Sugar Research Australia

Cane Matters

Spring 2022

CONTENTS

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(Cover page) Wilmar Sugar's Rob Stobie and Jonathon Gilberd at the Victoria Mill evaporator station, with the new No. 5 evaporator. Picture by: Matt Ingegneri

WELCOME TO *Cane Matters*

A shudder ran through Australian agriculture earlier this year as the arrival of varroa mite on Australian shores, and a foot and mouth outbreak in Bali, thrust animal biosecurity into the headlines.

Plant biosecurity is just as important. SRA is continuing to work closely with researchers here and overseas to ensure we are prepared and ready to deal with a future incursion of the sugar industry's most dreaded exotic pests. In this edition, we share how work is progressing to prepare for and manage exotic moth borers.

In our varieties feature, we drop into the Burdekin to look at SRA23$^{\phi}$ which is matching popular district standards in strip trials and early plant cane. We also examine what it has to offer from a risk management perspective as the increasing volume of the district's most common variety prompts a reminder about disease lessons of the past.

Diminishing land under cane is a serious concern in many sugarcane regions, so it is pleasing to see land returning to the industry on the Atherton Tablelands. Read how MSF Sugar is incentivising growers to plant more ground to cane.

Technological advancements and research in our mills also come under the spotlight in this issue. We feature the new model Robert evaporator installed at Victoria Mill, and innovative instrument testing of molasses samples at Rocky Point Mill.

We meet a new 'mate' for harvesters with trials of a prototype smartphone harvesting app designed to optimise productivity and profitability. Would the potential to make an extra $100 a hectare entice you to give it a go?

The results of our grower and partner surveys are in, with some 'green shoots' suggesting improved satisfaction with SRA – yet we know there is more work to do.

And SRA launches a new funding round, seeking research and innovation proposals to solve key industry challenges. The challenges are among the priority investment areas in our new Annual Investment Plan which was co-developed with industry stakeholders.

Welcome to our Spring edition of *Cane* ***Matters***.

As always, you can reach me at cweis@sugarresearch.com.au if you have feedback or story suggestions for our next edition. We would love to hear from you.

Cathy Weis
Head of Strategy, Insights and Engagement

Editorial contributions by Cathy Weis, Christine Walker and Helen Cook. Design by Eli Lin.

THANKS TO OUR OUTGOING BOARD DIRECTORS

Two SRA Board Directors, Lindy Hyam and Dr Jeremy Burdon are stepping down at this year's Annual General Meeting. You may have had the opportunity to meet them when they toured sugarcane growing regions during their terms. We thank them for their work for SRA and the industry over recent years.

SRA's annual general meeting will be held on Monday 21 November.

The meeting will be conducted in a hybrid format with the opportunity to attend either face-to-face at SRA's Indooroopilly office, or virtually through an online platform.

Members will receive the Notice of 2022 Annual General Meeting (AGM) during October and will have the opportunity to vote on several resolutions, including the election of new directors and some proposed changes to the SRA constitution.

More information will be shared through the Notice of AGM and SRA's communications channels in coming weeks.

(Top) *Outgoing Director Lindy Hyam with fellow Director Sam Bonanno and MSF's Mark Magnanini during a visit to Far North Queensland.*
(Bottom) *Director Dr Jeremy Burdon (right) with Chairperson Rowena McNally and farmer Joe Marano in Far North Queensland.*

NEIGHBOURLY COLLABORATION TO MANAGE BIOSECURITY THREATS

Australia's north has a vast coastline of more than 10,000 kilometres with neighbouring countries only a short boat ride away.

While recently closed due to COVID-19, and now reopened, state and international borders have once again increased the movement of visitors and shipping to Australia. The biosecurity threat to our agricultural industry has always remained constant and real.

Exotic moth borers are insects widely found in the cane-growing regions of South-East Asia and the Pacific including Indonesia and Papua New Guinea (PNG). In these countries moth borers are not easily controlled and they represent a significant productivity constraint - causing up to 70 per cent yield reduction.

Not yet seen on our shores the exotic moth borers are identified as one of Australia's most significant biosecurity threats.

SRA entomologist Dr Kevin Powell led a previous collaborative project on moth borer diagnostics entitled *'You can't manage what you can't identify - Managing threats from exotic moth borers through accurate identification'*. That project improved our ability to rapidly identify each moth borer species.

The question Dr Powell is now asking through his current research project (Project number 2018/010) is not 'How do we keep this significant pest out?' but 'How are we going to manage them when they arrive?'

"Our research is about incursion management," Dr Powell said. "No one wants to see moth borers in Australia. Security at our borders is doing everything it can to keep all exotic pests out, but if we do see an incursion of moth borers, we need to identify and control it quickly."

Through a collaboration with international colleagues from Indonesian Sugar Research Institute and Ramu Agri Industries in Papua New Guinea, Dr Powell is leading trials in these two countries to develop a strategy to rapidly identify and manage moth borers in the event of an incursion in Australia.

Field studies in Indonesia and PNG are testing a range of systemic insecticides,

Dr Powell joins staff from the Indonesian Sugar Research Institute to take moth borer trial samples.

applied at either planting or fill-in stage and in ratoons; for the management of a range of moth borer species, including the stem borers *Chilo sacchariphagus, C. auricilius* and *Sesamia grisescens* and the top shoot borer *Scirpophaga excerptalis*.

Dr Powell has spent time living and working in PNG but is now leading this project from SRA's Meringa Station in Far North Queensland.

"Being based in Cairns and working in PNG in normal circumstances isn't a problem. Travel restrictions brought about by the pandemic have limited my visits to the trial sites but that hasn't stopped the work," he said.

"Pre-COVID I would travel to each site at trial set up and as three and six month samplings are due. I would then join the team when it was time to harvest the crop.

"When international borders closed, I was very reliant on the people on the ground to keep things running smoothly. Unfortunately, domestic travel was also restricted within Indonesia and PNG and this affected some of the trial work. We reverted to regular video meetings and would chat regularly on WhatsApp."

When the team were establishing the trials in Indonesia they would send Dr Powell regular videos to review their work.

"That worked well," he said. "The teams wanted to make sure that the treatments were going in the right place, so that everything would be done effectively.

"It's a little more challenging in PNG because the internet is sometimes unreliable, but we do have phone chats and keep up-to-date via email," he said.

Working across countries and cultures, challenges are to be expected but trust is the priority for successful working relationships, Dr Powell says.

"This project has involved working with two very culturally distinct groups in two very different countries but thanks to my time working in PNG and other countries I have a connection culturally, and that's critical to build up trust.

"I haven't spent as much time working in Indonesia, but I have worked in other Asian countries, and that has helped me build trust with the local team there. And they're both great teams, with skilled and knowledgeable supervisors.

"Another advantage of working offshore is our ability to monitor for other potential biosecurity threats and add value to other SRA projects," Dr Powell said, explaining he has also been sampling for other pest threats during his visits.

Staff from Ramu Agri Industries, PNG learn how to sample for insect pests using yellow sticky traps.

***(Above)** Moth borer damage to cane stalks at harvest.*
***(Left)** Assessing cane weight in moth borer trials in Indonesia.*

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TWO-YEARS INTO THE FIELD STUDIES DR POWELL IS ENCOURAGED BY THE DATA

"We've been testing several insecticides in both countries. Across 12 field trials we've been able to identify one stand-out product.

"From the trials we've done we believe this product only needs to be applied once as it likely has a systemic effect throughout the whole insect.

"And you would only apply it if there was a likely incursion of moth borers, it's not something that growers would need to be applying every year. But they would need to be prepared to apply it if moth borers were found.

"This strategy is about speed. Once applied it would last for several months which would manage the incursion effectively," he said.

Dr Powell is quick to point out that before the product could be used in this capacity it would need emergency approval from the Australian Pesticides and Veterinary Medicines Authority (APVMA) - and it is not a silver bullet.

"As we've seen in the management of other pests we can't rely on one chemical alone. This could be a good short-term solution to moth borers in Australia, but we have to continue to look at other control options.

"Moth borers are already present in most countries in the world that grow sugarcane, causing big problems. Everyone is looking at ways to control it, using different methods including in South America and South Africa where they're looking at genetically modified sugarcane and biological control.

"We now have to develop an integrated approach to stopping and managing moth borers in Australia in the long-term which hopefully will utilise our short-term solution and some of the work that's going on around the world."

"I'd compare our strategy to stopping an unwelcome visitor at the front door and not letting it get into the house."

Dr Kevin Powell

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

Queensland Government

eDNA DETECTION - **MARRYING NEW TECHNOLOGY WITH DECADES OF ACCUMULATED KNOWLEDGE**

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

Existing surveillance is based on trapping or in-field identification of pests and diseases by specialist entomologists and pathologists. It is hoped access to new technology and tools will improve and speed-up surveillance.

One SRA-supported research project is developing an in-field DNA-based method, similar to a rapid COVID-19 test, that plans to be efficient, cost-effective, and accurate, without input from experts. Other methods based on the presence of trace pest DNA on plant surfaces and soil are also being developed.

eDNA samples are taken from cane fields in Far North Queensland.

"All organisms shed their DNA into the environment and this environmental DNA (eDNA), similar to a fingerprint, can reveal the presence of pests, even when the pest is no longer there," EnviroDNA Project Manager Luke Noble said.

"Using eDNA sampling we are developing diagnostic assays to identify key sugarcane exotic pests, and also modelling the likelihood of incursion and spread based on factors such as climate, trade routes, and pest biology.

"'Pest forecast maps' can then be drawn up across northern Australia which will lead to improved incursion responses, and reduce the need for widespread chemical control. This then reduces potential environmental impacts and pesticide resistance," Luke said.

Upskilling of government and industry surveillance staff in the application of these methods for sugarcane pests, including in-field capabilities, is a key output of the project.

"The ability of new tools, like eDNA-based tests, to identify things from the environment relies on decades of knowledge accumulated by the patient work of experts identifying species, and putting their DNA sequences into public databases.

"Genetic tools can help use that knowledge more widely, but maintaining progress in building reference databases remains crucial to all that we are doing now."

SRA entomologist Dr Kevin Powell, Dr Luke Noble and Dr Lily Tran EnviroDNA and Hang Xu, USQ PhD student.

eDNA samples are bagged and sent to the laboratory for extraction and identification by DNA sequencing. Work on DNA extraction and rapid testing in the field is progressing in parallel with simple sampling methods.

For more information please visit the EnviroDNA website via the QR code provided.

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

Queensland Government

Wilmar Sugar Australia's Jonathon Gilberd and Rob Stobie in front of Victoria Mill's new No. 5 evaporator.

NEW MODEL ROBERT EVAPORATOR **PROVES ITS WORTH IN VICTORIA MILL**

SMALL MILLING RESEARCH PROGRAM

Sugar Research Australia's SRA investment in the Small Milling Research Program for 2021/22, saw several milling companies partnering with research organisations to undertake projects which benefit the Australian sugarcane industry.

The research program has been developed as a way for SRA to invest in relatively small research projects that develop a product, service, or process that will solve specific problems in sugar mills and deliver tangible outputs.

Two of the projects which finished this year were:

- At-line purity sensor to enhance the monitoring, control and performance of the pan stage
- Evaluation of the operational performance and industry application for the final evaporator design at Victoria Mill.

For the 2021 season a new model Robert evaporator developed by the Sugar Research Institute (SRI) was installed in the final vessel position of the multiple-effect evaporator process at Victoria Mill.

Its performance was evaluated by Chief Investigators, Queensland University of Technology's Ross Broadfoot and Hakan Bakir and Wilmar Sugar Australia's Rob Stobie and Jonathon Gilberd.

"Just pointing out the glitch. Evaporation is an important step in the manufacture of raw sugar and largely determines the process steam consumption of the factory," Ross Broadfoot said.

"It concentrates clarified cane juice into syrup prior to crystallisation at the pan stage. Evaporation is performed in a series of connected vessels with each boiling stage providing further concentration of the juice. The final effect vessel concentrates the juice into syrup brix."

Robert evaporators are the most common evaporator design in the industry. They require a certain minimum temperature difference between the boiling juice and vapour for effective operation. This temperature difference progressively increases from about 5 degrees Centigrade (°C) at the first effect to 25 to 28 (°C) for the final effect. The aim of the new design of evaporator was to increase the heat transfer efficiency and so operate with a smaller temperature difference.

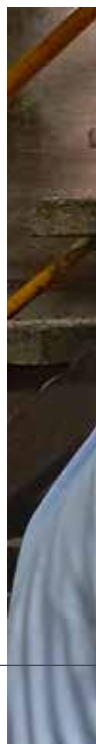
"Achieving a reduction in the required temperature difference in the final effect has the strongest influence on the juice processing rate of the whole set and on the operating time before cleaning of the equipment is necessary," Ross said.

The efficiency of the new evaporator was compared with data from 14 Australian factories with conventional Robert evaporators at the final effect.

"The Victoria Mill evaporator was found to operate with a smaller temperature difference under the same juice processing conditions (in terms of brix, juice temperature and vapour condensation coefficient)," Ross said.

"The temperature difference was a very favourable 3 to 4 °C lower than that typically required.

"Based on the magnitude of the benefits, it is expected other mills will include the design features of the new model into new vessels. Kalamia Mill is currently undertaking a staged project to install four evaporators of this new design, including one at the final effect position."



AUTOMATED SENSOR IS A POTENTIAL BREAKTHROUGH IN PURITY CONTROL

Controlling the purity of molasses streams is a critical factor that defines the efficiency of the raw sugar making process.

A new instrument was recently developed to analyse the purity of a molasses sample within the mill very quickly, using electrical conductivity.

The prototype is the work of Queensland University of Technology (QUT) Research Fellow at the Centre for Agriculture and Biocommodities, Neil McKenzie, and the technicians at the QUT Banyo Pilot Plant.

A small milling project funded by Sugar Research Australia and conducted by QUT and Rocky Point Mill sought to test the instrument within the mill. The Chief Investigator was Industrial Chemist, Rocky Point Mill, Bruce Tyson.

"The instrument is a breakthrough. Currently, analysis of pan stage liquid streams is time intensive. Typically, only three analyses can occur in every 24-hour period," Bruce Tyson said.

"Some mills make only one analysis in that time. That is not ideal. Changes in purity are being recorded from samples that were collected in the factory more than 30 hours previously. This makes fine-tuning difficult in the factory."

With the new automated instrument operating within the mill, all pan stage liquid streams (Liquor A, B and C Molasses) could be sampled and analysed every five minutes to provide an estimate of the purity of these streams more than 290 times a day. Having this timely purity information enables the pan stage to make optimal changes to the purity balance of the factory every hour.

The instrument is based on a previously developed laboratory analysis method. It uses a basic computer acting as a programmable logic controller.

The computer program is available for use throughout the Australian sugar industry. All other equipment used in the project is non-vendor specific.

"The instrument is not a replacement for laboratory analysis; it is complementary," Bruce said.

"A standard laboratory analysis needs to be undertaken to calibrate the instrument regularly."

Unfortunately, only limited testing was able to be undertaken in the 2021 crushing season with further delays preventing testing this year.

Nevertheless, site testing refined the instrument controlling program and determined that the analysis cycle for a single instrument is fewer than five minutes.

It is hoped that other factories will be interested in trialling the instrument in the current crushing season before deciding to install the technology within the mill on a permanent basis.

The installed cost of the instrument is expected to be less than $30,000 per site, with no additional costs to calibrate the instrument to the current methods of laboratory analysis.

Chief Investigator, Industrial Chemist, Bruce Tyson with the At-Line Purity Sensor installed at Rocky Point Mill.

A NEW MATE IN THE FIELD AND YOUR BACK POCKET

SRA District Manager Northern and Agricultural Machinery Specialist Phil Patane and Department of Agriculture and Fisheries, Queensland (DAF) Economist Brendon Nothard are excited.

From almost five years of investigations and trials and after sitting down with hundreds of contractors and growers to capture and analyse thousands of hours' worth of data, they have a new mate that they can't wait to introduce to the industry.

"We've been working together on the concept of a Harvesting Predictive Tool (HPT) since 2019," Phil said. "And we are excited that we are now in a position and on schedule to take the newly named *Harvest Mate* online platform and smartphone App prototype out to selected harvesting groups and growers for testing."

The app has been created to fill an identified and critical knowledge gap in the sugarcane industry.

"In 2019 SRA had 148 responses to a survey that asked growers and harvesting contractors about their harvesting best practice. We wanted to understand who was following best economical practice and, from those that weren't, what was stopping them," Phil said.

(Below right) *Phil Patane and Brendon Nothard are excited to be testing the prototype of the* Harvest Mate *app.*
(Centre) *Growers were engaged in the development of the* Harvest Mate *app at recent SRA field days.*
(Below) *The free* Harvest Mate *app will be launched for use by the Australian sugarcane industry in early 2023.*

"We would encourage all growers and contractors to give Harvest Mate a go. If someone told you, you could make an extra $100 a hectare, wouldn't you give it a go?"

Phil Patane

"More than 68 per cent of survey participants told us they weren't adopting the best economical practice because they didn't know what it was. More specifically they didn't know the cost of harvesting versus the yield benefits when changing from their current practices," Phil said.

"But the encouraging output from the survey was that the same group told us they would consider the adoption of a harvesting tool - if there was one that they could trust and could easily learn to use and adopt."

"Through running trials on properties from Mossman in Far North Queensland, all the way south to Hardwood in NSW, we've spoken to hundreds and hundreds of growers and contractors about how they harvest, and gathered as much data as we could," Brendon said.

"We've captured a range of different scenarios and machine types, down to the size and length of billets and extraneous matter levels. We wanted to understand how the harvester deals with different crop sizes, in different conditions and at different flow rates."

Harvest Mate users will be encouraged to set up their unique profiles online during the months leading up to the harvest.

"At this time the grower can estimate how much more he might pick up in dollars per hectare when changing to different harvester settings," Brendon said.

"Contractors are able to enter their own information and review outputs to ensure the predictions are relevant to their own businesses.

"Then, when the grower or contractor is out in the field, they can refer to the data to find out the most economical way to harvest a particular crop, and can quickly change some inputs and settings easily via a smartphone."

"It's been developed to be user-friendly and we hope that's reflected in the name," Phil said. "But more than that, we hope growers see it as a mate helping them out."

Brendon added that the app is based largely on cost benefit economics.

"It's the only tool out there that takes into account the true economics in relation to both real revenue changes against the actual cost of harvesting," he said.

"We know this is something growers have understandably struggled with in their planning. In the past, our data gathering has involved DAF economists spending many hours with trial participants adding information to a detailed economic spreadsheet. This has achieved the same results the app provides. But, with the app it requires minimal input in a fraction of the time.

"Of course, if we get a new machine on the market, we will have to test it against the existing data and see if it behaves similarly but we are comfortable *Harvest Mate* will accommodate most situations for our existing machines and cane regions. We believe we have covered our bases about yield, varieties and most conditions," Brendon said.

The app is now at the prototype stage and will be tested in seven demonstration sites between September and December this year – keep an eye on SRA's website and eNewsletter for advertised demonstrations in Innisfail, Ingham, and Tully.

With the ongoing support of DAF, a series of harvesting forums are planned next year, together with a full launch and release of the tool in time for the 2023 season.

"We encourage all growers and contractors to give *Harvest Mate* a go," Phil said. "If someone told you, you could make an extra $100 a hectare, wouldn't you give it go?" The tool will be free for anyone to use in the Australian industry.

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

Queensland Government

CANEBOOSTER - RETURNING AND INTRODUCING AGRICULTURAL LAND TO SUGARCANE

MSF Sugar is proud of its commitment to the local community in its milling regions.

But it is thanks to the community in the Atherton Tablelands of Far North Queensland that the Tableland Mill, now with its Green Energy Power Station, exists says MSF Cane Supply Manager Aaron Moore.

"I was 16 at the time the mill opened in 1998," Aaron said. "I wasn't living in the area and I wasn't thinking about sugarcane back then but Tableland farmers were. Some were growing avocados and bananas and some were invested in tobacco. But that was all about to change with the government buyout, and many farmers were looking at cane as an alternative crop," he said.

"Then, when I came up here from the Burdekin in 2015, there had been a succession of dry years which were knocking the industry about, together with some pretty average pricing.

"This saw a transition away from cane. The biggest movement by area was towards pasture grass. Being in drought, feedstock was in demand and quite profitable; we were losing sugarcane to grass!"

But that has changed, thanks, Aaron says, to rainfall, sunshine, the global price of sugar and incentives.

"In the past three years rainfall has improved, which for the northern Tablelands is a big bonus (the north and south regions have distinct climates). I believe that, along with the amount of sunshine we get, puts our climate probably second only to the Burdekin when it comes to cane suitability, and we've got good soils. Of course, the world price for sugar has improved which in turn has improved the overall reputation of cane. And to top it off, in 2018 MSF introduced *CaneBooster,*" he said.

MSF's CaneBooster is a financial incentive program to assist growers to maintain and grow cane supply to its factories. It is available to current and new growers supplying MSF's Tableland, South Johnstone and Mulgrave mills. For the last three years Aaron has been working with farmers who

(Below) *Agriculture on the Atherton Tablelands includes a large diversity of plant and animal industries and production of both tropical and subtropical crops.*

"The northern Tablelands is what we call an irrigated district, so even if we get a heavy rainy season, as we have in the last two years. we still need to irrigate."

Brett Lewis

have never farmed cane before, or who are returning to sugarcane after years of 'experimenting' with other crops and livestock.

"Uptake of *CaneBooster* was primarily focused on the southern Tablelands," Aaron said. "Maize growers coming out of fall armyworm and potato growers who wanted to move away from the volatility of that market were looking for options and welcomed the incentives.

"Now we're seeing old cane land come back that's been out of production for some time. These farmers have tried cotton, peanuts and other crops and livestock. Some farmers have been in dairy for generations and they're now turning to cane, wishing they'd done it sooner."

One such farmer is Bill Knowles, a second-generation dairy farmer in the southern Tablelands, who is thinking about the future of his farm, and his retirement.

"I came into the farm in my 20s. My Dad would have had about 300 cows back then," Bill said. "But around the year 2000 the dairy industry took a turn when regulation happened. I was lucky and got out and moved into beef at a good time. We grew lupins for the cattle and on top of that I've got a silage harvesting business.

"I like to keep my business diverse and I want to manage its future. I did look at planting cane about 10 years ago but then it took a fairly sharp dip in price on the global market and I held off. But at the same time I was watching what the mill was doing here, and the way it was run and I liked what I saw.

"But I still wasn't confident if cane was going to be the right crop long-term, it would mean a heavy commitment. Potatoes have five months in the ground, cane can be seven years or more.

"Then around the same time as the sugar price was moving back up, I heard about MSF's incentives program, and I knew there were good varieties out there, so I took up the offer. This year I've got about 320 acres (130 hectares) under cane. Next year I plan to add another 130 acres; that will be about half of my land. And I'm pleased that I did," Bill said.

In the northern area of the Tablelands, an hour's drive from Bill's lush green pastures, Rivera Farming's irrigation system is running full pelt on a 28 degree September day where, with assistance from MSF's *CaneBooster* program, Farm Manager Brett Lewis is overseeing around 190 hectares of cane.

"Under previous owners this property was 100 per cent cotton. We're now a rotational property and planting cane suits us, allowing for fallow crops and good weed management. At the end of the day, we plant cane for the economic outcomes. All our decisions are business based," Brett said.

"The *CaneBooster* program has helped us with our long-term planning, and the support we've got from the guys at the mill has been invaluable."

Mick Ward is Senior Cane Supply Manager for MSF Sugar and says the company is pleased with the uptake of the incentives program.

"Through our *CaneBooster* program we continue to adapt a range of grower incentives to drive cane supply and best fit the requirements of growers in our regions," he said. "We are really pleased with the uptake from Tableland Mill growers of our *New Land Planting Bonus* and *Planting Turbocharge Bonus* schemes, for new cane land and current cane land respectively. We have also had excellent uptake of our zero-interest New Land Planting Loans," Mick said.

***(Right)** MSF Sugar CEO Krisda Monthienvichienchai (right) visited new cane farmer, Bill Knowles in March 2022. **(Centre)** Aaron Moore, Bill Knowles and MSF agronomist/extension officer, Graham Cripps.*

GROWER SATISFACTION AND ADVOCACY **UNDERSTANDING THE VIEWS OF INDUSTRY**

Since releasing its Strategic Plan 2021-2026 last year, SRA has been focused on implementing the strategy, with a strong commitment to local engagement. In our first industry surveys since launching the new strategy, we sought feedback on a range of outcomes including district-level engagement, products and services, variety development and communications.

When Roslyn Baker joined SRA as its Chief Executive Officer in 2020, she heard some blunt feedback during an industry listening tour about SRA's services.

Two years and a new strategic plan later, SRA is seeing some "green shoots" emerge from recent industry surveys, including the annual survey of 250 grower members from across all growing districts.

"The SRA team has made a huge commitment to respond to our industry feedback and pleasingly, our most recent surveys with industry indicated that we're starting to turn the corner. The industry is starting to feel more engaged with the direction for SRA and more satisfied with what we are delivering on the ground," Roslyn said.

"We know we've got a long way to go, and we won't stop working on that, but it's really heartening that we are getting those indicators of improvement."

With finite resources to spend for the benefit of the industry, Roslyn said it is important that SRA understands what is most valued by its customers.

"Our surveys have actually been extended so industry has a voice and can tell us what they most value and what they least value from us," Roslyn said.

She said an important shift in this year's surveys was understanding awareness of SRA's activities across the industry.

"That goes right from the varieties that we're putting out, to research plans and investment, our district managers and district plans, and our products and services.

"Where our industry is familiar with what we're doing, they typically have a higher level of satisfaction and involvement," Roslyn explained.

"It's the first time we've really drilled right into how aware our industry members are about what SRA does and the services we provide."

Having gathered feedback from industry, she said the next step is taking action to support further improvement.

"We'll continue to listen. Our surveys are about how we continue to respond over time. SRA has an important role to play as the sugar industry research and development arm, and it's important we are absolutely meeting our industry's expectations.

"We'll certainly be looking to improve how we get out to industry and how we work with industry to build familiarity with the work we're doing, with our research programs, our objectives in a district, our knowledge about penetration of pests and diseases, and the capability of our experts."

SRA's grower and miller surveys were undertaken concurrently with the support of independent survey provider, Intuitive Solutions. An investor/partner survey was undertaken directly by SRA through an online survey.

The surveys adopted a new approach designed to support actionable insights and understand progress against key outcomes and measures in the strategic plan. While several questions were not directly comparable to previous survey cycles, key overarching measures, such as grower advocacy of SRA products and services, remained consistent and are a useful point of comparison.

In the next edition of* Cane Matters *– we'll share insights from the miller survey along with an update on action planning to address industry feedback.

WHAT GROWERS TOLD US

Growers on average reported overall satisfaction with research and development levy investment of 6.2 (on a rating scale of 0-10).

Almost two thirds of growers (67%) rated their satisfaction moderate to strong (at 6 or above).

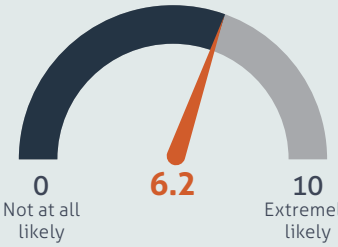
Growers in the Herbert region were the most satisfied on average, while growers in far north and southern Queensland were least satisfied.

Small and extra-large growers reported higher average satisfaction than medium and large growers.

Advocacy improved 4 points to 6.5, up from 6.1 in the previous survey cycle, suggesting growers are more likely to recommend SRA products and services to other growers and industry associates.

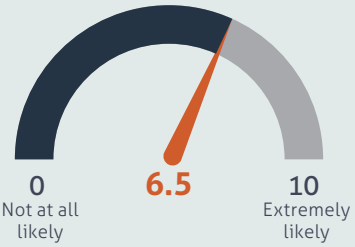
Satisfaction

How satisfied are you that your research and development levy is being invested to achieve the outcomes you expect?



Advocacy

How likely is it that you would recommend the services, products and information SRA provides to other growers or industry associates?



Growers are cautiously confident about the future

More growers are positive than negative about the future of the Australian sugarcane industry in the next 12 months.

Most growers (58%) reported to be fairly positive or very positive suggesting there is some encouragement from improved operating conditions and current commodity prices.

However, like other sectors, input costs and market volatility typically dampens grower optimism.

Satisfaction higher where there is greater familiarity

Grower support of SRA's industry and research plans is influenced by their familiarity with the plans. Results suggest that where growers are very familiar with these plans, there is typically a strong level of satisfaction.

Satisfaction with key grower touchpoints

Satisfaction

**The average satisfaction score provided underneath each topic is a rating of 0 (extremely dissatisfied) to 10 (extremely satisfied).*

Grower familiarity with SRA's research investment:

	% familiar*
Nutrient management	82
Pests, diseases and weeds	79
Farming systems and agronomy	74
Biosecurity	70
Small Milling Research Program	33

**Familiar = very familiar or I have some understanding*

Satisfaction with plant breeding

Regarding SRA's plant breeding program, overall, how satisfied are you ...

	% familiar*
With distribution of cane from local approved plots?	7.5
That information about variety performance and selection is useful and credible?	7.2
That SRA's plant breeding program offers value to your farm business?	6.6
With the quality of new varieties defined as SRA9 or later?	5.8

**Scores are a rating of 0 (extremely dissatisfied) to 10 (extremely satisfied)*

Products and services

Of SRA products and services, growers are most familiar with:

	% familiar*
SIX EASY STEPS	84
QCANE Select®	75
Pathology diagnostic service for RSD, Pachymetra and nematodes	69

**Familiar = very familiar or I have some understanding*

Grower profile

The 'average' grower survey respondent in 2022 was male, 59 years old, with 189 hectares of land, of which 74% is used to grow sugarcane, 16% for fallow, other crops and/or grazing, 7% for environmental purposes, and 3% not used for farming.

Average tonnes of sugarcane harvested was 8,937 tonnes for an average commercial cane sugar (CCS) of 13.3 and average cane yield of 87 tonnes.

Farm business intentions over the next five years reported by growers includes:

Improve my farm productivity through increased investment	20%
Improve my farm productivity but not invest heavily	29%
Maintain farm productivity – keep to current production	30%
Transition to retirement and/or wind down operations, or transition to other cropping	21%

For more information about these results and other industry insights scan here to visit SRA's Industry Information and Insights page.

Head of Strategy, Insights and Engagement Cathy Weis and Principal Monitoring and Evaluation Officer Ben Simpson review insights on SRA's communication channels. Satisfaction with key communications channels - including the SRA website, magazines such as Cane **Matters**, *and printed farming guides - increased during the latest survey cycle.*

FIRST INVESTOR AND PARTNER SURVEY PROVIDES NEW INSIGHTS

SRA has undertaken its first investor and partner survey, providing a baseline against which future insights can be monitored.

Unsurprisingly, there was differing awareness of SRA products and services between investors and growers, and less familiarity with district plans.

Investor/partner average satisfaction with levy investment rated 6.8 (on a scale of 0-10, where 10 is extremely satisfied).

Eighty per cent of investors and partners indicated they were satisfied with SRA's levy investment.

Satisfaction

Overall, how satisfied are you that SRA invests the levy paid by sugarcane growers and milling companies to achieve the outcomes they expect?

Investors/partners reported a high degree of familiarity with the strategic plan and research investment

Strategic plan	85
Research Investment	62

% familiar

However, they were less familiar with district plans

District Plans	31

% familiar

Advocacy

How likely is it that you would recommend the services, products and information SRA provides to other colleagues or industry associates?

In other feedback, investors and partners indicated:

SRA staff are active in engaging in industry matters and events	92%
SRA is easy to work with	76.9%
SRA collaborates well with other organisations and industry stakeholders	76.9%

NEWLY DISCOVERED NEMATODE MAY POSE CHALLENGE **FOR BREEDING FOR NEMATODE RESISTANCE**

A new project running until early next year is conducting a risk assessment of a species of root-lesion nematode new to the Australian sugarcane industry - *Pratylenchus parazeae.*

A recent SRA project discovered the new species in the Burdekin cane growing region. The only other place where this nematode species has been found in sugarcane was in Guangxi, China, in 2015.

Chief Investigator for the project, based at Woodford Station, is SRA Manager Biosecurity and Disease Screening Dr Shamsul Bhuiyan.

"Plant-parasitic nematodes are a significant pest of sugarcane, causing from 5 to 20 per cent yield loss at an estimated cost of more than $80 million in productivity annually," Dr Bhuiyan said.

"The most destructive pathogen of sugarcane is root-lesion nematode - *Pratylenchus zeae* - because of its ability to survive under diverse agroclimatic conditions and in all soil types.

"Resistance to *P. zeae* is rare in commercial sugarcane in Australian and other cane industries across the world. Recently though, SRA identified several lines from *Saccharum spontaneum* a wild relative of sugarcane, which possessed a high degree of resistance to *P. zeae*. Subsequently, these genes have been bred into 150 progeny, the majority of which are showing high resistance to *P. zeae* in the glasshouse study at Woodford Pathology Research Station.

"Unfortunately, a study in China found the new root-lesion nematode, *P. parazeae*, can invade sugarcane roots and cause similar disease symptoms to *P. zeae*.

"This project seeks to find out if that's also true in Australia. The pathogenicity of different lesion nematodes can vary depending on varietal and/or environmental conditions so what is happening in China may not be the case here.

"Once we find out what is happening here, we also need to find out if cane with limited resistance to *P. zeae* is also limited in resistance to *P. parazeae*. If so, this new nematode could pose a real challenge in developing lesion nematode resistant varieties for the Australian sugar industry."

The two species of lesion nematodes are almost identical in form and structure, and it is extremely difficult to separate them visually. This poses a challenge to the scientists to develop a pure population of *P. parazeae* for the pathogenicity (i.e. its ability to cause disease) study. Only molecular tests can reliably identify the *P. parazeae*.

The project aims to:

- Diagnose and isolate *P. parazeae* for a pathogenicity study
- Determine the pathogenicity of *P. parazeae* compared to *P. zeae*
- Determine whether breeding lines resistant to *P. zeae* are equally resistant to *P. parazeae*

Two lesion nematode species of sugarcane, Pratylenchus zeae *(left) and* P. parazeae *(right). Photos: courtesy of Kylie Garlick.*

Sugarcane root-lesion nematode on sugarcane roots. The pest destroys cortical tissues (i.e. the outer layer immediately below the 'skin') of the sugarcane roots.

PROMISING SIGNS FOR SRA23Φ

Farming 340 hectares of land across his four properties in the Burdekin, Russell Jordan is always keen to try newly released varieties to see how they perform on his farms.

This season, Russell planted around 20 hectares of SRA23Φ from approved seed cane from Burdekin Productivity Services. It is his first year growing the variety as a commercial plant crop.

"We planted this in mid-March, which was nice and early. There was no rain, so it came up on moisture and it has been really good," Russell said.

"It seemed to come out of the ground reasonably fast and then got going well. We didn't have to spray too much. We fertilised and hilled it up early and it has just powered since then.

"We've always tried the new varieties that come out. Sometimes you might only put a few hectares in and propagate it up for the next year to see what it looks like."

Russell follows advice to rotate varieties for each crop cycle to manage disease.

"This block was Q240Φ beforehand. You really shouldn't put it back-to-back. So, we thought we'd try something different."

Russell said he is pleased with what he has seen so far. He plans to expand the amount of SRA23Φ next season, having bought approved seed cane for another of his farms.

He also has around eight drills of SRA23Φ at first ratoon from approved seed cane.

"It looks very good, too. We have held it back next to a plant crop that we're going to cut next. It will be interesting to see what it does later in the year, but it looks good for now."

Across his farms, Russell grows the district standards – Q240Φ, Q208Φ and KQ228Φ – as well as Q232Φ, and more recent releases SRA23Φ and WSRA17Φ.

It's an approach encouraged by Burdekin Productivity Services Manager Rob Milla who advises about the importance of managing risk.

He has concerns about the increasing volume of Q240Φ grown in the district.

Burdekin farmer Russell Jordan checks out the SRA23Φ plant crop on his Burdekin farm.

Burdekin Productivity Services Manager Rob Milla and Burdekin farmer Russell Jordan review strip trial results for SRA23Φ.

"Pathologists certainly inform us that growing 40 per cent or more of one variety carries significantly extra risk," Rob explained.

"In the past three years, we've had 41 per cent, 45 per cent and then 49 per cent of the district plant Q240Φ."

Q240Φ made up 39.5 per cent of the total Burdekin crop in 2020, increasing to 43.3 per cent in 2021.

"More than 60 per cent of the district could be planted to Q240Φ over the next few years," Rob said.

"History tells us that when a variety dominates a district something often comes along that has quite a negative impact on it."

Rob acknowledges Q240Φ is a high performing variety and is doing well for a lot of growers.

"As an advisor, it's not my role to tell any grower what they can or can't plant. However, as an advisor we need to provide all the information to make sure that they are managing their risk.

"I think growers need to have a look at varieties like SRA23Φ and some others coming through the system to see how they could manage and limit the risk on their own farms," Rob said.

STRIP TRIALS **GOING STRONG**

Burdekin Productivity Services (BPS) undertakes strip trials at commercial scale when varieties are supplied from SRA, including multiple trials with SRA23Φ.

BPS Manager Rob Milla said the trials have occurred on a range of soil types.

"The strip trials that we've conducted have been done in some heavy clay soils, some marginal soils, some high producing soils and some sands," Rob said.

"They have reflected very well what the SRA recent plant breeding research data showed - that it is consistent with our current suite of varieties: Q240Φ, Q183, Q208Φ and KQ228Φ.

"There haven't been any trials where it's been spectacularly better or terribly worse, so fairly average tonnes, fairly average CCS. That's actually good because our standards are reasonably high performing.

"One trial where SRA23Φ did well was on a slightly heavier delta soil, and out to third ratoon it outperformed the other varieties.

"I'm not saying that's going to be replicated everywhere, but we did see performance going through ratoons.

"Since then, we have had some comments that ratoons are a little bit sparser emerging out of the ground. But that's purely a visual thing, and all our data says at harvest time it's comparable with all our other standards."

What SRA23Φ offers over some other varieties in the district is its good smut resistance.

"The smut resistance was seen as the most attractive trait when it was approved for release by the local Regional Variety Committee," Rob said.

While district standards Q240Φ and KQ228Φ are classed as resistant, Q183 and Q208Φ have an intermediate resistance rating for smut.

Rob said seed sales for SRA23Φ have been positive.

Last year it accounted for 23 per cent of clean seed sold in the district, with 2022 sales so far around 27 per cent.

As a newly released variety there are limited amounts being processed through the mill this season, but Rob said he looked forward to full paddock data in the next few years.

SRA23ф FACTS

SRA23ф has been planted into five demonstration trials by Burdekin Productivity Services.

As with other varieties, yields dropped off in ratoons.

Resistant to smut, leaf scald, and mosaic.

It can be a trashy variety.

It has good early, mid, and late sugar and average lodging tolerance.

In final assessment trials (FATs), it had yields and CCS that were average compared with the standard commercial varieties in the district.

SRA23ф was first released in 2019.

More than 2000 tonnes of approved seed is available in 2022.

VIGOROUS EARLY GROWTH OF SRA23ф A POSITIVE FOR WEED CONTROL AND WATER USE

SRA's District Manager Burdekin Terry Granshaw is a regular at local shed meetings where discussion often turns to varieties, and SRA23ф is a popular topic.

"It's early days yet but what a number of growers are really happy with is the way that it strikes out of the ground," Terry said.

"It seems to come out of the soil very quickly compared to some of the other varieties, especially some of our standards. They are very happy with that.

"What they've been telling me is that after only a couple of months it will be 200 to 300 millimetres higher than their other varieties.

"Because it covers in quite quickly and grows so quickly, that's an advantage for growers for weed control and water use."

Terry said most growers with SRA23ф are propagating it out from their approved seed source and planting their crop for next year.

Only a small amount has been processed through the mills.

"We're comparing hundreds of tonnes to thousands and thousands of tonnes of other varieties through the mills but certainly there are good signs.

"Growers seem to understand why it was released through the Regional Variety Committee.

"It's a variety that is as good as our standards we have now. It's not higher yielding but it does have a good smut rating, so from a biosecurity perspective, that's exactly what we want.

"I think it's going to be one of those varieties that every grower should probably have a little bit of."

TOO MUCH OF A GOOD THING
MULTIPLE VARIETIES MANAGE RISK

SRA District Manager Burdekin Terry Granshaw has been around the industry long enough to have seen the financial impacts of having a large volume of a single variety of cane when something goes wrong.

Like Rob Milla, he is a strong advocate of managing risk through planting multiple varieties.

"Every time we've seen 60 per cent of a district growing a single variety, we always seem to have some sort of issue that follows it," Terry explained.

"We had a massive amount of KQ228$^{\Phi}$ as standover in 2010 when we had a La Niña event. And it didn't stand up well – it just didn't perform and had very poor CCS.

"And of course, Q124 down in Mackay. It was at 85 per cent and then orange rust came in and the result was very significant yield reductions."

SRA Pathologist Rob Magarey understands farmers' desire to grow the highest producing variety possible but said most disease epidemics in the Australian industry have occurred when a single variety was dominant in a mill area.

"What we've noticed over time is that when a single variety dominates the variety scene, it gives great opportunity for any organism that can attack the cane to multiply, grow and quickly escalate," Rob said.

"The longer we see a variety grown in a large part of the mill area, the greater the chance of organisms building up in that cane to colonise it.

"We're growing monoculture for a period of five to six years with the same crop and the worst case is to a have a single variety. Not only a single crop, but a single variety."

Rob said the rapid onset of orange rust in the Mackay district resulted in the most widespread, severe disease occurrence and largest single-year financial losses of any of the epidemics.

He said there is a strong correlation between the percentage of an area planted to one variety and the occurrence of a major disease epidemic.

"The safest option is to grow a range of varieties so that disease risk is minimised, with at least one likely to have sufficient resistance to withstand a disease incursion," Rob said.

***(Left)** District Manager Burdekin Terry Granshaw*
***(Middle)** Burdekin Productivity Services Manager Rob Milla*
***(Right)** SRA Pathologist Rob Magarey*

The coconut rhinoceros beetle attacks the developing fronds of coconut, oil and other palms in tropical Asia and a number of Pacific islands.

IDENTIFYING VIRUSES FOR THE BIOLOGICAL CONTROL OF CANEGRUBS

With a background in entomology Dr Kayvan Etebari's work in the School of Biological Sciences at The University of Queensland focuses on how viruses interact with insects. For more than a decade his priority has been mosquitoes in relation to dengue and Zika in humans and how those viruses may be disrupted through biological control.

More recently, his work in South-East Asia and the South Pacific Islands significantly contributed to control of the coconut rhinoceros beetle - *Oryctes rhinoceros* (Coleoptera: Scarabaeidae) through classical biological control involving a virus.

In a new research project funded by SRA, Dr Etebari hopes to work with this knowledge to identify novel insect-specific viruses for the biological control of canegrubs.

"The greyback canegrub *(D. albohirtum)*, and French's canegrub *(L. frenchi)*, are the most damaging and widespread sugarcane pests in Australia," Dr Etebari said. "They belong to the same family as the coconut beetle."

The year-long study is looking to identify two things: insect viruses and plant pathogens. The work involves a comprehensive metagenomics survey (i.e. the study of genetic material recovered directly from insects' gut samples) of a wide range of canegrubs in sugarcane fields.

"Previous studies have shown that canegrub larvae are susceptible to a few pathogens that could, in some cases, be responsible for significant suppression of their local populations," Dr Etebari said.

"This project is the first to investigate and characterise ribonucleic acid (RNA) viruses in canegrubs. We have already taken samples from sites across Queensland and found more than six different novel viruses.

"It is our hope that these findings will provide new insights to identify and account for the factors responsible for the unexplained mortalities among different populations of canegrubs in north Queensland," Dr Etebari said.

The long-term aim of the project is to then determine if any of the viruses identified in this research could be developed into viable and effective biopesticides and biological control options.

"At the moment the only option available for the control of canegrubs is a single pesticide," Dr Etebari said. "Overreliance on one compound presents a significant risk that canegrub populations will ultimately evolve resistance. Residues that pesticides can leave in the wider environment will also have negative impacts on the Australian sugar industry," he said.

It is hoped this research will contribute to the development of new integrated pest management activities and arm the industry against future pest threats.

"While we are in the very early stages of this work, biological control and biopesticides are proven and welcome technology that can be used in conjunction with insecticides, if necessary," Dr Etebari said. "But before any viruses are used in this way we will need to confirm that they are not going to have any negative impact on other beneficial insects, such as bees," he said.

"The added beauty of the work we are currently doing, as well as detecting viruses that can kill insects, is that we may also detect some plant viruses that at the moment we know very little about but could become a threat in the future."

Chief Investigator: Dr Kayvan Etebari, The University of Queensland, School of Biological Sciences.

HANNAH GREEN
James Cook University

Born in Townsville, Hannah's family moved to Singleton NSW (cattle country), where agriculture studies would become an exciting part of Hannah's high school days.

"I loved everything about agricultural studies but dropped it when I got to Year 11," Hannah said.

"I chose to focus more on the sciences, particularly chemistry and biology. I had my heart set on going to uni and then working in the rainforests to save endangered species. I wanted to work with orangutans!"

Hannah may laugh about this now but with an exceptional Australian Tertiary Admission Rank (ATAR) and the NSW Premier's award for All-Round Excellence, any university would have welcomed her to do whatever she wanted. Her choice was James Cook University, back in tropical Townsville, where subjects chosen for their pathway to Borneo (and orangutans) would rekindle her passion for agriculture.

"In my first year I took an environmental science class and I started learning about the soil and how important it is to the environment; and the concerns that relate to the state of soils around the world. And when I learnt that I took up Earth science and found it so interesting," she said.

While studying for her Honours project - *The effects of long-term irrigated sugarcane cultivation and repeated gypsum application on the chemistry of sodic soils* - Hannah embraced the opportunity to work with Wilmar Sugar. She gained practical experience in the field, taking soil cores from irrigated cane fields, processing samples for laboratory analysis, and measuring soil physical properties.

POSTGRADUATE RESEARCH OPPORTUNITIES **WITH SRA**

To help encourage young scientists into our industry, SRA makes available a number of Sugar Industry Postgraduate Research Scholarships (SPRS) every year, undertaken at Australian universities and institutions for postgraduate research study.

SRA is currently supporting Hannah Green, Ian Peterson and Angela O'Keeffe. *Cane* ***Matters*** checked in with these students to find out what drew them to the work and how their research is tracking.

Graduating with a Bachelor of Advanced Science, Hannah had majored in Earth Science, Zoology and Ecology with a strong focus on advanced statistics and ecological modelling. Research was always going to be the next step.

"I'm really passionate about living and working in the tropics; and as sugarcane is one of the major agricultural industries up here and lots of people depend on it, I'm especially keen to understand more about it,' she said.

Hannah explains that one main part of her PhD research is the potential for mill by-products to be used as materials for enhanced weathering, a technique to remove carbon dioxide from the atmosphere and store it in the soil; and potentially move it from the soil and store it in the ocean.

"This technique has been previously investigated with mined rocks like basalt. And there have been suggestions that mill by-products like mill-ash could be used to achieve the same results," she said.

Hannah is only six months into her research, currently leading up to her PhD confirmation and planning her schedule for the next three years but she has already carried out some exciting work.

"I've collected samples of mill-ash from different regions and I've measured a range of chemical and physical properties," she said. "And I'm parameterising these models that have previously been used to assess the carbon dioxide removal potential of basalt, and so through that we'll be able to compare the potential of mill-ash – I'm excited to be able to do that so soon in my project.

"I treat my research just like a job, coming to work every day. Being awarded scholarships like this one from SRA takes a lot of the pressure off financially and lets me focus on the work that I need to do.

"I'm also getting a lot of first-hand invaluable advice. One of my PhD supervisors is also a Wilmar staff member and I've had help accessing their field trials."

Hannah hopes that one day her work will form the basis for establishing the use of mill-by products for a carbon sequestration technique.

"Maybe a carbon credit scheme for cane growers," she said. "If we can prove that it is feasible, then that would be really exciting.

"In the future, my goal is to work as a research scientist in the fields of agricultural and soil science. I want my research to be applied and to contribute to improved productivity, efficiency, profit and environmental outcomes for Australian agriculture. I specifically hope to strengthen the major industries in North Queensland, which is home for me and my family."

Mill ash and mud have high potential to sequester carbon through enhanced weathering better than basalt, due to their liming effects. These products are known to be beneficial for crop growth. However, little is known about their effects on soil including their liming and carbon sequestration abilities.

One outcome of this project will be a carbon sequestration methodology. Additional outcomes for the sugar industry include improved runoff water quality through increased nutrient use efficiency and increased crop productivity through improved nutrient supply.

Hannah Green

Hannah and her soil cores from cane paddocks in North Queensland.

IAN PETERSEN

The University of Queensland, School of Agriculture and Food Sciences, Australian Institute for Bioengineering and Nanotechnology

This project has potential to benefit the community and industry both economically and environmentally with delivery of a high-performance biofertiliser product. The biofertiliser will promote soil health regeneration and maximise plant growth while reducing nutrient runoff into the environment.

Ian Petersen

Ian Petersen graduated from The University of Queensland in 2020 with a Bachelor of Chemical Engineering and Bioprocess Biotechnology. He was considering a career in chemical engineering, until the Honours component of his dual degree involved working with a bacterium found in the roots of sugarcane. That sparked an interest in agriculture and specifically biofertilisers and now the course of his PhD.

"Through my Honours project I looked at improving the cultivation strategies of a selected plant growth promoting rhizobacterium (PGPR) isolated from Queensland sugarcane fields and found a 40-fold increase in yield. If this were to be used on a commercial scale it could mean significant reductions in production costs and benefits for the environment," Ian said.

"Improved crop yields are a key target for farmers, but the overuse of chemical fertilisers to increase yields as much as possible has negative impacts on soil health and future crop sustainability.

Taking advantage of nature and the complex systems involved in plant-microbe symbiosis could potentially provide results for a fraction of the price of a chemical-based approach," he said.

Whilst microbial biofertilisers alone have been shown to reduce soil acidification and nutrient leaching, Ian says an organic or mixed chemical/organic fertilisation regime supplemented with microbial biofertiliser has the strongest potential for high yields without sacrificing soil health.

Ian adds that a key part of his project and biofertiliser is the use of mill mud and other waste streams as both a source of nutrients for the crop, and a stable carrier for the beneficial microbes.

"The primary goal of my research is to see if these microbes can be produced as a high quality biofertiliser that will address the key industry issues of crop yields and soil health; and then produce a marketable biofertiliser that is widely used by industry," he said.

Ian began his research in 2021, and while he has had to adjust his work schedule around this year's Brisbane floods and cold weather, he has made good progress.

"I have been able to collect soil samples from sites around Brisbane and have also received some from a phosphate rock mine near Mt Isa thanks to one of our industry partners. I am hoping that some of these microbes living in close proximity to rock phosphate deposits may have evolved an improved ability to solubilise these compounds. This is one of the main mechanisms of growth promotion I'm looking into at the moment, whereby these microbes can break down the insoluble phosphate in these deposits into a form that is readily available for plant uptake.

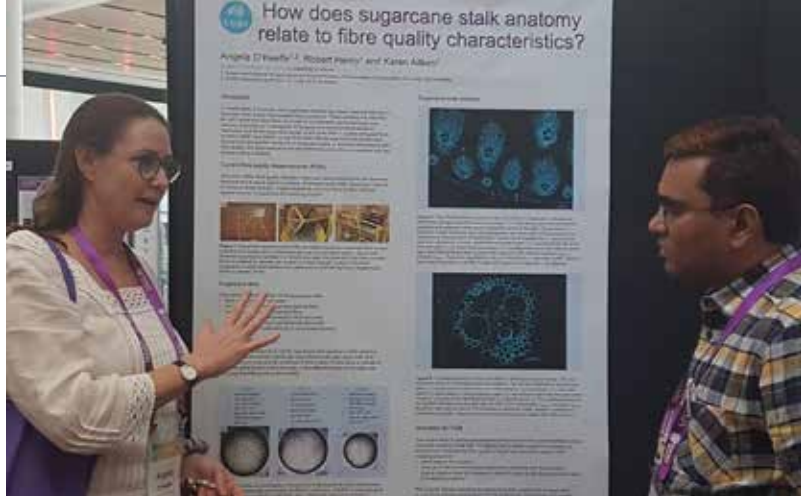
"I have also identified the most promising strains of microbes in these samples that we then grow in the lab and use in glasshouse trials. As we come back into summer I'm hoping for some conclusive data from these trials.

"The next step will be trials in cane paddocks. We plan to do these in North Queensland in the coming months. This will involve providing farmers with the biofertiliser for testing and seeking their input to help drive further formulation.

"I am really enjoying trying to develop something that can be used as a product with a practical and immediate application that also has environmental benefits," Ian said.

"The biofertiliser has come from the soil and will go back into the soil, providing benefits to soil health while reducing waterway contamination, and in the long-term reducing production of chemical fertilisers that contribute to greenhouse gas emissions."

Harvested sorghum from a trial to see what impact three of the best performing soil isolates had on the solubilisation of rock phosphate: Ian Petersen



Angela presented a poster on her early research at TropAg 2019

ANGELA O'KEEFFE
CSIRO

Angela O'Keeffe admits to a lifelong fascination with the plant kingdom, fuelled through several botanical courses during her undergraduate Bachelor of Applied Science.

After graduating, Angela worked on medical research projects before landing what she called her dream job as a research technician with Professor Robert Henry at the Queensland Alliance for Agriculture and Food Innovation (QAAFI).

Working in Prof. Henry's molecular lab, Angela coordinated the Australian Research Council project *'Manipulation of carbon partitioning to enhance the value of sugarcane'* and worked under Principal Research Scientist in CSIRO Agriculture and Food, Dr Karen Aitken, on the first sugarcane genome sequence. This is now being used for selection of high sucrose and disease resistance in several sugarcane breeding programs.

"Working with researchers like Robert and Karen, was inspiring. I learnt so much about sugarcane and by the end of my contract I became keenly aware of the underutilised value of the commodity in Australia. Robert preferred to call it 'energy cane'."

Angela said she loves the concept of the potential sugarcane has beyond sugar.

"I love what the Brazilians do when they follow the marketplace to decide whether to go for sugar or go for ethanol. I'd love to see Australia doing that," she said.

"I believe sugarcane could take centre stage in a green revolution with its potential for valuable biocommodities, beyond sugar feedstock and molasses, to bioethanol, bioplastics, biochemicals, and an evolving list of renewable bioproducts.

"In the United States there is research into transformed sugarcane lipids for aviation fuel. My imagination takes over with sugarcane growers becoming the oil sheiks in our post-fossil fuel world. And in India they're making fabric from cane. It is such a versatile plant."

For the moment Angela is bottling her excitement for sugarcane through her PhD studies to determine fibre quality traits while continuing to work with Prof. Henry and Dr Aiken.

"I had the good fortune to be in the right place at the right time when Karen had this project in mind," Angela said. "I am privileged to take on the translational research which is exploring what the fundamentals contributing to the quality of sugarcane fibre are."

Angela's PhD research includes comparing two cane varieties, with soft and hard fibre quality, with respect to anatomy (using microscopy and image analysis) and biochemical composition, looking for traits linked to fibre quality. In recent years some new 'soft cane' varieties have seen fibre quality measurements that sit outside the normal range but their softness has resulted in challenges at the mill.

Currently in the third year of the 4-year project Angela's excitement for cane hasn't waned.

"To date I have completed two major experiments, nuclear magnetic resonance (NMR) and inductively coupled plasma (ICP) spectrometry and most of my microscopy experiment. I'm currently analysing and writing up large datasets. My aim is to submit my thesis next year," she said.

Before then Angela will present a poster at TropAg later this year, as she did in 2019; and hopes to present at next year's Australian Society of Sugar Cane Technologists conference in Cairns.

"I never imagined that I would undertake a PhD but the research project has allowed me to stay in agriculture and more specifically sugarcane, working with great scientists," she said.

"The SRA operational grant and stipend top-up has allowed me to remain a full-time student devoted entirely to my research and to pay for experiment-associated expenses at the University of Queensland.

"After my PhD I hope to continue along the pathway to becoming an experimental scientist in sugarcane research, and who knows where that will lead?"

My PhD project aims to deliver information to assist the breeders to develop varieties that have good quality fibre characteristics and remove the clones with poor fibre quality measurements (FQM), early in the breeding program. This will allow faster generation of new improved varieties to be delivered to the sugarcane industry.

Ultimately millers will benefit from the reliable development of varieties with improved fibre quality and an increase in mill efficiency from a guaranteed supply of varieties with good milling properties."

Angela O'Keeffe

Angela is pictured suited up to work in the UQ School of Earth and Environmental Sciences (SEES) Environmental Geochemistry Laboratory (EGL) Radiogenic Isotope Facility (RIF).

Primary school children got EXCITED learning about the attributes of soil.

In the classroom, students investigate their interests, strengths and values to determine where they sit according to the RIASEC psychological model (see below right) and what agricultural careers might bring them future satisfaction.

SRA District Manager Central Dylan Wedel teaches young students the various properties of soil.

School children participating in the EXCITED 4 Careers in Agriculture program.

A young student decides whether to become a soil scientist through her analysis of clay-based soils.

GETTING EXCITED 4 CAREERS **IN AGRICULTURE**

SRA Mackay is a collaborating partner in CQ University's program, EXCITED 4 Careers in Agriculture with the goal of attracting more young people into careers in the sugar industry.

District Manager Central Dylan Wedel said the partnership was formed in accordance with SRA's Research Mission, Skilled for the future, to support the development of an adaptable, professional, commercial and entrepreneurial industry and research community.

"In the past, farming had been thought of as a job you had to be born into," Dylan said.

"That is an outdated view which doesn't recognise that students coming out of agricultural degrees and technical schools today have a vast array of choices for getting into the agricultural industry.

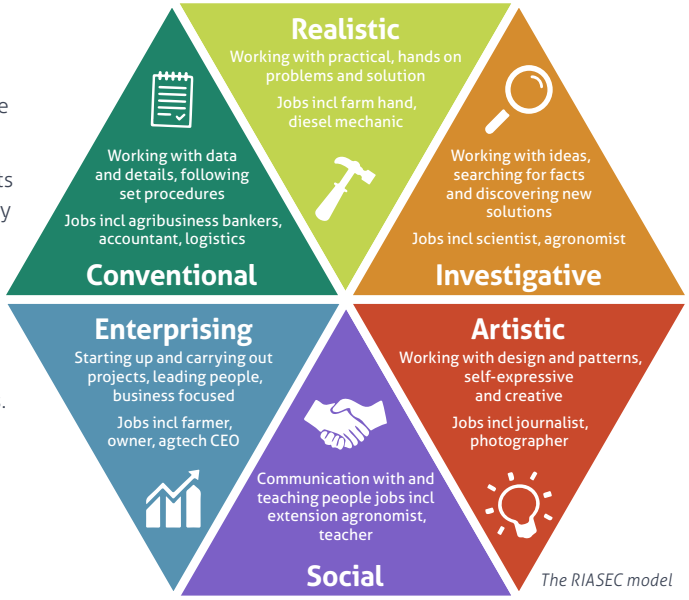
"The Mackay area is not unique in needing a wide range of different kinds of workers in the sugar industry – from scientific and statistical, to hands-on trade skills roles, to agronomy roles, to automation and artificial intelligence roles.

"The EXCITED 4 Careers in Agriculture program is helping to widen young people's understanding of what's on offer and how it might appeal to their interests."

CQ University's Agricultural Education and Extension team were awarded a grant last October to deliver the program.

It aims to attract young people to agriculture careers which are important in their local region, while also equipping teachers, parents and industry leaders with the tools to support the exploration of young people's career interests.

The program targets students from Kindergarten to Year 10 in regional and rural communities across Australia.



The RIASEC model

Feedback from attendees ...

It was cool to see the different textures of the soil with the water, like the sand, silt and clay.

I like math and there is lots of math in mill operating and there's lots of opportunities at the mill, there's a whole heap of stuff you can do there.

I think it was really interesting how each different type of cane had a different maturity, how much sugar they can hold and how over time sugar grows from the bottom up to the top.

It was cool to see the sugar level in the refractometer and how we compared the bottoms and tops.

There seems to be more jobs in agriculture that we don't really know about at the moment.

The career guidance offered to students is aligned to the RIASEC model, a theory designed by American psychologist John L. Holland. RIASEC codes (realistic, investigative, artistic, social, enterprising and conventional) are a way to understand how an individual's personality and interests may fit into a career. Students found out their personalised RIASEC code and used it to explore which agricultural careers would suit them best.

The program rolled out in Mackay with an online workshop in May for parents, teachers and industry members who want to support young people to find their way into a career in agriculture.

Then in August a networking night was held at SRA Mackay station to give teachers, parents and careers advisors the chance to meet industry professionals representing the diversity of careers in the local sugar industry.

This was followed by a roadshow that included a visit to Homebush State School where Dylan Wedel gave a presentation to primary school students showing the jobs involved in making sugar. Students were able to undertake a number of hands-on activities to show them facets of work in the industry. Visits to a number of other schools in the region followed.

The EXCITED 4 Careers in Agriculture is a collaboration between CQ University and a wide range of industry partners including Sugar Research Australia (Mackay, sugar), AgForce Queensland (Central Qld, beef), NT Farmers Association (NT, mangoes), GippsDairy (Gippsland Victoria, dairy), Cotton Australia (Riverina NSW, cotton), Australian Prawn Farmers Association (Northern Rivers NSW, prawns), Wine Australia (Clare and Barossa Valleys, wine) and the National Association of Agricultural Educators and the Australian Science Teachers Association.

The program received grant funding from the Australian Government as part of the National Careers Institute Partnership Funding Round. It continues until the end of May next year.

(Left) *To test the sugar content of a stool of cane: Step 1: Run it through SRA's mobile maturity trailer and Step 2: take your juice sample.*

(Below Left) *Step 3: Add your cane juice sample to the digital refractometer.*

(Below Right) *Step 4: Take your reading.*

VIRTUAL REALITY TOUR OF SUGAR INDUSTRY
A CROWD PLEASER AT THE BRISBANE EKKA

The Australian Sugar Industry returned to the Brisbane Exhibition this year with a popular stand in the Agricultural Pavilion, jointly managed by CANEGROWERS, Sugar Research Australia and Sunshine Sugar.

Visitors were practically non-stop thanks to an on-trend virtual reality (VR) experience from Sunshine Sugar where children and adults wore headsets that took them on a 360 degree sugar journey from the paddock to pack, including growing, milling, refining and in store.

The stand was also an opportunity to present to the public the Sugar Plus roadmap, the industry's collaborative plan to unlock growth opportunities presented by the bioeconomy.

Also of interest, were displays of insects as only North Queensland can grow them. Adults and children alike were particularly fascinated (and a little horrified) by the size of the stick insects, the cicadas and the cockroaches.

Low glycaemic index (GI) sugar made by Sunshine Sugar drew positive comments from visitors, together with information showing that sugar mills are a source of renewable power, and a display of cutlery and other products made from sugarcane trash.

Visitors left with 'show bags' containing a wealth of information plus jelly beans, an SRA pen and free low GI sugar samples.

Holding a sugar industry stand for the public was useful for staff who volunteered on the stand to hear general commentary about the industry.

"A number of people said they had grown up on cane farms and were nostalgic about chewing cane as a memory of childhood. They also remembered being given a daily spoonful of molasses as a child for its health benefits," CANEGROWERS Senior Manager Membership Engagement and Innovation Matt Kealley said.

Matt added people were disappointed that the products made from cane are imported and hoped that the industry would one day make them in Australia.

Where people raised their concerns about sugar and its role in a healthy diet, the samples of Sunshine Sugar's low GI product provided a talking point for the benefits of sugar.

Because low GI sugar is more slowly digested, absorbed and metabolised, the result is a lower and slower rise in blood glucose. Lower, more stable blood sugar levels can help improve control of diabetes. Low GI foods also help a diabetic to feel fuller for longer, which can help to control appetite and assist with weight management.

"The displays of cane beetles led to conversations about it being a major pest for the industry. Staff discussed how the industry now targets the canegrub using an insecticide buried under ground where the canegrub feeds," SRA Head of Partnerships and Grants Bronwyn Venus said.

BRISBANE EKKA

PEOPLE SAID THEY DIDN'T KNOW THAT ...

- sugarcane is grown not just in Central and Far North Queensland, but also around the Gold Coast and in northern NSW
- sugarcane is still burnt in some areas
- sugarcane is harvested green in most regions and the trash left on the paddock
- sugar mills generate electricity
- the 'bamboo' on display at the sugar industry stand was sugarcane
- stools of sugarcane are planted horizontally into the soil
- you can make hand sanitiser from sugarcane
- the industry produces low GI sugar
- there are many types of sugars, from white and raw sugar through to caster, icing and brown, and different liquid forms including molasses
- sugar mills have their own laboratories to test the sugar content in the cane stool
- sugar refineries have their own laboratories that test the sugar to ensure it meets food safety and quality standards.

(Top Left) *Look left, look right, look up, look down, look around! A father and daughter enjoyed the VR experience – and then took home a show bag with sugar industry information, jelly beans, a pen and sachets of low GI sugar. (Photo credit: CANEGROWERS)*

(Top Right) *Two young visitors take a VR trip to the farm paddock, the mill, the refinery and on to the shop. (Photo credit: CANEGROWERS)*

(Middle Left) *Federal Minister for Agriculture, Fisheries and Forestry and Minister for Emergency Management, Senator Murray Watt was a special visitor to the sugar industry stand. He is pictured with SRA's Head of Strategy, Insights and Engagement Cathy Weis and CANEGROWERS' Manager for Membership Engagement and Innovation Matt Kealley. (Photo credit: CANEGROWERS)*

(Middle Right) *TFederal Opposition Leader Peter Dutton, with RNA Councillor Jamie Grant, also visited the stand. (Photo credit: CANEGROWERS)*

(Bottom Left to Right)
Visitors to the Ekka were intrigued (sometimes horrified!) by the size of the insects that grow in North Queensland.

Young students enjoy their VR experience of sugar's journey from cane farm to grocery store.

Senator Murray Watt tried the VR experience during his visit. (Photo credit: CANEGROWERS)

Sunshine Sugar Communications Manager Vivien Miller shows the Governor of Queensland, Her Excellency the Honourable Jeannette Young and RNA Councillor Jamie Grant the VR headsets used on the stand and describes the sugar journey visitors take. The Governor was presented with a copy of the Sugar Plus *industry roadmap.*

SRA's Head of Research Investment Jane Trindall has a background in the application of science and technology to solve real-world problems. She previously worked in the cotton industry and the university sector, building industry partnerships with the research community.

BIOSECURITY A PRIORITY AS FUNDING ROUND TARGETS INDUSTRY CHALLENGES

SRA has released its first research and innovation funding round since endorsing a new Annual Investment Plan (AIP), outlining key industry challenges for priority investment.

Chief Executive Officer Roslyn Baker said the call for applications covers critical industry issues including biosecurity.

"We've heard a lot about livestock biosecurity in the media recently but not much about plant biosecurity," Roslyn said.

"We really need to elevate the risks and productivity drivers for our industry.

"The team has worked on updating the biosecurity risk register to ensure that we've got a very fulsome understanding of the threats from exotic pests, whether or not we have solutions for those, and whether we could roll those solutions out in Australia if the worst happened.

"This funding round is targeted towards closing key gaps and making sure that the industry is well protected.

"We want to prevent incursions, but unfortunately, because a lot of our threats may come in through cyclones, or even in the jet stream, we need to have those prevention and recovery strategies well under way."

Roslyn said another important challenge in the funding round is nutrient management, as part of broader soil health.

"It's something that industry talks to me about everywhere I go. How we balance nutrients is a problem and the industry is looking for solutions focused on balancing nutrients across the whole of our soil construct.

"We're looking at what's the next level of science that our industry needs. I'm keen to see things move towards an approach that takes account of crop requirements for all essential nutrients and develop a better understanding of the productivity associated with micro-nutrients.

"Technology will play a large part in our future, and I would like to see SRA deliver technologies such as rapid in-field measurement and monitoring of soil and crop nutrient status, real-time quantification of nutrient uptake in harvested cane, and real-time measurement of the bioavailability and total nutrient content in mill by-products," Roslyn said.

Applications across eight challenge areas are open until 2 November 2022 as part of the Research and Innovation Fund (RIF), the mechanism through which SRA seeks research and innovation collaborators to develop and build solutions to fill key gaps identified in the annual investment plan.

The AIP outlines a focused, balanced and collaborative portfolio of research, development and adoption investments to deliver tangible solutions that improve productivity, sustainability, profitability, and long-term growth prospects for the Australian sugarcane industry.

It was co-designed by SRA, industry representatives, investors, and research partners, through a series of surveys, interviews and workshops involving dozens of stakeholders in the past nine months.

SRA's new Head of Research Investment Jane Trindall says the funding round signals a shift in SRA's approach, to becoming a solutions broker for the industry through implementation of a best practice, open innovation funding round.

SRA's Gavin Rodman, Jason Eglinton, Barry Salter and Rob Magarey with (third from left) Ian Davies (Wilmar Sugar) and Nikki Seymour (formerly of Queensland Department of Agriculture and Fisheries) discuss industry challenges during a collaborative workshop earlier this year.

ANNUAL INVESTMENT PLAN SUMMARY

The following table summarises the root problems and challenge statements that make up the Annual Investment Plan and their relationship with the Research Missions in SRA's Strategic Plan.

RESEARCH MISSIONS	ROOT PROBLEM	CHALLENGE STATEMENT
Research Mission 1 Profitable and productive	New varieties need to clearly contribute to increased productivity and profitability for the industry, so growers have greater confidence in them.	New breeding technology
		Plant breeding
	Growers are diverse, and have different soils, climate and environmental conditions. They also have varying personal motivations and familiarity with technology. Research, products and services need to be tailored to meet their diverse needs.	Planting decisions and variety choice
		Technology application for a step change in productivity and profitability
		Maximising the harvest
	Mills have varied levels of financial resilience and are under substantial pressure to increase near-term profits. This reduces their ability to invest time and capital in long-term, research-based innovation opportunities.	Transformational technologies
Research Mission 2 Resilient and enduring	There is limited awareness of existing and emerging risks from pests, diseases and weeds (biotic threats). There are also threats to the use of existing management solutions that could impact yield, productivity and industry viability. The development and adoption of effective, integrated, and sustainable management systems for biotic threats are not widely prioritised.	Biosecurity surveillance, preparedness, and response
		Optimising disease, weed and pest management
		Sustainable crop protection
	The industry is focused on addressing immediate pressures and has not proactively sought to fully understand the impacts of climate change. As a result, there is inadequate planning and preparation for future needs and opportunities.	Climate resilience and mitigation
Research Mission 3 Diversified and adaptable	Current economic activity is not sufficient to maintain the industry in the long term. Diversification opportunities need individual assessment to understand fit for the district/mill, as well as grower implications.	New products and value-chains
Research Mission 4 Wealth generating through land stewardship	Growers have different motivations for increasing environmental stewardship. For those who are financially motivated, technology is needed to reliably create and measure environmental products and services.	Sustainability – soil carbon, reef and biodiversity
	With pressure on inputs, growers are seeking improved resource use efficiency including irrigation systems, labour, energy costs, and time, while at the same time reducing the impact on natural and fragile ecosystems.	Soil health – balanced nutrient management and overcoming soil constraints
		Irrigation
		Integrated farming systems
Research Mission 5 Skilled for the future	Practices, products and services are not typically designed to meet the needs of a broad range of industry end-users. To achieve widespread adoption and impact, innovations need to match user needs and characteristics and be technically robust.	Understanding the customer
		Collaboration and innovation design
	Low technology readiness, infrastructure limitations, and poor integration of digital solutions are impacting the adoption of digital technology that can enable improved efficiency, value, and innovation.	Data driven agronomic decisions
		Digital solutions

***(Right)** Emilie (foreground) with Meringa colleagues sort the weed pots after spraying by a spray tractor equipped with a boom and three flat fan nozzles.*
***(Far right)** Emilie inspects the second balsam pear pot trial three weeks after spraying.*

DISTRICT PRODUCTIVITY PLANS

Sugar Research Australia's District Productivity Plans have been developed through consultation and engagement undertaken through SRA's Industry Services team.

Scan the QR code to download your district plan.

WEED MANAGEMENT A PRIORITY UNDER THE FAR NORTH DISTRICT PLAN

During consultation to identify priorities for the Far North District Productivity Plan, many growers volunteered that they were struggling with current control methods to keep weeds at bay, specifically itch grass, navua sedge and balsam pear.

SRA weed scientist Emilie Fillols has begun trials to respond to these concerns by observing the impact of a range of different herbicides and mixes at different rates, applied at different growth stages under varying weather conditions.

"We began these trials in the field (in June) for itch grass and navua sedge, but as balsam pear is too patchy in the field we've undertaken pot trials at Meringa Station," Emilie said.

To prepare for the pot trials, ripe fruits and seeds were collected from the Mulgrave district and Emilie validated a reliable germination protocol.

"Once the seeds germinated we repotted the plants in bigger pots with a sugarcane plant next to it to serve as a stake," she said. "The sugarcane plant did what it does in the field and grew at the same rate as the weed. Once they were both actively growing, we sprayed them with a cocktail of herbicides."

So far two pot trials have been carried out and more than 25 different treatments, repeated up to eight times have been compared. Balsam pear plant fitness and mortality data were recorded, and results are being analysed.

"We now need to screen, rescreen and narrow down the method to find two or three efficient herbicide combinations," Emilie said.

"As the second pot trial was carried out in July, the best combinations will need to be repeated in another trial in the hot and wet months of January and February, when growers would normally apply the treatment.

"After February we'll have more data to analyse and then we'll be able to report the final outcomes," Emilie said.

SRA BUNDABERG STATION FIELD DAY 2022

At the start of this year, District Manager Southern Lisa Devereaux worked with southern districts on a calendar of local events as part of the Southern District Productivity Plan.

One activity SRA is excited to deliver to industry is the Bundaberg Station Field Day from 8.30 am - 3 pm on Thursday 24 November.

The Field Day will be an opportunity for growers to engage in various activities, demonstrations and presentations showcasing SRA's researchers across a range of disciplines.

Growers will will have an opportunity to meet and talk to specialist researchers on the latest advances in:

- Agronomy
- Irrigation
- Entomology
- Weed management
- Quality and chemistry
- Harvesting machinery

Variety Development Manager Southern and New South Wales, Roy Parfitt (left) with Plant Breeding Technician Mauricio Montoya and Field Technician Southern Phil Netz.

WEED MANAGEMENT WORKSHOPS SHOW GROWERS HOW TO ACHIEVE A BETTER SUCCESS RATE

With sugarcane growers thinking about pre-emergent weed control over the next couple of months, SRA Weed Scientist, Emilie Fillols' recent Southern Weed Management workshops were well attended.

The three-hour session focused on pre-emergence weed control and how timing of application, soil type, presence of a trash blanket, farming system and method of incorporation e.g. mechanical or rain influences vary for each pre-emergent herbicide.

"Knowing these different factors gives you an understanding of why an application of one product will work well in one paddock but not in another," Emilie said.

"A pre-emergent herbicide is designed to be sprayed on the soil, be incorporated in the top-soil layer where the weed seeds are and remain there for several weeks to prevent the weed seeds from germinating," Emilie said.

"The label gives you the information you must follow to apply the agricultural chemical correctly, at the correct rate, for the correct weed and by the correct method. However, it does not explain the multitude of factors which influence why it does or doesn't work in your paddock, regardless of the precision of the application.

"Unlike knockdown herbicides that will display visual effects on weed foliage, the action of pre-emergent herbicides is underground, so you can't see what's happening, or not happening," Emilie said.

"Knowing the factors that impact on pre-emergence herbicides' efficacy helps the grower achieve greater success every time."

The workshop also looked at a variety of different weed species and the factors which influence their control, including the life cycle and habits of the particular weed.

"For example, the annual grass weeds set seeds quickly, and care must be taken to control them before they do. As they have only small seeds, the cane trash blanket can prevent their germination in ratoon.

"Meanwhile, vines' bigger seeds have enough energy to emerge through the cane trash blanket and climb their way through the cane crop before finding sunlight. This ability to germinate after the cane out-of-hand stage often coincides with the end of activity of the pre-emergent herbicide, making vines particularly troublesome in the trash blanket."

Emilie recommends that once you have made a correct identification of a weed species in your block, you use the SRA weed management manual and refer to the product labels to find the best herbicide option.

"You can also use an application such as the Australian Pesticides and Veterinary Medicines Authority's (APVMA's) free Public Chemical Registration Information System Search (PubCRIS) to find out the best agricultural chemical to control the pest," she said.

"It is important to study the withholding periods on each herbicide option. When growers are rotating their cane with food or feed crops such as soybeans, peanuts or maize, or exporting the trash blanket as stock feed there are plant back periods for different chemicals that must be attended to carefully.

"This is particularly important with the APVMA reviewing agricultural chemicals on a regular basis and amending product labels.

"Now more than ever growers must be diligent with how they use their chemicals."

This event marks the welcome return of field days to the Bundaberg research station and is an opportunity for SRA to share with growers what happens at the station.

The 56-ha station built in 2019 is home to the research and adoption staff for the southern region. The field day will be a chance to hear more about how SRA delivers outcomes for the southern sugarcane industry and growers across the Bundaberg, Childers and Maryborough growing areas.

It will also be an opportunity for growers to see the scope of the Southern Sugarcane Variety Development Plant Breeding Program and the new varieties in development to benefit their businesses.

A full schedule of activities is currently being finalised. A BBQ lunch and refreshments will be provided throughout the day.

Bookings are now open via Trybooking: www.trybooking.com/CCXEF

Emilie will host a similar workshop for Far North Queensland growers in Gordonvale on 14 October 2022. Scan the QR code for details.

RESEARCH PROJECT INVESTMENTS

PROJECT IDENTIFIER	TITLE	CHIEF INVESTIGATOR	RESEARCH AGENCY	END DATE
Research Mission 1: Continuous improvement in farming and milling profitability				
2017/002	Implementing and validating genomic selection in SRA breeding programs to accelerate improvements in yield, commercial cane sugar, and other key traits	Ben Hayes	UQ	1/10/2023
2018/005	Genetic analysis and marker delivery for sugarcane breeding	Karen Aitken	CSIRO	1/11/2022
2019/002	Validating high-throughput phenomics technologies for sugarcane clonal selection	Sijesh Natarajan	SRA	1/10/2022
2019/005	Strategies to minimise impacts of processing existing soft cane varieties, and industry cost/benefit analysis	Floren Plaza	QUT	1/05/2023
2019/007	Eliminating roll arcing	Geoff Kent	QUT	1/11/2022
2020/003	Maximising cane recovery through the development of a harvesting decision-support tool	Phil Patane	SRA	1/06/2023
2020/202	Improving pan stage performance by on-line monitoring of C seed grainings using the ITECA Crystobserver	Ashley Curran	Sunshine Sugar/ QUT	1/11/2022
Research Mission 2: Position the industry to stay ahead of climate, environmental and biosecurity threats				
2017/809	Modern diagnostics for a safer Australian Sugar Industry	Chuong Ngo	SRA	1/02/2023
2018/010	Moth borers - how are we going to manage them when they arrive?	Kevin Powell	SRA	3/01/2023
2020/002	Developing an integrated device for on-farm detection of sugarcane diseases	Muhammad Shiddiky	Griffith University	1/04/2023
2020/004	Beyond imidacloprid - chemical and biorational alternatives for managing canegrubs	Kevin Powell	SRA	1/03/2025
2020/007	Environmental DNA technologies and predictive modelling for rapid detection and identification of sugarcane priority pests	Andrew Weeks	EnviroDNA Pty Ltd	1/03/2024
2020/008	Transformational crop protection - Innovative RNAi biopesticides for management of sugarcane root feeding pests	Neena Mitter	UQ	1/06/2024
2021/002	Pre-commercial development, testing and validation of RSD LAMP assay for sugar mill roll-out.	Jimmy Botella	UQ	24/08/2022
2021/401	Risk assessment for the newly discovered parasitic nematode *Pratylenchus parazeae* in the Australian sugarcane industry	Shamsul Bhuiyan	SRA	1/05/2023
2021/402	Towards more sustainable pest control strategies through a metagenomic survey of viral entomopathogens in canegrubs populations	Kayvan Etebari	UQ	1/04/2023
2022/002	Sugarcane Biosecurity Plan Review	Stuart Kearns	Plant Health Australia	1/06/2027
Research Mission 3: Capitalise on changing consumer preferences, and the growing bio and green economies to develop diversification opportunities				
2020/011	Demonstration of safety, palatability, and efficacy of novel, sugarcane-derived feed ingredients in ruminants	Mark Harrison	QUT	12/09/2022
2020/013	Oil Canes Part 1: Technical readiness and regulatory assessment	Robert Henry and Frikkie Botha	UQ	30/08/2022
2021/004	Project BGreen	Greg Watson	Burdekin Renewable Fuels	31/10/2022
Research Mission 4: Position the Australian sugarcane industry as leaders in profitability, environmental sustainability and resource-use efficiency				
2020/001	Environmental risk assessment and life cycle assessment of the raw sugar manufacturing	Stephen Wiedemann	Integrity Ag	1/03/2023
2020/017	A common approach to sector-level greenhouse gas accounting for Australian sugarcane	Kate Ricketts	CSIRO	30/07/2022
2020/802	Mackay Whitsunday Cane to Creek	Matt Schembri	SRA	31/10/2023
2020/804	Reducing herbicide usage on sugarcane farms in Reef catchment areas with precise robotic weed control	Mostafa Rahimi Azghadi	JCU	31/08/2022
2020/805	Increasing industry productivity and profitability through transformational, whole of systems sugarcane approaches that deliver water quality benefits	Cathy Mylrea	SRA	30/06/2024
2021/007	Investigating potential for sugar industry participation in green markets	John Rolfe	CQU	1/11/2022
2021/008	Develop a Sustainability Framework for Australian Sugarcane and Sustainability Report in collaboration with stakeholders	Ingrid Roth	Roth Rural	1/05/2024
2021/804	Mobilising the Murray	Cathy Mylrea	SRA	30/06/2023
2021/805	Soil specific management for sugarcane production in the Wet Tropics	Danielle Skocaj	SRA	30/04/2024

Research Mission 5: Support the development of an adaptable, professional, commercial and entrepreneurial industry and research community				
2018/015	Sugar milling R&D capability building program	Geoff Kent	QUT	1/05/2023
2019/102	Genetic solutions for determining fibre quality traits in sugarcane	Angela O'Keefe	CSIRO	30/06/2023
2019/806	Advancing techniques for diagnosis of yellow canopy syndrome	Kevin Powell	SRA	13/04/2023
2020/101	Engineering bacterial enzyme secretion for cellulose utilisation	Madeline Smith	QUT	1/02/2023
2021/101	Optimising mill mud and ash applications for soil improvement and carbon sequestration	Hannah Green	JCU	30/04/2025
2021/102	Systems biology for sustainable agriculture: evaluation of plant growth-promoting bacteria to produce high-performing biofertilisers	Ian Petersen	UQ	30/04/2025

DISTRICT PRODUCTIVITY PLANS – CURRENT PRIORITIES

DISTRICT	PROJECT	COLLABORATORS	PROPOSED OUTCOME
Far North	Mulgrave CCS Improvement Project	CANEGROWERS Cairns Region, MSF Sugar and Mulgrave growers	Identify opportunities to improve CCS, yields and profitability through productivity data analysis and on-farm practice review.
	Development of application parameters for ripeners	MSF Sugar, FNQ growers	Develop in-field parameters to support successful applications of sugarcane ripeners to improve CCS.
	Strategies for emerging weeds	Nufarm, Queensland Department of Agriculture and Fisheries (QDAF), Federation University, FNQ growers	Develop management strategies for balsam pear, itch grass and navua sedge.
North	Local Expert Analysis (LEA) South Johnstone	Innisfail Babinda Cane Productivity Services, Innisfail CANEGROWERS, local growers and MSF Sugar, Cassowary Coast Reef Smart Farming Project and local industry organisations.	A lift in productivity through improved management of Pachymetra root rot, RSD, plant nutrition (including calcium, silicon) and increased adoption and exploitation of higher yielding resistant varieties.
	Local Expert Analysis (LEA) Tully	Tully Cane Productivity Services Limited, Tully CANEGROWERS, Tully Sugar	Improved profitability through balanced crop nutrition, targeted use of mill by-products, automated mill alerts for poor yielding crops, better disease management. improved use of NIR to indicate crop status, and validation of '*Harvest Mate*' for optimising harvesting economic outcomes.
	Variety observation plot and CCS maturity profiling	SRA Plant Breeding	Variety demonstration plot and CCS maturity profiling.
	Sterilisation unit for harvesting	Fire Suppression Services QLD PTY LTD	Prototype automatic spray unit to clean a commercial harvester to minimise RSD transmission.
	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	Improved understanding of nitrogen requirements to manage CCS following application of mill by-products.
	Herbert temporal nitrogen trial	University of Southern Queensland	Generating cane yield and nitrogen uptake response curves for different enhanced efficiency fertiliser products.
	Herbert harvesting demonstration trials validating new decision support tool *Harvest Mate*	QDAF, CANEGROWERS Herbert River, AgriFutures and Clevvi	Validating best economic harvest practice utilising *Harvest Mate.*
Burdekin	Tissue culture and variety management	Growers	Successful adoption of tissue culture to increase adoption of new high productive varieties such as SRA32.
	Reducing herbicide usage on farm with precise weed control	Autoweed, James Cook University, QDAF	Reduce herbicide use by comparing efficacy of weed control and evaluate economic savings.
	Burdekin phosphorous response trial	Wilmar and Burdekin Productivity Services	Investigate phosphorus management for sugarcane crops growing in alkaline soils.
Central	Increasing irrigation utilisation	Productivity services companies, boards and government bodies.	Increase utilisation of irrigation to increase profitability and productivity. Note: Seeking more growers to work with in the irrigation space.
	Variety observations	Productivity services companies	Improve knowledge of varieties, particularly with regard to early CCS and the impact of soil moisture on CCS.
	Ripener trials	Productivity services companies and growers.	Improve CCS when cane is harvested earlier in the season.
Southern	Local Expert Analysis (LEA) Bundaberg/Wide Bay	Productivity boards and mills	Identification of unrealised industry constraints.
	Rocky Point Productivity Services contract	Rocky Point CANEGROWERS	Disease management program.

SRA is also participating in multiple cross-sectoral research activities in conjunction with other Rural Research and Development Corporations.

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