 2024)

White leaf disease (WLD) is a severe disease affecting sugarcane, particularly in some countries in Southeast Asia. First discovered in the 1950s in Thailand, it has caused significant yield losses in sugarcane producing areas of Thailand and India.

Dr Powell recently travelled to Thailand where he established the foundations of a new international collaboration with the University of Khon Kaen, which will involve investigating disease vectors – insects known to spread WLD.

"Khon Kaen University is one of the main experts in white leaf disease, so we are working with them to investigate the ways they manage the disease and how we may potentially monitor for vectors of the disease in Australia. So it's all about taking a proactive approach to our biosecurity preparedness," Dr Powell said.

"At the moment there are some of our neighbouring countries like Indonesia that don't have white leaf disease – Papua New Guinea (PNG) also doesn't have the disease – however the actual vectors, the insects that can carry white leaf disease, one of these species is actually present in PNG.

"So, you have to ask: How close is the vector (to Australia)? How close is the pathogen? And, if these two meet, how long is it going to take before they potentially arrive in Australia?"

Currently two insects are the main vectors for WLD and they are both present in Thailand - the scientific names of these leafhoppers are *Matsumuratettix hiroglyphicus* and *Yamatotettix flavovittatus*.

The vectors increase the dispersal of WLD both within already diseased crops and between diseased and healthy crops and are active at different times of the year. This makes management challenging.

"Overseas, white leaf disease causes about 20 percent loss to crops. At the moment there are two main leafhopper vectors, but if there are other vectors, then it becomes more of a problem," Dr Powell said.

"I'll be returning to Thailand early next year to set up some leaf hopper traps, to see how we may potentially monitor for vectors in Australia. I'm also going to be setting up collaborations in Papua New Guinea and Indonesia, to see if we can detect vectors in those countries as well. Although this project is only for 12 months it will give us a good set of baseline information. This will help should there be any future incursion of WLD.

"It's important to know exactly where the vectors are. It's all about information gathering, but also pre-emptive monitoring as well."

Project 2024/401, 'Proactive preparedness for incursion of Leafhopper Vectors of White Leaf Disease – A major biosecurity threat', is a 12-month project led by SRA Entomology Leader, Dr Kevin Powell.

SRA Entomology Research Technician Dr Samuel Bawa will undertake a 12-month pilot study targeting sugarcane's most destructive insect pest – the canegrub.

STUDY TO TRIAL NEW TACTIC IN CANEGRUB CONTROL

Targeting the Australian sugarcane industry's most destructive insect pest at its host source, is the aim of a new pilot study funded by SRA.

SRA Entomology Research Technician Dr Samuel Bawa will take a new approach to canegrub management efforts, during a 12-month study to identify volatile compounds present in host plants, which naturally attract, adult cane beetles.

"Most of the trial work we have done in the past and continue to do in canegrub management has targeted the (canegrub) larvae, through testing different chemical and biological insecticide products," Dr Bawa explained.

"But what we are trying to do in this project is target a different part of the life-cycle – the adult cane beetles – and identifying the volatiles present in the host plants which attract the adult beetles, where they feed and breed on these plants."

A volatile is a naturally occurring, organic chemical, that is found in host plants and released through different parts of the plants, such as the leaves, roots and stem, attracting the pest.

If volatiles from host plants can be identified, Dr Bawa said it would ultimately open the way for the development of a natural alternative to existing chemical management techniques.

"The first stage of this pilot project is to identify the host plant's volatile profile. Once we get that, the next stage would be to conduct behavioural bioassays in the lab to identify the most attractive volatile organic compound that could lead to developing a synthetic product, that mimics that volatile compound," Dr Bawa said.

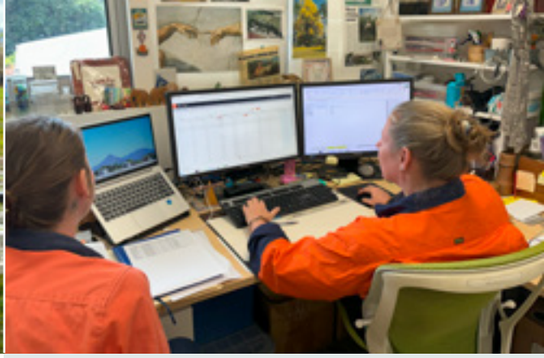
"In nature, when adult cane beetles emerge from the soil, they will identify a host plant that they will feed on and breed. After that, the beetle will lay their eggs in the soil next to the cane, and when hatched, the larvae will dig down and start attacking the sugarcane roots.

"It's not the adult beetles that feed off the roots of the cane, it's the larvae. So, if we can develop a synthetic compound that attracts the cane beetle in the same way as the host plant, we can use this to eventually develop a commercial product to use in traps, to trap the cane beetles, before they have a chance to lay their eggs in the soil."

Dr Bawa begins project 2024/402 on 19 December 2024 and will work in collaboration with the University of New England throughout the trial.

If he is successful in identifying the volatiles which attract the adult beetle, it could potentially lead to either a significant shift away from existing chemical management or be incorporated in an integrated approach to target both adults and larvae.

Project 2024-402 – The Sweet Smell of Success – Sustainable Canegrub Management using Host Plant Volatiles is funded by Sugar Research Australia (SRA) and is being run in conjunction with the University of New England (UNE).



Northern Senior Plant Breeding Technician, Vivien Dunne (pictured right) inspects parents from SRA's photoperiod facilities to assess if their flowers are ready for cross-pollination.

Plant Breeding Technician Danielle Simcock (above left) and Northern Variety Development Manager Dr Felicity Atkin, also inspect and pluck any florets with open anthers from sugarcane flowers for pollen testing during the cross-pollination process at SRA Meringa.

All possible cross combinations (combinations of female parents matched with male parents) for the day, based on available breeding data are generated, interrogated and ranked in SPIDNet. After careful consideration, cross combinations are selected and recorded on SPIDNet, to achieve the specific breeding objectives for each of SRA's regional selection programs.

PART 1

MAGIC AT **MERINGA**

THE SCIENCE AND SOPHISTICATION BEHIND SRA'S EFFORTS TO PRODUCE NEW SUGARCANE VARIETIES FOR COMMERCIAL RELEASE

Most people involved in the Australian sugarcane industry are familiar with the end-product of Sugar Research Australia's efforts to release new varieties to industry each year for commercial use. However, less is known about just how SRA actually produces new genotypes for testing in its selection programs.

Here in the first of a two-part series, we shine a light on this meticulous process – beginning with the creation of new genotypes through cross-pollination.

Tucked away off the Bruce Highway south of Cairns, in Queensland's Far North, SRA's Meringa Station has been the main variety breeding facility for the Australian sugarcane industry for almost 100 years.

It's here, amongst its unassuming buildings, photoperiod facilities, laboratories and trial plots, that the intricate work of creating new, commercially-viable sugarcane varieties for Australian cane growers and millers takes place.

Developing new cane varieties, with superior productivity and agronomic traits such as high yield, sugar content (CCS) and good resistance to disease, is central to helping the industry to remain productive, sustainable and profitable.

However – as with most significant scientific breakthroughs – producing a new variety that outperforms existing, commercially-proven varieties, takes many years of experimental genetic crossing, research and development.

Only the best progress

At any one time, more than 70,000 experimental clones are under trial at various stages of selection at the experiment station.

However, of these, only an elite few will progress through to commercial release; after approximately 13 years of rigorous testing, trial work and industry endorsement.

Here, we give an insight into the complex work undertaken by SRA's dedicated Variety Development team, to bring the best-of-the-best varieties to commercial evolution.

Where it begins – The crossing process

The journey to develop a new sugarcane variety begins at Meringa by creating new genotypes (or individuals with different sources of genetic variation) through cross-pollination of existing sugarcane varieties used as parents, varieties which have the breeding potential of passing on their favourable traits to their offspring.

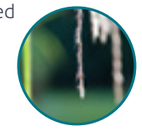
SRA's parent population includes previous and current commercial varieties, experimental clones which never made the commercial grade but are ideal parents, elite clones from each of SRA's regional selection programs, international varieties, and Introgression clones containing wild genes.

Approximately 2,500 parents are maintained either in one of SRA's climate-controlled photoperiod facilities (pictured above left), or infield, in one of the station's numerous 'arrowing' or flowering blocks (pictured above right) or in a parent holding block (while parents' offspring are being trialled to assess the future use of a parent).

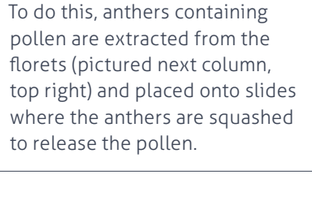
However, not all 2,500 parents are used annually.

"Generally, we inspect up to 500 parents two to three times a week, depending on if we are doing field or photoperiod (PF) crossing," Northern Variety Development Manager Dr Felicity Atkin explains.

"We look to see which parents are flowering, and how many flowers we've got of each of those parents. What we are looking for is when the anthers at the top of the flower are just starting to open (pictured right). That's when we know the parents are ready for crossing," she said.



Once the parents are assessed, available flowers of each parent for that day are recorded in SRA's plant breeding database called SPIDNet, by scanning a barcode assigned to each flower on a mobile device (pictured below).



This allows full traceability from cross to commercial release, as every step of the crossing and selection process is barcoded and recorded in SPIDNet (including seed or cane movement, propagation, trial performance and disease screening).

This means SRA can manage the breeding and selection performance of every genotype, and trace every commercial variety back to the original cross made to produce it.

A tiny botanical gender reveal

Florets from the flowers of selected parents are brought back to the laboratory at Meringa Station to determine if the parent will be used as a male or female. This is determined by how much viable pollen a flower produces.

To do this, anthers containing pollen are extracted from the florets (pictured next column, top right) and placed onto slides where the anthers are squashed to release the pollen.

A basic starch test using a drop of potassium iodide is then conducted on the pollen grains (pictured below).

An assessment of the percentage of viable pollen present under a microscope is used to determine the gender (pictured below).

A parent that produces more than 20 percent viable pollen is considered a male, and any less it is used as a female. This process is conducted each time a crossing session is carried out at the station, as pollen viability is sensitive to nocturnal temperatures, and male sterility is often experienced when night-time temperatures drop below 18 degrees Celsius.

These changes in pollen viability often results in some parents being used as both a male and a female at different times during a crossing season.

Shuffling the genetic deck

"Once we know what males and what females we have, we use various types of information, to determine which of those parents we match together," Dr Atkin said.

"This information includes the average breeding value of two parents as potential cross combination, that is, their potential to pass on their favourable genes to their offspring, such as cane yield, sugar content and disease resistance.

"We also use pedigree information, as we don't want to match close relatives together, such as brothers and sisters. This part of the process is very important as the more distantly related two parents are, the more variation we get.

"Pollen compatibility between two parents is also an important consideration – we want to make sure the male parent is strong enough to pollinate the female parent to maximise seed viability after pollination.

"Previous success of a female by male combination is also used in our assessments (including how many offspring have made it to the final assessment selection stage or to commercial release). Current seed availability is also considered, as there is no sense in wasting valuable/limited flowers if a cross combination is currently available in good quantities.

"And finally, we also consider, is the cross combination wanted by one or more of the selection programs? A list of commissioned crosses from each of SRA's regional selection programs is used to guide the cross-selection process."

By crossing two parents together, this reshuffles the genes of each parent to create new sources of genetic variation, which creates the seedlings that form the basis or starting population of SRA's variety selection process.

Continues Page 16...

THE CROSSING PROCESS
WHERE THE MAGIC HAPPENS

Once the cross combinations (or the happy couples) are selected, the flowers are then arranged together in SRA's crossing paddock (or 'the honeymoon suite' as it is affectionately known by SRA breeding staff).

Before the male and female flowers are placed together, the female flower is inspected once more, and any open florets are plucked off just in case this female plant has already been pollinated in the field, to ensure controlled pollination will occur (pictured above).

"It's very important to trace the pedigree of each of our crosses as this information is used to assess the breeding value of a parent, so bringing the female flowers back to a virgin state by plucking off any open anthers is crucial. We want to make sure we know which male has pollinated which female," Dr Atkin said.

Match-making in the honeymoon suite

Each cross is then carefully arranged in a fabric hanging lantern for controlled pollination and tied together (pictured above), with the cut stalks of each flower placed into a crossing solution to keep the flowers alive for up to eight weeks during the pollination and ripening processes.

The male flowers are also placed approximately one foot above the female flowers, so that the male flowers' pollen dusts the female flowers when they shed pollen, to maximise the fertilisation process and seed viability of each cross.

Once the crosses are arranged, the lanterns are then tied shut to ensure controlled pollination takes place (pictured below). This is to prevent the pollen from any (unwanted) male flowers accidentally contaminating and pollinating the female flowers, resulting in an unwanted or undesirable match.

"By crossing parent A with parent B, we are re-sorting the genes and creating new (and ideally improved) sources of genetic variation, from which we then select to grow as the start of our SRA selection programs across the regions," Dr Atkin said.

"On average we make approximately 1,000 unique cross-combinations each year, and in a good year we can make as many as 2,500, but we tend to focus on quality rather than quantity."

During the cross-pollination process, the plants are kept inside the lanterns for two weeks. This is how long it can take for each flower to open up and for complete pollination to occur.

After two weeks, the male flowers have done their job and are discarded. The female flowers are also removed from the lantern so the lantern can be used for another crossing. But the females are kept alive for an additional three to six weeks to allow the seed to mature for 'good seed set', that is, a healthy number of viable seeds to generate the initial selection population for the start of the selection program. Before that happens, the variety breeding team assesses each cross to see how much viable seed has been produced.

Evaluating seedling success

Once the seed from each female flower has matured, the flowers are harvested in the crossing paddock, stored in muslin bags and dried down for a minimum of four days in Meringa's de-humidifying chamber (pictured below) at 11 degrees Celsius and 13 percent humidity.

Once dried, the seed can be harvested from each female flower and the breeding team can start evaluating just how successful their crossing efforts have been.

"The process starts by weighing the seed from each cross (pictured below), and anything yielding more than five grams of seed we will take a one gram sample from and perform a germination test on them," Dr Atkin explains.

"Based on that germination test, we will determine either how many bags of seed we will get per cross, or whether we discard that cross. Generally, we discard up to 30 per cent of the crosses that we make, just because the percentage of viable seed is too low or there was no pollination at all."

The viable seeds are vacuum packed and stored in SRA's seed freezer at -20 degrees Celsius where they can remain viable for future use. This seed will be used to produce the starting population for the first stage of the selection program.

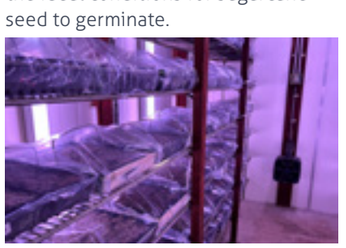
"From the crossing work, we select the best crosses to germinate approximately 100,000 seedlings which are all genetically unique to start the selection process," Dr Atkin said.

"So, the elite cross combinations will potentially be the source of new commercial varieties released in 13 years' time."

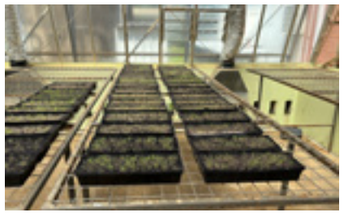
Germination - The start of the selection process

Each year, seed selected from the most recent crossing efforts are germinated in the Meringa, Ingham, Burdekin and Mackay stations to produce starting populations for the Northern and Herbert (Meringa), Introgression (Ingham), Burdekin (Ayr), and the Central, Southern and New South Wales selection programs (Central), respectively.

Sugarcane seed (also known as fuzz) are spread onto the surface of trays of seedling raising mix, sprayed with a fungicide and watered in (pictured above) where they are then covered in plastic to create a warm moist microclimate in a germination chamber (pictured below) at approximately 32 degrees Celsius for a minimum of two days. This creates the ideal conditions for sugarcane seed to germinate.



After two days the seed has germinated, and the trays of germinated seedlings are then moved to the glasshouse where they continue to grow and harden (pictured below).



After four weeks' growth the seedlings are large enough to transplant into bigger trays as family groups and are moved to the seedling rearing benches outdoors to continue to harden.

This means that each tray of seedlings represents 20 siblings from the same female by male cross combination, that is, they are all brothers and sisters who share common parents but are all genetically different.

The number of trays per family transplanted depends on whether it is a proven family or not. Once out on the benches, the seedlings are watered three to four times a day, and excess leaf material is trimmed once a week to harden the seedlings and promote tillering.

Stay tuned!

Read Part 2 of SRA's variety breeding story in our next edition of *Cane Matters* – Autumn edition 2025 - which will be published in March.

The second and final part of this series will highlight all three stages of SRA's Variety Development program, including the processes to determine which elite clones progress through to commercial release.

SRA Meringa is considered a world-class breeding facility and produced over 250 of Australia's current and historical varieties since 1936 to improve the productivity and profitability of the Australian sugar industry through improved productivity, disease resistance and/or improved milling and sugar quality. SRA collaborates with growers, productivity services and millers to encourage the adoption of our new varieties each year.

SRA Central District Delivery Officer Jessie Borg (pictured right) takes Mackay cane grower Sam Deguara through the IrriSAT online irrigation scheduling tool.

SUGAR INDUSTRY'S NEW, FREE ONLINE IRRIGATION SCHEDULING TOOL

A free online irrigation scheduling tool is delivering significant benefits to Australian sugarcane growers, offering a simple, cost-effective means to implement efficient irrigation management systems on farm.

IrriSAT is a paddock-specific decision-making tool that calculates how much water a crop has used, to allow a grower to automatically schedule irrigation applications.

The program was developed almost a decade ago, in a collaboration involving Deakin University, CSIRO and the NSW Department of Primary Industries. However, more recently, CANEGROWERS Mackay received funding support from Advance Queensland (Queensland Government Department of Environment, Science, and Innovation) to improve IrriSAT's accuracy for the sugarcane industry, and improve the overall user experience. The outcome has been IrriSAT Version 2.

"We were looking for a simple, easy to use and user-friendly tool that could provide scheduling information to sugarcane growers in the high rainfall areas along the east coast," CANEGROWERS Mackay Agricultural Economist John Eden explains.

"In basic terms, IrriSAT Version 1, had no way of determining soil constraints, so the drawdown on soil moisture had no limit or restriction, eventually exceeding the PAW (plant available water) that was available to the crop.

"In reality, daily crop water usage reduces once the readily available water (RAW) has been consumed.

This is why irrigations need to be applied when the soil moisture content reaches the depletion of RAW for maximum growth."

IrriSAT (v2) was developed to make the soil water balance model more realistic and usable for sugarcane by incorporating features such as:

- saturation days to replicate the standing water that is held on the paddock following a saturation event
- stress co-efficient to reduce the crop water usage rate once the water balance falls below the refill point
- preventing crop water usage below the plant available water content
- providing a simple summary of all paddocks to quickly assess current water balances and schedule.

SRA District Manager Central, Dylan Wedel, said growers in the Central District were already taking advantage of the improved IrriSAT (v2), while others were being encouraged to try the decision-making tool, as part of the area's District Plan.

Mr Wedel said while irrigation scheduling tools were not a new concept, timely irrigation was the simplest means for a grower to maximise their return from their irrigation management set ups.

"There are numerous products on the market to assist growers with scheduling their irrigation, however they have intricacies that have prevented widespread adoption, including costs, labour intensiveness, inaccuracies and not being representative of individual paddocks," Mr Wedel said.

How IrriSAT (v2) overcomes hurdles to adoption:

- completely free
- simple to use
- available online (computer or mobile)
- specific to a grower's actual paddock by using weekly Normalised Difference Vegetation Index (NDVI) satellite data
- one time set-up of each paddock
- ability to import all paddocks in from mill maps
- quickly able to view the water balance in all paddocks.

The system calculates the water balance daily using NDVI satellite data to determine the crop coefficient (Kc) and evapotranspiration data (ET0) from SILO to calculate the crop water usage (ETc) – ETc = Kc x ET0. To make the system more accurate, soil specific parameters are entered into the paddock settings to better model the reality of sugarcane crop water usage.

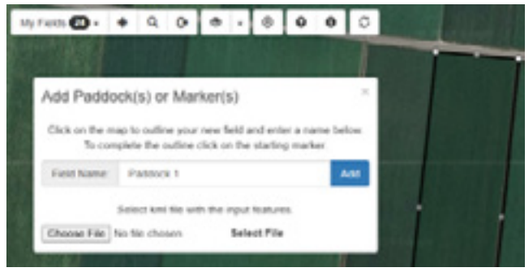
Central District growers and any other growers who would like to try IrriSAT on their farms or further finetune the system, can contact Dylan Wedel, District Manager – Central, 0490 029 387 or DWedel@sugarresearch.com.au

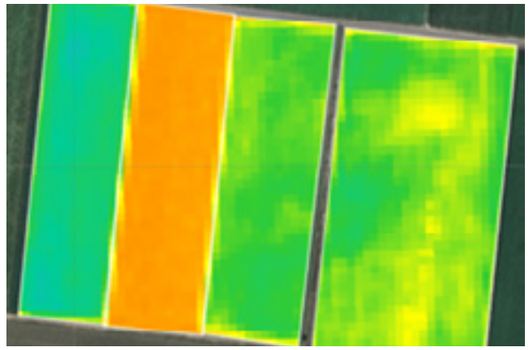
SIMPLE SET-UP TUTORIAL

How to use IrriSAT (v2).

Step 1: Go to https://irrisat-mackay-canegrowers.ts.r.appspot.com/ and login with a Gmail account (if you haven't got one, these are free to create through Google).

Step 2: Add your paddock. The crop coefficient layer will be displayed for each paddock, highlighting real life variability across the paddock. This is updated weekly from satellite data and is what increases the accuracy of IrriSAT as the data is specific to the paddock.





Step 3: Select the paddock, input the paddock settings and press apply on each one that you change. A quick starting point for simple irrigation scheduling is to input:

- Reference ET: SILO
- Rainfall: SILO
- Irrigation: User defined
- Planting date: 1/1/2024. This helps establish the water balance since the wet season
- Refill Point (Readily available water) and F.C. (plant available water content (PAWC)) are soil specific parameters. To start you can use the PAW/PAWC from mill soil maps and 60 percent of the PAWC for the refill point or give us a call and we can help with these numbers.
- Saturation days: 2 (a soil moisture probe in key soil types will help determine this)
- Stress co-efficient: 0.5

Step 4: Input irrigation events by sliding the timescale to the date, entering the irrigation amount or "fill" and press apply.

Step 5: View the summary of all paddocks under the My Fields tab. The blue bar is the current water balance, the green zone is the readily available water content of the soil down to the refill point.

Background image: CANEGROWERS Mackay.

PROMISING START TO A MICRO-ALGAE PRODUCTION PROJECT

Sugar mills in some regions are addressing the challenge of declining cane volumes by investigating alternative sources of income to assist the business to meet maintenance and operational requirements.

Isis Central Sugar Mill Co. Ltd (ICSMC) has been considering a number of diversification options with the proviso that they do not affect core sugarcane milling operations and are able to provide financial and operational synergies within the existing business.

This includes finding projects that assist in using existing waste streams to provide profitable outcomes beneficial to the business or to solve existing problems. In Isis Mill's case, waste streams do not include bagasse which is used in the co-generation of electricity for the grid.

However, the Gregory/Burrum River catchment has been classified as a catchment of the Great Barrier Reef, and standards of discharge water quality must always meet the federal government's Reef 2050 Water Quality Improvement Plan targets.

After careful examination of many alternatives, ICSMC determined that algae production was a feasible option for a diversification project that would provide two useful functions for Isis Mill.

Freshwater algal species can absorb excess phosphorus and nitrogen in waste water. In addition, among many useful products made from algae, it can be grown to make biofuels i.e. renewable diesel which can be used to operate harvesters and transport equipment used in processing the sugarcane crop and farm machinery used to grow the crop.

Renewable diesel can be integrated into the mill's existing distribution infrastructure as an alternative to fossil fuel diesel with only minor diesel engine modifications.

In addition, production of algae would not affect the Isis Mill's core sugarcane processing operations.

A number of successful algae production factories are already underway overseas.

ICSM proposed an algal biomass and low-carbon liquid fuel (LCLF) production model to diversify and add value to its operations.

The mill approached Wide Bay Pacific Pty Ltd, a company actively involved in algae production in the Bundaberg region to assist in assessing this idea.

ICSM wants to use both the mill's wastewater and flue gas to support microalgae production for protein-rich biomass for human and stock food, and for biofuel production.

Step one in the project was to investigate if the opportunity was a way to address existing bottlenecks for algal biomass and bio-diesel production in the current market.

An additional project will be needed to use process modelling software to evaluate material and energy balances.

Overall, the results of modelling studies highlighted the potential for scaled-up production of biomass, biofuels and protein products by cultivating high-protein microalgae.

The studies also found that challenges in income, fuel yields, operating costs and carbon intensities for algal systems could be significantly improved by using the mill's wastewater and CO_2.

They concluded that the production of lipid extracted algae protein was an important factor to lower the mean biofuel selling price.

A financial model predicted the establishment costs for a 10 hectare farm and associated processing plant to be about $4 million with income from production after the second year assisting in the capital costs of establishing a 105 ha micro-algae farm with production bringing in an annual profit of $12.4 million after 2030.

A joint venture has been proposed between ICSM and WBP but details have not yet been finalised.

A fully developed Life-Cycle Assessment, Mass and Energy Balance assessments and full Techno-Economic Analysis was outside the scope of this project.

Pictured below (L-R) Wide Bay Pacific consultants Clive Keenan and Malcolm Prowse, with Isis Central Sugar Mill CEO Craig Wood at the Isis Mill.

HARVEST MATE: FREE ONLINE TRAINING AVAILABLE NOW

Free online training is now available for Harvest Mate – the free best practice support tool designed to help cane growers and harvesting contractors to capture additional cane and sugar yield through harvesting practice change.

Available online and via a smartphone app, Harvest Mate was developed and funded over three years by Sugar Research Australia (SRA) and the Department of Primary Industries (DPI) with the support and input from hundreds of sugarcane growers.

It looks at yield improvements and lowering harvesting costs in green cane harvesting, by identifying the harvest practice which is the most profitable and suitable for growers' and harvesting contractors' businesses.

The tool is based on the findings from green cane harvesting trials across the industry and has been met with positive responses from growers and harvesting contractors. If you'd like to try Harvest Mate but don't know where to begin, free online training is now available.

All you need to do is to log into SRA's Learning Management System (LMS) which is hosted on the platform Talent LMS.

You may already have login details from undertaking the Online Sugarcane Nutrient Management program. Otherwise, you will have to set up your login. The course is listed in the catalogue next to SIX EASY STEPS®. There are only two courses on offer at the moment – but more are coming!

The training is introductory and simply guides growers and contractors on how to use the app.

SRA encourages growers and contractors to use Harvest Mate to help identify more profitable harvesting options. For more information, please visit: https://sugarresearch.com.au/research-development/harvest-mate-project/

SRA acknowledges the invaluable research contribution by economists from the Queensland Department of Primary Industries (DPI) for the development of this tool, as well as funding from DPI for its delivery.

Queensland Government

INCREASING VARIETY ADOPTION THROUGH NEW CENTRAL DEMONSTRATION SITES

New on-farm demonstration sites in the Central District have been established to assist sugarcane growers in the region to make decisions on variety choice and management in challenging soils.

One-eye-sett mother plots have been established by Sugar Research Australia (SRA) at four sites, one in Proserpine, one in Plane Creek and two in Mackay, with billet planting to take place in 2025.

SRA District Manager Central, Dylan Wedel, said selecting new varieties for difficult soil types was a common challenge for growers in the region, particularly for those farming in areas with heavy clay or sodic soils.

"Shed meetings are organised by Productivity Services in the district each year and they are one of the best opportunities we get to hear from a large proportion of the region's growers, and variety selection is always a common concern," Mr Wedel said.

"At shed meetings earlier this year, heavy cracking clay/gluepot soils and sodic soils were the main issue, with growers struggling to select varieties that would perform well in these soil types.

"Q253$^{\Phi}$ is currently the best option, however growers need other options to rotate with Q253$^{\Phi}$ in these soil types."

Heavy clay/gluepot soils become unworkable when too wet, or too dry, leaving only a brief opportunity to achieve tillage. Sodic soils present their own challenges, particularly with achieving amelioration in the soil to remove salt content and improve nutrient uptake by the sugarcane plant.

As new varieties are approved for release in the region through the Regional Variety Committee (RVC) each year, growers are encouraged to collect a sample of new varieties from the productivity services for propagation on their own farms.

SRA's recommendation is for growers to trial these varieties across different management zones on their farms, to better understand not only how to best manage them, but also test their tolerance and productivity in different soils.

"Each year, SRA's Variety Development team plants final assessment trials (FATs) in Proserpine, Mackay and Plane Creek, in key areas in each district. However, we can't plant these trials on every soil type or every farming system, which results in a potential knowledge gap when new varieties are released," SRA Variety Officer Christopher Tom said.

Mr Wedel added: "We try to overcome this by encouraging growers to trial new varieties themselves. However, to bridge this information gap even further for the district, four demonstration sites will be established in a commercial setting, three on heavy cracking clay soil and one on sodic soil."

The demonstration sites will host two promising new varieties, and a released standard variety, for comparison. The plant source for these demonstration sites was planted out this season and will be commercially billet planted in 2025. The plots will be monitored, and information collected for specific traits, for example, speed and reliability of germination, ratooning, and diseases.

"From 2026 onwards, the demonstration sites will be harvested commercially with individual rake data to be collected when the cane is processed at the sugar mill," Mr Wedel said.

"The information collected from these demonstration plots will complement what is already being collected from observation plots managed by the three productivity services companies in the district, as well as the information and data collected from SRA FAT trials.

"Through this collective effort, we are aiming to assist growers to make more informed variety management decisions in the future, improve productivity, and increase adoption of new varieties coming through the selection program."

Depending on the success of this initiative, SRA will repeat the process with new elite clones when they are identified for potential release to the industry.

Pictured: One of the one-eye-sett mother plots established by SRA at four sites in the Central District.

Far Left: *Planting of the new clean seed mother plot in the Mulgrave was undertaken in September.*

Left: *The driving forces behind the CANEGROWERS, MSF Sugar and SRA clean seed collaboration (pictured L-R) CANEGROWERS Cairns Region, Environment and Sustainability Officer Joel Tierney, Tableland CANEGROWERS Manager Angela Sturgess, SRA District Manager Far North, Gavin Rodman, and Mulgrave Mill Cane Supply Field Officer Matt Hession. Absent: Graham Cripps, MSF Sugar, Extension Officer, Tablelands.*

NEW CLEAN SEED PLOTS FOR THE FAR NORTH

Additional approved clean seed plots have been established in the Far North District to reduce barriers that may impede growers' access to disease-free planting material and new sugarcane varieties.

In recent months, SRA has collaborated with CANEGROWERS Cairns Region, Tableland CANEGROWERS and MSF Sugar to establish additional distribution plots and a mother plot in both regions to support an ongoing effort.

SRA District Manager, Far North, Gavin Rodman, who was instrumental in the establishment of the plots said increased disease pressures across the region was, a major driving factor behind the project and a key priority in the area's District Productivity Plan.

"Disease pressures have been steadily increasing over time, with greater incidence of ratoon stunting disease (RSD) across the district, and recent surveys indicating significant yield losses to Pachymetra both in Mulgrave and Babinda," Mr Rodman said.

"A combination of variety selection and regularly planting clean seed are a part of the solution, which is what we are aiming to offer through the additional access provided by these plots."

The additional access to clean planting material through the new clean seed plots is seen as a valuable addition to existing supply.

"We established these plots as an added resource for growers, to complement current supply, not compete with it," Mr Rodman said.

The sites – located at Fishery Falls in Mulgrave and Tolga on the Atherton Tablelands – were selected after meeting strict criteria required for hosting an SRA-approved clean seed plot.

"This has been a huge team effort across several organisations – including existing local suppliers of clean seed - where everyone has chipped in and got the job done in a very short period of time.

"Without the assistance of everyone involved, this project would not have been possible.

"I think we are all grateful for each other's efforts to get this happening. To have staff from CANEGROWERS Cairns Region, Tableland CANEGROWERS, MSF Sugar, SRA and growers all in the paddock working together, cutting, loading, transporting, treating and planting cane - it sends a powerful message about how important this is to all of us."

For CANEGROWERS Cairns Region, it is the first time the organisation has been involved in delivering a clean seed service to its members.

The group's Environment and Sustainability Officer Joel Tierney said the need for greater access to clean seed had been highlighted in a number of SRA programs, including the Mulgrave CCS Improvement Project.

"That's why when we thought of developing a program in general to try and improve productivity, we thought access to clean seed was a good starting point," Mr Tierney said.

"I've had feedback from growers around this region that this is a positive step forward and it can only help within the district. There are a few that have expressed interest in hosting a distribution plot, or being involved in some way, just to help with access to clean seed going forward, because they see the importance of it."

Mulgrave Mill Cane Supply Field Officer, Matt Hession, is a strong proponent of the additional clean seed plots, despite currently being the main supplier of clean seed in Mulgrave.

"This year was a good year for plants going out; we've just about cleaned out the whole of our plots here in Mulgrave. Some of those varieties we could have probably sold half again," Mr Hession said.

"The additional seed (in the new plots) will relieve a bit of that pressure and increase the amount of clean cane available that I can't do.

"It's going to come in handy particularly for getting those stronger varieties out there – the new varieties that have shown to have demonstrated some very good productivity results, getting them out there in bigger quantities, so they can be propagated faster. Because, if you look at our variety milling data, these new varieties are certainly driving a significant portion of the area's productivity."

Tableland CANEGROWERS Manager, Angela Sturgess said that the additional plots were an opportunity that couldn't be missed for the Tableland.

"We have had a clean seed plot here on the Tableland for many years, however this year it was looking to be unlikely that we would be able to continue servicing a clean seed plot after changes to our revenue and the retirement of our long-term agronomist," Ms Sturgess said.

"I'm hoping that we will have at least one other distribution plot next year. The plan is to establish one at the southern end of the Tablelands, and another somewhere near Mareeba. But it's all about finances, staffing resources and finding blocks that meet all the strict criteria.

"But, without these guys helping me up on the Tablelands, it may have been three or four years that we would have been without access to clean seed. So, I'd like to say thank you to Gavin (Rodman), as he was the driving force behind it all."

POSITIVE OUTCOMES FOR eDNA PROJECT IN RAPID DETECTION OF INSECT PESTS

eDNA-based sampling tools may eclipse yellow sticky traps in detecting and monitoring insect pests in crops across wide areas.

Sugarcane growers rely on the support of the scientific community, including SRA researchers, to rapidly detect and contain exotic pests and diseases before they affect crop yields.

Under Project 2020/007, methods for the early detection of pests and diseases in sugarcane were refined using new technology, known as environmental DNA (eDNA).

A pest risk forecasting app was also developed to view maps of climatic suitability across Australia for seven priority pest species of concern to the Australian sugarcane industry.

The app is publicly available and hosted on Cesar Australia's server, which can be found by clicking the url next: https://ec2-52-65-31-166.ap-southeast-2.compute.amazonaws.com/SugarPestsSDM/

Solving the biosecurity challenge

Current biosecurity surveillance methods are time consuming, particularly in cases where large areas need to be monitored. eDNA uses simple environmental sampling methods to indirectly identify species that have recently been in an area.

Priority pest species already present in Australia were targeted in the project (including the planthopper, *Perkinsiella saccharicida* which transmits sugarcane Fiji Disease Virus and *Eumetopina flavipes*, a vector for Ramu stunt virus), together with those pests that are a potential threat to the industry (i.e. three species of moth borers).

Reference sampling of more than 15 species of priority pests occurred across multiple sites and locations, including North Queensland and Torres Strait (Australia), Ramu (Papua New Guinea) Lampung (Indonesia) and Kohn Kaen University (Thailand).

Six different eDNA sampling approaches were compared and tested during the project. These included leaf-rolling swabs (using paint rollers to wipe across the leaf surface), ladybird beetle (genetic material extracted from crushed beetles which are predators of other invertebrates including the target pest species), soil samples, and plant washing.

eDNA-based sampling tools can offer both real-time, in-field detection of target species, and large-scale monitoring of insects of interest.

Methods used were qPCR, used to detect target species by identifying their DNA; and metabarcoding which is used for biodiversity monitoring to identify many species within a sample by matching their DNA against a reference library.

Plant wipes were shown to be a simple and effective eDNA monitoring method for both qPCR and biodiversity monitoring of priority pests, even when the species was not visibly present at the time of sampling.

In addition, eDNA sampling was able to detect target species (*P. saccharicida*) within 30 minutes of sampling, requiring simple cost-effective equipment to perform the test. Broad scale biodiversity data and detection frequency were also provided by these methods, which also recorded changes in population sizes over time.

Comparisons of eDNA methods over the course of one season showed that detection of *P. saccharicida* correlated with counts using traditional labour-intensive yellow sticky trap counts and changes in insect abundance.

Reference samples of exotics and sites for field testing were collected by SRA in collaboration with researchers at Ramu Agri-Industries (Papua New Guinea), Indonesian Sugar Research Institute (Indonesia), and Australian growers who provided access to field sites on their properties.

Collaborators in this project were Sugar Research Australia (SRA), the Department of Agriculture, Fisheries and Forestry (DAFF), Northern Australia Quarantine Strategy (NAQS), Cesar Australia, and EnviroDNA.

Please click the link below for the final report for the project 2020/007 Environmental DNA Technologies and Predictive Modelling for Rapid Detection and Identification of Sugarcane Priority Pests and Diseases.

https://sugarresearch.com.au/research-development/research-projects/

This project was funded by Sugar Research Australia and the Department of Primary Industries.

Queensland Government

AGTECH INNOVATION MEANS LESS LABOUR AND TIME SPENT IN ACHIEVING QUALITY RESULTS

A precision planter developed by the plant breeding team at SRA Bundaberg Station several years ago has improved efficiencies in setting up variety trials in the area. Currently, its only use is for research and development, but it may be the only precision sugarcane planter in the world. It may also inspire growers about technology opportunities for their own equipment.

The innovation was introduced by Bundaberg Station Field Operations Leader Southern, Richard Cervellin, who described how trials were previously set up.

"In the past trial plantings were done by a team with a measuring tape and pegs," he explained. "We would measure down the side of the paddock, cross marking the gaps between the varieties; we would then plant out the varieties.

"During planting, we relied heavily on an operator feeding in the cane stick at the start of a plot, and then feeding the last stick in just before they got to the end of the plot, judging sufficient time so that the stick would run out at the end of the plot.

"We'd go back and either rotary any gaps, or dig or spray out the plant material, to ensure all the plot lengths were exactly the same."

With the emergence of Real Time Kinematic (RTK) Technology, the team realised they could improve the process, saving labour and time.

"We spoke to our suppliers, about the potential of using RTK to develop a planter which could be automatically turned on and off by a sensor for the start and end of plots," Richard said.

"We use two hydraulicly driven chopper boxes - one plants odd numbered plots, and the other, even numbered plots.

"The cane is rested against the edge of the chopper box on the planter which remains inactive until it receives the signal that the start of the plot is reached. Then it engages and the cane is fed in, landing at precisely the start of the plot.

"At the end of the plot, the operator can just go on feeding in the stalks. The chopper box will stop. A flap will close across the drop chute to the ground, and any excess material goes into a waste hopper.

"At the start of the next plot the same thing happens on the other side of the planter, and the chopper boxes are alternated left and right as the rig goes up and down the paddock."

Thanks to this home-grown innovative use of technology, SRA can deliver the same high quality trial results at lower overheads.

SRA Field Operations Leader Southern, Richard Cervellin pictured with the precision planter developed by the plant breeding team at SRA's Bundaberg Station, which has improved efficiences in setting up variety trials.

SRA Principal Agronomist Dr Danielle Skocaj (pictured right, centre) and Professor Bernard Schroeder of the University of Southern Queensland (UniSQ), (pictured far right, third from the right) were instrumental in the development of the latest SIX EASY STEPS booklet. Both are part of the SIX EASY STEPS R&D team which has worked collectively over many years to develop the SIX EASY STEPS program.

10TH SIX EASY STEPS® BOOKLET

The SIX EASY STEPS team recently launched a new booklet entitled *Soil-Specific Nutrient Management Guidelines for Sugarcane Production in the Wet Tropics* (hereafter referred to as the Wet Tropics booklet). It is the tenth in the series of technical reference publications that support adoption and/or greater understanding of the SIX EASY STEPS program.

In 2003, a soil reference booklet entitled *Soil Specific Management Guidelines for Sugarcane Production* was produced for use in the Herbert District. Due to the success of that publication, similar booklets followed for various other districts. These include booklets for Proserpine (2006), Johnstone (2007), Bundaberg (2008), Plane Creek (2009), Mackay (2014), New South Wales (2016), Isis (2017) and Rocky Point (2020). All of the booklets describe the basic principles of soil management and present nutrient guidelines for major soils in each of the districts and provide the appropriate SIX EASY STEPS nutrient management guidelines.

Development of the Wet Tropics booklet was slightly more complex than that of the other districts because it includes the greater region extending from Tully in the south to Mossman in the north, inclusive of the South Johnstone and Mulgrave districts. Despite this complexity, the booklet is based on a methodology originally developed within a project (*Improved nutrient management in the Australian sugar industry*) funded by the former Sugar Research and Development Corporation (SRDC).

The Wet Tropics booklet includes 24 soil types divided into seven groups that cover soils broadly described as basaltic, metamorphic, well-drained alluvial, poorly drained alluvial, swamp and beach ridge soils. All the soil types included in the booklet were previously identified and described by Dr Grahame Murtha and his colleagues who worked within the Commonwealth Scientific and Industrial Research Organisation (CSIRO) during the 1980s and 1990s. Their survey reports and maps were used as a basis for describing the soils in the booklet but in easy-to-understand terms. Those resources are invaluable, and their indirect contribution to the booklet is acknowledged by the SIX EASY STEPS team.

As indicated in the booklets, the SIX EASY STEPS philosophy is that knowledge of soils should form the basis for making sound management decisions on-farm. Not only does soil type influence decisions on which sugarcane variety to plant and how much fertiliser to apply, but it also has an impact on the choice of tillage practices, planting techniques, drainage requirements, and harvest scheduling.

Two of the standout features of the booklets are:

- The two-page descriptions of each soil type (as characterised by the reference soil sites that were specifically excavated for development of the booklets) that include diagrammatic assessments of the relevant soil chemical properties (relative to the regional median values), and the tabulated nutrient management guidelines based on these values. An example is shown in Figure 1.
- The series of diagrams that show the location of the soil types relative to positions in the various Wet Tropics landscapes and to each other. An example is shown in Figure 2.

The Wet Tropics booklet will be officially launched at an appropriate event early in 2025 with hardcopies available at that time. In the meantime, an electronic version of the booklet can be accessed via the SRA website or scan the QR code below.

Click the link to read Soil-Specific Nutrient Management Guidelines for Sugarcane Production in the Wet Tropics.
https://sugarresearch.com.au/wp-content/uploads/2024/12/Soil-Specific-Nutrient-Management-Guidelines-for-Sugarcane-Production-in-the-Wet-Tropics.pdf

Acknowledgements: *The Wet Tropics booklet was developed by Sugar Research Australia (SRA) and the University of Southern Queensland (UniSQ) through funding from the Australian Government's National Landcare Program.*

This paragraph serves to acknowledge the SIX EASY STEPS program and the input of the SIX EASY STEPS R&D team (Bernard Schroeder, Andrew Wood, John Panitz, Barry Salter, David Calcino, Alan Hurney, Danielle Skocaj and Glen Park) who have worked collectively over many years.

This project is supported by Sugar Research Australia (SRA) and the University of Southern Queensland (UniSQ) through funding from the Australian Government's National Landcare Program.

Figure 1. *An example of a two-page description of the soil types in the Wet Tropics booklet.*

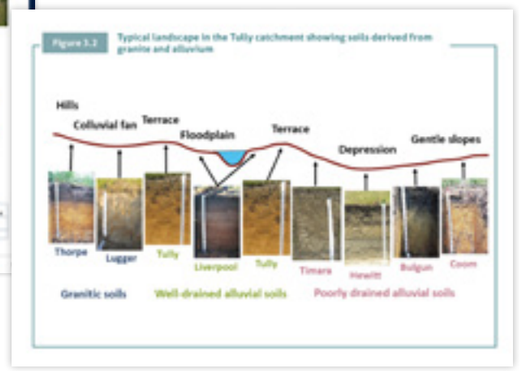


Figure 2. *An example of the diagrams in the Wet Tropics booklet showing the relative positions of soils in the landscape and to each other.*

ON-LINE TOOL TO COMPLEMENT NEW SOILS BOOKLET

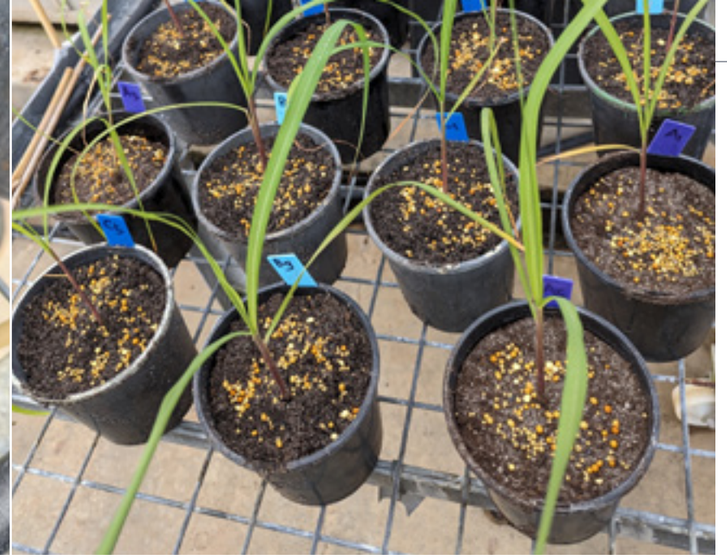
Sugarcane advisors from districts between Mossman and Tully gathered in Innisfail in September for a first look at the new Wet Tropics Sugarcane Explorer, an online tool developed to assist cane growers to generate farm soil maps.

The tool was developed by GP One Consulting in collaboration with SRA and the University of Southern Queensland through funding from the Australian Government's National Landcare program, and is designed to complement the new Wet Tropics Soil Reference booklet.

"The tool was a way of making the soil survey information, that is on hard-copy maps and digitised, more accessible to the everyday grower and advisor, and couple that with the thorough information that Professor Bernard Schroeder, myself, Andrew Wood and David Calcino have put together in the new Wet Tropics Soil Reference booklet," said Dr Danielle Skocaj, who led the development of the tool.

Professor Schroeder, lead author of the new publication, said "The tool adds value to the booklets."

Acknowledgments: *This project is supported by Sugar Research Australia (SRA) and the University of Southern Queensland (UniSQ) through funding from the Australian Government's National Landcare Program. The Wet Tropics Sugarcane Soil Explorer app was developed by GP One Consulting on behalf of Sugar Research Australia. SRA would like to thank the Cassowary Coast Cassowary Coast Reef Smart Farming project for hosting the advisor training session with GP One Consulting.*



Left: *Transplanted sugarcane.*

Far left: *Innoculum in a suitable medium in a pot.*

FINDING AN EFFECTIVE BIOFERTILISER

Improved sugarcane yields are vital for the sugarcane industry, but using chemical fertilisers can have negative impacts on soil health and future crop sustainability. An effective high quality biofertiliser would overcome this problem for the industry.

Researcher, Ian Petersen (pictured), has received an SRA scholarship to enable him to complete his PhD thesis on producing an effective biofertiliser. He is studying the common fungus, *Aspergillus niger.*

Ian aims to understand how the fungus uses its natural chemicals such as organic acids to break down matter in soils to yield useful nutrients such as phosphorus for crop growth and soil health.

In particular, he is interested in examining the differences in the proteins expressed by the fungus when in contact with different phosphorus sources, hoping to further understand how soil conditions affect the performance of the fungus.

Using soil incubation trials, he is also measuring the impact of the fungus on phosphorus content in soil.

Positive results of an increase in soluble phosphorus have been recorded with the addition of the fungus alone, however much more substantial increases were seen in those cases where the soil has been enriched with additional carbon in the form of either a sucrose solution or compost.

Based on these results and other experiments, adding particular nutrients along with the fungal inoculum may allow for better phosphate solubilisation.

If the phosphorus can be transformed into a soluble form a plant will be able to take it up easily to improve its development and yield.

Even with applications of chemical fertiliser, much of the applied phosphorus is quickly locked away in forms that are unavailable for plant uptake, so looking at ways to unlock these pools of phosphorus is crucial.

Ian set up an initial trial to measure the impact of the fungus on phosphate levels in two different types of soils in the presence of crushed rock phosphate.

The fungus was incubated at 30°C for three weeks to allow for sufficient establishment of the fungus and release of phosphate-solubilising organic acids.

The amount of free water-soluble-phosphate which resulted was measured using a standard test kit. It was found that the inoculation of the soil with the fungus substantially increased free phosphate in both types of soils.

However, this preliminary trial was not statistically significant because of the low number of replicates and experimental setup issues. Trials have continued since then which have confirmed the initial results.

Ian has also completed bioreactor fermentations with the fungus. Taking place in a controlled environment, this can allow for the study of the metabolism, acidification, and growth of the fungus.

Ian found evidence of an increase in the abundance of certain proteins involved in the fungus's organic acid production which could contribute to the production of soluble phosphate.

Organic acid production appears to increase with general growth and nutrient availability to the fungus.

Future experiments will include repeat trials to confirm findings, investigations into compost inoculation as a potential method for a large-scale application, and larger-scale trials to validate results in realistic conditions using non-sterile soils.

Ian Petersen has a Bachelor of Chemical Engineering and Bioprocess Biotechnology from the University of Queensland.

SRA provides a number of Sugar Industry Postgraduate Research Scholarships (SPRS) every year, tenable at Australian universities and institutions, for postgraduate study to facilitate research and training in areas of value to the Australian sugarcane industry.

FACTS ABOUT *ASPERGILLUS NIGER*

- Common fungus found throughout the environment (soil and water, vegetation, decomposing matter, and in the air)
- Can cause infections in some legumes, fruits and vegetables such as peanuts, grapes, and onions, leading to the fungus being a common food contaminant
- Widely used in science as its characteristics make it invaluable in the production of many acids, proteins and bioactive compounds
- Changes metabolism depending on the carbon sources and other nutrients available to it
- Can be grown in the lab under either cold or hot humid conditions with little water needed and using different mediums
- Used in industry to produce 600,000 metric tonnes of citric acid worldwide annually using a fungal fermentation process
- Produces useful enzymes used in the production of high fructose corn syrup and pectinases used in cider and wine clarification
- Potentially a new source of natural food grade pigments
- The World Health Organization has deemed it safe for daily human intake

The innoculum of Aspergillus niger used in the project.

LEARNINGS AND GROWER FEEDBACK FROM NQ FLOODS 2023/24

Following the significant flood events across North Queensland in 2023/2024, a series of SRA workshops were held to support the sharing of information between researchers and growers.

These workshops provided the opportunity for SRA agronomist Dr Danielle Skocaj, SRA Weed Scientist Emilie Fillols and District Manager Far North Gavin Rodman, to answer questions where needed, and for growers to share feedback on practices that were helping them overcome the impacts from these events.

Learnings from these floods can help prepare for, or identify strategies, to minimise the impact of future flood events and prepare for the coming wet season.

Some of the Frequently Asked Questions (FAQs) included:

- What will be used for planting material post-flood?
- Should severely flood-affected paddocks be replanted that season?
- How are nutrient levels in the soil affected after being underwater for extended periods of time?
- What could be done with paddocks that have patches of cane removed by flooding or "dead" areas scattered throughout?
- Dealing with thick silt and thick trash deposits – growers' experiences.
- Should a new soil sample be taken after a major flooding event?
- Are there products commercially available to stimulate the growth of cane that has been stressed by flooding?
- How do stress events such as flooding impact crop behaviour?

For the answers to these FAQs and more, go to the comprehensive list on SRA's website below.

https://sugarresearch.com.au/faqs-nq-severe-flooding-2023-2024-learnings-and-grower-feedback/

DISTRICT PRODUCTIVITY PLANS - CURRENT PRIORITIES

INITIATIVE	COLLABORATORS	PROPOSED OUTCOME	STATUS – December 2024
Far North District Manager: Gavin Rodman E: grodman@sugarresearch.com.au M: 0476 807 355			
Mulgrave CCS Improvement Project	CANEGROWERS Cairns Region, MSF Sugar and Mulgrave growers.	Improve CCS through monitoring and measuring crop indicators. Development of new datasets. Identification of management strategies. Identify the impact of current practices on CCS, including those impacting upon extraneous matter.	The Mulgrave CCS Improvement Project has recently shared with the industry in the Mulgrave and Babinda areas initial insights on potential CCS impacts. These include crop age at harvest, increasing ash percentages, timing of planting and harvest scheduling, use of growth regulators/ripeners, topping practices, row profile and crop presentation, and Pachymetra root rot. The project has developed a suckering estimation tool and also produced templates to support appropriate row profiles. The planting practices survey is ongoing, with hill-up measurements, stooling assessments and shoot counts continuing throughout the growing season. Activities on the Tableland are underway to support the investigations in Mulgrave, to gain an understanding of trends across the region. The Pachymetra survey on the Tableland has commenced and will supplement the row profile survey completed in early-2024.
Development of maturity calibration for MicroNIR	Far Northern growers.	Develop a calibration for the MicroNIR unit to support rapid infield maturity measurements.	A preliminary calibration has been developed for sugarcane maturity. Calibration and validation activities will continue through the early months of 2025.
Variety adoption and distribution	CANEGROWERS Cairns Region, Tableland CANEGROWERS, MSF Sugar.	Support the adoption of new varieties and distribution of clean seed.	A collaborative effort between SRA, CANEGROWERS Cairns Region, Tableland CANEGROWERS and MSF Sugar saw the establishment of additional clean seed plots across the Mulgrave and Tableland regions in 2024, for distribution in 2025.
North District Delivery Officer: Glen Park E: gpark@sugarresearch.com.au M: 0428 720 930			
Variety observation plot and CCS maturity profiling	SRA Plant Breeding.	Variety demonstration plot and CCS maturity profiling.	Completion of CCS curves of new release varieties for the 2024 season. Data analysed and ready to be added to the 2022 and 2023 season dataset.
Targeting balanced nutrition and productivity constraints in the Herbert	Herbert Cane Productivity Services Limited, Department of Environment, Science and Innovation (Queensland Reef Water Quality Program).	Targeted whole of farm management plans, workshops, training and meetings with one-on-one extension activities.	Four draft farm plans completed. One grower completed SIX EASY STREPS® training and BMP accreditation. Project grower cohort informed that project would support SmartCane BMP benchmarking. Detailed on-farm review of restraints completed for nine growers. One-on-one grower meetings commenced. SRA weed scientist Emilie Fillols held a pre-emergent herbicide workshop in Ingham on 24 September.
Refining nutrient recommendations for ratoon crops following application of surface banded mill by-products to manage the effect on yield and CCS	Wilmar Sugar Australia, Reinaudo Farming Company.	Improved understanding of nutrient requirements following application of surface banded mill mud to manage effects on yield and CCS.	Two trials implemented. Both sites are located in the Orient subdistrict which is south of Ingham. Mill mud was surface banded at 80 t/ha on first ratoon cane. Harvest data, soil and mill mud sample analyses, collected from both sites to be presented at discussion forum in December 2024 with other researchers (DAF, Tully Sugar and Wilmar Sugar Australia) who have conducted similar trials.
Burdekin District Manager Terry Granshaw E: tgranshaw@sugarresearch.com.au M: 0457 650 181			
Lower Burdekin Smart Irrigation Project (LBSIP) XXXX & BIP	Agritech Solutions, Burdekin Bowen Integrated Floodplain Management Advisory Committee (BBIFMAC), Department of Primary Industries, North Queensland Dry Tropics and growers.	Reduce energy costs, improve water costs and irrigation efficiencies. Measure water quality benefits. Modernisation of farming systems e.g. smart farming technology. Improve productivity/ profitability which has a direct effect on environmental outcomes.	XXXX N drip site has been converted to a control V LBSIP automated furrow irrigation replicated trial. Flumes have been reinstalled in the Ayr site along with all sensors. Tensiometers have been installed in both sites. Growth measurements on both sites being recorded. BIP project has now ended. The district plan is currently continuing activities on all three demonstration sites. All three sites have now been harvested and nutrients applied.
Burdekin phosphorus response trial (SRA project 2022/011)	Wilmar, Burdekin Productivity Services and field experimental site grower hosts.	Improved understanding of phosphorus requirements for sugarcane crops growing in alkaline soils.	Harvested first ratoon crop at Site 1 (BRIA) and trial re-established in the second ratoon crop. Plant crop sampling activities continue at all three sites. Identified and commenced collection of suitable soils for inclusion in the pot experiments. Generated awareness of factors impacting phosphorus nutrition.
Imidacloprid trials	Burdekin Productivity Services and field experimental site grower hosts.	Investigate liquid vs granular imidacloprid in early plant cane crop.	Established and implemented random replicated strip trials with liquid and granular imidacloprid products at maximum label rates in a high grub pressure site. Drone flight has been completed, daily growth measurements have been completed.
Central District Manager Dylan Wedel E: dwedel@sugarresearch.com.au M: 0490 029 387			
Increasing variety adoption	Productivity services companies and growers.	Increase adoption of new varieties by making additional information available to growers to make variety management decisions.	During productivity board shed meetings earlier in the year, variety selection for challenging soils was a common concern raised by growers. To bridge this information gap, four demonstration sites have been established on these soil types across the district (3x heavy cracking clay, 1x sodic). The plant source for these demonstration sites has been planted out, with the demonstration sites to be commercially billet planted in 2025 and for annual commercial harvest/ individual rake data to be collected from 2026 onwards. The demonstration sites will host two promising varieties and a released standard for comparison. The information collected from these demonstration plots will complement what is already being collected from observation plots managed by productivity services companies.
Increasing irrigation utilisation	Productivity services companies and growers, CANEGROWERS Mackay, Greater Whitsunday AgTech Hub.	Increase utilisation of irrigation to increase profitability and productivity.	The Greater Whitsunday Alliance is supporting the development of multiple irrigation demonstration sites across the district. An expression of interest for growers to host an irrigation demo site has been circulated. These demonstration sites will be established over the coming months and field walks will be held in early 2025. CANEGROWERS Mackay has recently received funding from Advance Queensland's Regional Futures – Collaborative Projects fund to improve a free online irrigation scheduling tool, IrriSAT, for sugarcane. CANEGROWERS Mackay and SRA have run workshops for growers and productivity services companies. We are looking for growers to host further workshops across the district.
Supporting the adoption of fallow crops	Productivity services companies and growers.	Increase adoption of fallow crops to increase cashflow and improve subsequent cane productivity.	The precision planter is currently available for growers to trial growing a fallow crop. It can be used to plant into cultivated ground or through the trash blanket. Previously growers have been supported in establishing successful soybean crops that were taken through to a profitable grain harvest.
Southern District Manager Lisa Devereaux E: ldevereaux@sugarresearch.com.au M: 0456 590 497			
Bundaberg/Wide Bay	Isis Productivity Ltd and CANEGROWERS Maryborough.	Nutrient Management plans and identification of productivity constraints.	Soldier Fly project (2022/004) continues. Further Soldier fly sampling is underway. Next steps are identification of the species and development of an artificial diet bioassay for selected economically damaging species. Burnett Mary Agronomy Project (2023/802) has progressed to Milestone 4 in the Maryborough and Isis region. Project engagement is well received , with field work led by the new SRA Southern Agronomist. Monthly Steering Committee Meetings have been established. Twenty six growers signed up for either new NMP budgets or Constraint Analysis Assessmets.
Rocky Point Pest and Disease Management Surveys	CANEGROWERS Rocky Point.	To deliver district-based activities that improve productivity, profitability and sustainability outcomes for the Rocky Point district.	Rocky Point is focused on RSD management and is testing the successful installation of a sterilisation unit on a harvester.
NSW multi-year productivity program	NSW Agricultural Services NSW Sunshine Sugar.	Improved profitability and productivity through various projects including the development of an economic model for farmers to determine whether to harvest one or two year cane.	Economic modelling and grower engagement on the benefits and drivers for growing one year old cane in the Harwood and Broadwater areas progressing to trial.
SIX EASY STEPS® Online Sugarcane Nutrient Management Program	Department of Environment and Science, CANEGROWERS.	Enable all Australian sugarcane growers to access nutrient management training that will improve the efficiency and productivity of their farms if applied.	The program has recorded more than 300 registrations since it was launched in 2023. Participants who finish the program receive a certificate of completion.

RESEARCH PROJECT INVESTMENTS

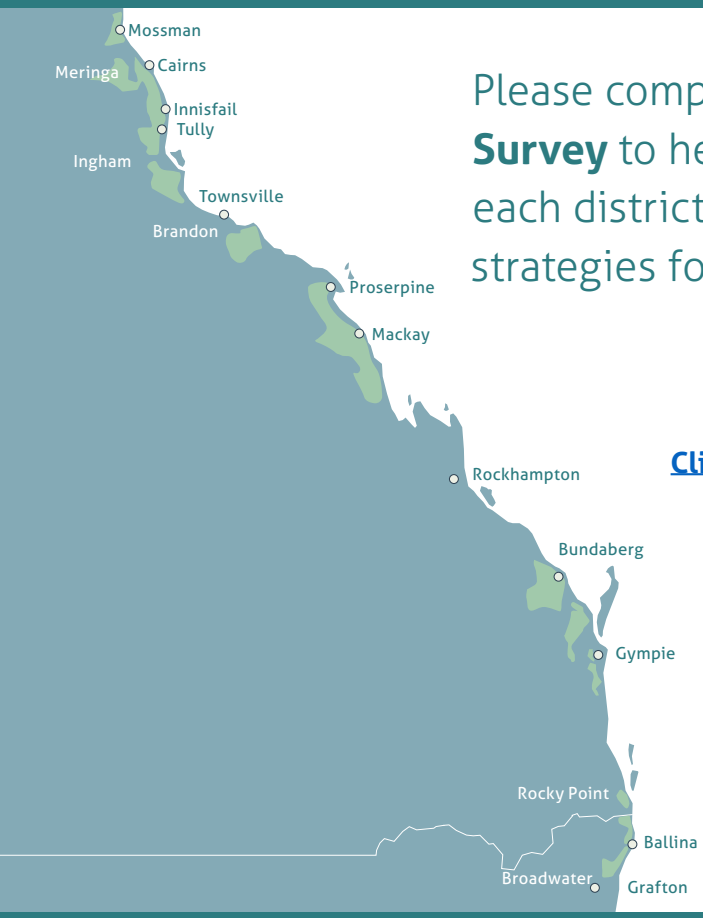
PROJECT IDENTIFIER	TITLE	CHIEF INVESTIGATOR	RESEARCH AGENCY	END DATE
Research Mission 1: Profitable and Productive				
2022/012	Use of machine learning to determine the extraneous matter and billet length in cane consignments	Geoff Kent	Queensland University of Technology	1/02/2027
2022/014	Australian Sugar Industry – Development of factory training modules – Phase 3	Geoff Kent	Sugar Research Institute	1/03/2028
2022/201	Feasibility study of using mill waste streams by a 5 ha micro-algae facility for supplemental income	Craig Wood	Isis Central Sugar Mill Co. Ltd	6/10/2023
2023/201	Bagasse fly ash system performance benchmarking	Jonathon Gilberd	Wilmar Sugar Australia Limited	30/06/2024
2023/202	Evaluating the suitability of measuring massecuite dry substance for control on Australian pan stages	Bryan Lavarack	Mackay Sugar Limited	1/07/2024
2023/203	Billet Quality Assessment	Barton Wixted	Grifith University	30/06/2024
2024/201	Hybrid pH control strategies to reduce sucrose losses and control corrosion in sugar factory evaporators	Aaron Baker	Sunshine Sugars	1/07/2025
2024/202	Demonstrate the use of a microwave dry substance transducer for controlling high grade boilings	Dr Bryan Lavarack	Mackay Sugar Limited	1/07/2025
2024/203	Greenhouse gas emissions from sugar factory boilers	Line Jenssen	Wilmar Sugar Australia Limited	30/06/2025
2024/204	Thermo-digester for Rapid Conversion of Mill Mud to Green Fertiliser	Stephen Xu	Charles Darwin University	1/07/2025
Research Mission 2: Resilient and Enduring				
2018/010	Moth borers - how are we going to manage them when they arrive?	Kevin Powell	Sugar Research Australia	1/06/2025
2020/004	Beyond Imidacloprid - Chemical and Biorational Alternatives for Managing Canegrubs	Kevin Powell	Sugar Research Australia	1/03/2025
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 biopesticides for management of sugarcane root feeding pests	Neena Mitter	The University of Queensland	1/03/2025
2022/001	Managing major diseases in sugarcane cropping systems using carbon nanodots	Qin Li	Griffith University	1/05/2025
2022/002	Updating the Sugarcane Industry Biosecurity Plan	Stuart Kearns	Plant Health Australia	1/06/2027
2022/004	Soldier fly diagnostics, distribution, and development of an artificial diet	Kevin Powell	Sugar Research Australia	1/05/2025
2022/005	Assess weed impact/distribution for prioritisation	Emilie Fillols	Sugar Research Australia	10/06/2025
2022/006	Development of a resistance screening method for chlorotic streak	Chuong Ngo	Sugar Research Australia	1/06/2026
2022/007	Delivery of a pest and disease diagnostic step change for the sugarcane industry (RSD - NIR)	Seona Casonato and Steve Staunton	Sugar Research Australia	1/12/2025
2022/016	Viruses to aid biological control of major root-feeding pests of sugarcane	Michael Furlong and Kayvan Etebari	The University of Queensland	1/08/2027
2022/901	Agri-climate outlooks	Danielle Skocaj	Agricultural Innovation Australia Limited	11/06/2024
2024/001	ARC Industrial Transformation Training Centre – Centre for Plant Biosecurity.	Stephen Mudge	Australian National University	30/06/2029
2024/007	Carbon nanodots - Woodford component	Shamsul Bhuiyan	Sugar Research Australia	1/06/2025
2024/401	Proactive Preparedness for Incursion of Leafhopper Vectors of White Leaf Disease – A Major Biosecurity Threat	Kevin Powell	Sugar Research Australia	8/08/2025
2024/402	The Sweet Smell of Success: Sustainable Canegrub Management using Host Plant Volatiles	Samuel Bawa	Sugar Research Australia	19/12/2025
Research Mission 3: Diversified and Adaptable				
2022/018	Building industry engagement capability for a diversified and adaptable Australian sugarcane industry	Madeline Smith	Queensland University of Technology	30/06/2024

PROJECT IDENTIFIER	TITLE	CHIEF INVESTIGATOR	RESEARCH AGENCY	END DATE
Research Mission 4: Sustainable and Efficient				
2020/802	Mackay Whitsunday Cane to Creek	Matt Schembri	Sugar Research Australia	30/06/2024
2020/804	Reducing herbicide usage on sugarcane farms in reef catchment areas with precise robotic weed control	Emilie Fillols	Sugar Research Australia	30/06/2024
2020/805	Increasing industry productivity and profitability through transformational, whole of systems sugarcane approaches that deliver water quality benefits	Simon Clarke	Sugar Research Australia	30/06/2024
2021/008	Develop a sustainability framework for Australian sugar and sustainability report in collaboration with stakeholders	Ingrid Roth	Roth Rural Pty Ltd	1/11/2025
2021/804	Mobilising the Murray	Simon Clarke	Sugar Research Australia	31/12/2023
2021/805	Soil specific management for sugarcane production in the Wet Tropics	Danielle Skocaj	Sugar Research Australia	13/06/2024
2022/010	Industry-wide leaf and soil survey to detect hidden macro and micronutrient constraints	Barry Salter	Sugar Research Australia	30/06/2024
2022/011	Understanding phosphorous requirements for sugarcane crops growing in alkaline soils	Danielle Skocaj	Sugar Research Australia	13/12/2027
2022/801	XXXX Lower Burdekin Smart Irrigation Project	Simon Clarke	Sugar Research Australia	1/05/2025
2022/802	Lower Burdekin Cane Major Grants Project	Simon Clarke	Sugar Research Australia	1/05/2024
2022/8803	Cassowary Coast Reef Smart Farming - Tully	Simon Clarke	Sugar Research Australia	17/05/2024
Research Mission 5: Resourced and Skilled				
2018/015	Sugar Milling R & D Capability Building Program	Geoff Kent	Queensland University of Technology	31/03/2027
2019/102	PhD Scholarship - Genetic solutions for determining fibre quality traits in sugarcane	Angela O'Keeffe	The University of Queensland	31/03/2024
2021/101	PhD Scholarship - Optimising mill mud and ash applications for soil improvement and carbon sequestration	Hannah Green	James Cook University	01/02/2026
2021/102	PhD Scholarship - Systems biology for sustainable agriculture: evaluation of plant growth-promoting bacteria to produce high-performing biofertilisers	Ian Petersen	The University of Queensland	30/04/2025
2021/401	Research Award - Risk assessment for the newly discovered parasitic nematode *Pratylenchus parazeae* in the Australian sugarcane industry	Shamsul Bhuiyan	Sugar Research Australia	1/04/2024
2022/101	PhD Scholarship - A novel biosensor device for on-farm sugarcane disease diagnosis	Simon Strachan	Griffith University	29/02/2024
2022/401	Research Award - Harnessing the SynBio potential of Australia's stingless bees, the first step	Natasha Hungerford	The University of Queensland	31/03/2025
2022/402	Research Award - Genomic prediction of ratoon yield robustness	Eric Dinglasan	The University of Queensland	14/05/2024
2023/101	Development of an automated system to perform localised in-crop replanting of sugarcane gaps	Bruen Smith	University of Southern Queensland	19/03/2027
2023/103	PhD Scholarship – An economic and agronomic assessment of Nitrogen Use Efficiency and the factors influencing it	Kristopher Woodrow-Smith	The University of Queensland	31/12/2025
2023/801	DES 1231311 Sugarcane practice change program - Herbert	Simone Clarke	Sugar Research Australia	31/08/2026
2023/802	DES 1231311 Sugarcane practice change program - Southern	Lisa Devereaux	Sugar Research Australia	31/08/2026

For more details on specific projects, email sraresearchinvestments@sugarresearch.com.au

Sugar Research Australia

WEEDS ON YOUR CANE FARM? THEY COULD BE REDUCING YOUR PROFITS



Please complete the online **SRA Weed Distribution Survey** to help us focus on the priority weeds in each district to develop better weed management strategies for sugarcane growers.

Click here for more information and to get started.

Complete the survey for your chance to **WIN a drum of** Nufarm DROPZONE

**See SRA website for Giveaway Terms and Conditions.*

https://sugarresearch.com.au/research-development/sra-weed-survey/

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