Sugar Research Australia

Cane Matters

Summer 2023/24

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(Cover page) SRA Manager Industry Services Operations, Dr Heidi du Clou, demonstrates a handheld MicroNIR instrument for use in the paddock. SRA is developing a suite of calibrations to predict nutrient parameters for mill mud, soil and whole stalk cane using the commercially available device.

Editorial contributions by Christine Walker, Glenda Viner and Mike Ebner. Design by Eli Lin.

SRA acknowledges co-investment partnerships and funding received during 2022/23 from the Commonwealth Department of Agriculture, Fisheries and Forestry; the Queensland Department of Agriculture and Fisheries; the Cooperative Research Centre for Developing Northern Australia (CRCNA); the Queensland Department of Environment and Science; the Great Barrier Reef Foundation; the Commonwealth Department of Climate Change, Energy the Environment and Water (Reef Trust); and the Australian Research Council. SRA was also involved in cross-sectoral partnerships with other rural research and development corporations.

Queensland Government

Australian Government
Department of Agriculture, Fisheries and Forestry

A MESSAGE *from our* ***Interim Chief Executive Officer***

Last month we achieved a significant milestone in our history by launching Sugar Research Australia's 10th Anniversary Research Fund and issuing a call for ideas to address the priorities of the sugarcane industry.

Australia and our industry have had their share of notable inventors – think of the Toft brothers in Bundaberg and their design for the Austoft harvester and our own scientists' role in tracking down the cause of chlorotic streak. I encourage you and those with bright ideas to develop the sugar industry to submit them. Together, we can shape an exciting future for sugar research, development, and adoption activities.

Sugar Research Australia (SRA) has been implementing the Strategic Plan and its update over the past few months, both documents are accessible on the SRA website. The refreshed strategy recognises SRA's essential role as a research purchaser and provider dedicated to benefitting the industry. Our 2022/23 Annual Report which highlights our achievements against the strategic plan is also available on the SRA website.

In recent months, our efforts in the regions have focused on developing cane varieties with increased disease resistance and improved CCS, tonnage and millability. We are also working on numerous other projects addressing local production challenges outlined in our district plans. These plans are being updated, and we encourage growers who want specific action on problems in their district to take part in their revision by contacting their District Manager with their ideas.

We engage with our growers and millers each year through an annual survey to gather feedback on what is working and what can be improved. This edition provides an overview of the survey results, guiding our communications and engagement plans for the coming year.

Every four years, SRA undertakes an Independent Performance Review as part of our obligations to the Commonwealth government under the *Sugar Research and Development Services Act 2013*. The upcoming review will take place over the coming months, with the results published upon its conclusion. GHD will undertake the review on behalf of the government, and if you are interested in providing feedback on SRA's activities, please visit the GHD Consultation Hub web page at: info.ghd.com/srareview2023

We are delighted to welcome our new Directors, Mr Chris Bosworth and Ms Donna Campagnolo whom you will meet in this edition and who joined the SRA Board at last month's Annual General Meeting.

Wishing you and your families a safe and enjoyable holiday season and looking forward to a prosperous New Year.

Shaun Coffey
Interim Chief Executive Officer

APPROVED TRIAL TO COMBAT RATS

For growers in the Herbert River district, SRA is pleased to announce that Herbert Region has been successful in acquiring a permit to allow growers to use Agvet chemical products for control of ground rats in regional sugarcane crops.

Receiving this permit was due to a collaborative effort from Queensland CANEGROWERS and CANEGROWERS Herbert River for submitting the permit application to APVMA, Sugar Research Australia for technical support and advice, Herbert Cane Productivity Services Ltd Ingham for collecting on ground data, as well as support from AgForce Queensland and Queensland Department of Agriculture and Fisheries. This outcome wouldn't be possible for growers without the efforts of all involved.

SRA is also pleased to announce that we are working with Animal Control Technologies and HCPSL to trial and assess different attractants on Ratoff satchets to assess whether this will assist in the controlling of ground rats.

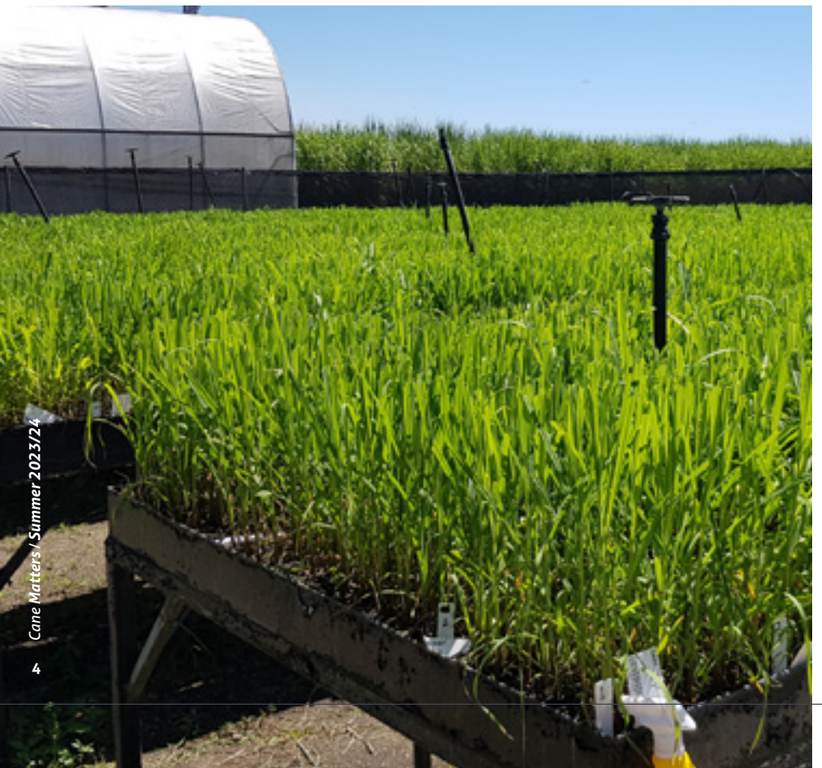
GENOMIC SELECTION OFFERS **SWEET SUCCESS FOR CANE GROWERS**

- **Researchers say genomic selection has potential to improve growers' profits**
- **The technology may improve plant breeding outcomes in a short time**
- **Genomic selection is capable of doubling the rate of gain for key traits.**

Researchers have proven that genomic selection can successfully predict the performance of key sugarcane traits, with the technology set to improve plant breeding outcomes in the crop.

The program is the culmination of five years of collaboration between Professor Ben Hayes' team at The University of Queensland and Sugar Research Australia (SRA).

Professor Hayes said a validation trial confirmed genomic selection could double the rate of gain for key sugarcane traits.



"We investigated the possibility of using genome-wide DNA markers, termed genomic selection, to accelerate gains for the sugarcane traits that determine profit for growers," Professor Hayes said.

"It's tremendous and a great sense of relief when you see the result is what you predicted, but it's also reassuring that this technology works very well.

"We've seen genomic selection technology work in dairy cattle, where it revolutionised the industry – we've seen it in wheat, and now sugarcane."

Professor Hayes pointed out that the sugarcane genome has one of the most complex plant crops with modern varieties containing between 110 and 120 chromosomes.

Research is also underway at Queensland Alliance for Agriculture and Food Innovation (QAAFI) to map the genome to pinpoint which genes are responsible for which traits and how genetic variation influences a plant's composition and performance.

"Sugarcane's genome is far more complex than the human genome, so it's very encouraging to confirm this process works," Professor Hayes said.

Big impact for sugarcane

Dr Jason Eglinton, SRA's General Manager of Variety Development said while other crop industries were also adopting genomic selection, the technology would probably have a bigger impact for sugarcane because of the plant's biology.

Professor Ben Hayes, University of Queensland.

Dr Jason Eglinton, SRA General Manager Variety Development.

Kevin Borg, Chairman, CANEGROWERS Mackay. (Photo credit: CANEGROWERS Mackay).

"For the UQ team to develop the calibrations, algorithms and then to validate those predictions in field performance work is a significant step forward," Dr Eglinton said.

The Australian sugarcane crop is projected to be worth more than $2.5 billion in 2023-24. Dr Eglinton said the potential to speed up the implementation of genetic improvements was a valuable tool.

"Sugarcane is a perennial crop so ordinarily we would be growing a trial for three years over multiple crop cycles to test its performance," he said.

"If you can have a shortcut like a DNA profile telling you something about its performance, we don't just save a year, we save three years."

Dr Eglinton said the models and methods developed by the UQ team were already being deployed in commercial variety development by SRA.

"We have a 10 to 12-year development pipeline to produce a new variety and the potential for genomic selection to be used is really exciting.

"If you can get a variety with a higher yield to market years earlier than you would otherwise, then the economic impact dwarfs the cost of the technology."

Commenting on the announcement, CANEGROWERS Mackay Chairman Kevin Borg said it was excellent news.

"The technology promises to bring benefits to the industry, improving plant breeding outcomes and speeding up the implementation of genetic improvements," Kevin Borg said.

"From my point of view as a grower, for some time now productivity has generally been in decline, although we have seen some reasonable outcomes in years of suitable weather conditions, particularly rainfall.

"Since the early '90s and the introduction of green cane harvesting and trash blanketing, the industry has been on the search for the next step change in increasing production. These findings, I believe, are a great boon for our industry and have the potential to see us making major advances in our breeding program.

"When we as farmers talk about productivity, it's very easy to blame variety development. But there is a huge amount of work that goes into selecting varieties that suit different climate patterns in different growing regions, varieties that perform well in difficult soils, and plants that have disease resistant qualities. The SRA plant breeders in each region are selecting years in advance to solve many productivity challenges.

"It's a long process to release a new variety, with thousands of seedlings and years of careful seedling selection and ratooning trials that look at traits for ratooning, disease resistance, milling performance and, of course, productivity qualities.

"In SRA's renowned plant breeding program, only a small percentage of varieties come through the trials to be released and then trialled by growers in their own conditions on farm.

As an important part of the process of release, new varieties need to pass an assessment of the data presented by SRA staff through a long process at a Regional Variety Committee, comprising representatives from CANEGROWERS, productivity services and millers.

"It's great to see this development in genomic selection which Professor Hayes has indicated has the capacity to accelerate gains for the sugarcane traits that determine increased profit for growers."

- Kevin Borg, Chairman, CANEGROWERS Mackay

"It is to be hoped that the introduction of this technology will support and refine the work of variety development and allow more precision in delivering the traits needed to build the industry's productivity in a shorter timeframe."

This research is funded by the Department of Agriculture and Fisheries, Sugar Research Australia and The University of Queensland.

Queensland Government

The University Of Queensland AUSTRALIA

Sugar Research Australia

ANNUAL GENERAL MEETING UPDATE

Sugar Research Australia's Chair and Interim Chief Executive Officer highlighted recent achievements at SRA's Annual General Meeting in Brisbane in late November.

Chair Rowena McNally said during the 2022/23 financial year, the organisation made significant progress in our commitment to grower and miller engagement.

"This year, we increased our engagement with key stakeholders by 40 per cent compared to recent years. This has increased our growers and millers' satisfaction with our overall performance," Ms McNally said.

"This success is attributed to our teams' efforts on the ground, building solid relationships through district-specific engagement in relevant research projects."

Other key highlights reported at the Annual General Meeting included the update of SRA's Strategic Plan, external financial and internal reviews to prioritise transparency and risk management and the sale of the Indooroopilly property.

"The property sale will support our research portfolio, our new laboratory, and the significant upgrade of our regional research stations."

Ms McNally thanked retiring Board Director Peter Russo for his valued contribution to Australia's sugarcane industry during a period of significant change within the industry and the organisation.

"I would like to confirm that our members have voted on the appointment of two new directors and sincerely welcome Mr Chris Bosworth and Ms Donna Campagnolo," Ms McNally said.

"In welcoming both Chris and Donna, I want to acknowledge their expertise and knowledge of our industry and the regional communities that they represent."

As a sugarcane grower within the Herbert River district, Chris Bosworth brings more than 45 years of experience and commitment to the sugarcane industry. Chris has held various board positions across the industry.

Donna Campagnolo (B.Sc.) is a third-generation sugarcane farmer with a Bachelor of Science degree from the University of Queensland. She has a background in research, development, and extension, in addition to biosecurity within the sugar industry and the public sector.

Interim Chief Executive Officer Shaun Coffey presented Sugar Research Australia's 2022/2023 performance highlights at the Annual General Meeting.

"During the 2022/23 financial year, SRA collaborated on more than 100 research development and adoption activities," he said.

"With an investment of more than $35 million this year, that is an increase of 16 per cent in RD&A activities and corporate support initiatives.

"Working in collaboration with Regional Variety Committees, two new SRA-developed varieties were approved for release, including SRA40$^{\Phi}$ in the Herbert and Central districts and SRA41$^{\Phi}$ in New South Wales.

Mr Coffey said research projects on crop protection and pest and disease management have made several noteworthy advancements.

"The full genome sequencing of the Greyback Canegrub and the development of a new DNA test based on loop-mediated isothermal amplification (LAMP) for Ratoon Stunting Disease at the mill are just two of these advancements," he said.

"I would encourage all growers and millers to have an in-depth look at our progress in SRA's 2022/23 Annual Report."

SRA's 2022/23 Annual Report provides an in-depth look at progress over the past year. View the Annual Report here: sugarresearch.com.au/sugar_files/2023/11/Annual-Report-2022-23_Digital-F.pdf

SRA 10TH ANNIVERSARY RESEARCH FUND CALL

Your ideas can shape the future

10TH ANNIVERSARY RESEARCH FUND CALL

Sugar Research Australia has announced the establishment of a $16 million 10th Anniversary Research Fund to deliver impactful research investment to Australia's sugarcane industry.

SRA's Interim CEO Shaun Coffey invites growers, millers, industry bodies, researchers, universities, and innovators to submit their visionary ideas to solve the sugarcane industry's challenges and deliver tangible outputs with industry-wide outcomes.

"Our Board's commitment to the industry is evident with this $16 million research investment designed to capture new ideas and opportunities that will make a difference," Shaun said.

"This first stage of the research call is designed to get those with ideas to submit them in a simple concept note by responding to four concise questions.

"Whether the idea is for an incremental improvement or a groundbreaking transformation, it must align with our Strategic Plan 2021- 2026 objectives. However, no specific eligibility criteria are used in the first stage.

"Ideas will be evaluated on their potential to address the industry's challenges and deliver a positive impact."

The second stage of the process will be to invite those who have submitted the most promising ideas to submit full research proposals for funding.

"Through this two-step process, we are confident this will encourage more collaborative research and innovation partnerships to solve our industry's most pressing issues," he said.

The $16 million 10th Anniversary Research Fund is in addition to the current level of research investment, including the Small Milling Research Project (SMRP) investment scheme, which is currently open for submissions.

"This is a milestone year for Sugar Research Australia, and there is no better way to recognise that milestone than by investing further in our industry and the regional communities where we live and work," Shaun said.

Submission guidelines and the concept note forms are available on the SRA website at www.sugarresearch.com.au/research/research-and-innovation-funding/

All submissions for Stage 1 must be received by
5 pm AEST on Wednesday 20 December 2023.

Read the Submission Guidelines here: sugarresearch.com.au/research/research-and-innovation-funding/

SRA34$^{\phi}$ LOOKS SET TO BE A **PERFORMER IN BUNDY**

Mark Pressler is a fourth-generation sugarcane grower whose farm is located in the rich red volcanic soils near The Hummock at Qunaba, east of Bundaberg.

He is well known in the Bundaberg region as the Chairman of Bundaberg CANEGROWERS and was Chairman of Bundaberg Sugar Services prior to that.

As part of his responsibilities he is a member of the Regional Variety Committee (RVC) representing local cane growers.

On the RVC Mark has the opportunity to review trials of new varieties before many others.

"I hear a fair bit, too. I talk to a lot of people about varieties all the time. We've got good staff on our prod board and really good relationships with our growers."

Mark farms about 100 ha and his cane averages about 95-100 tonnes/ha with CCS averaging in the high 15s in a good season.

That said, like many Bundaberg growers he's a mixed cropping farmer with about 50 per cent of his land currently ploughed out for potatoes on the best ground. These mainly get sold in Melbourne. He grows other crops too, including sorghum, soybeans, corn and barley as break crops and to sell for stock feed (hay) for cattle and horses.

"I'm really only growing cane on the poorer ground. But it's a resilient plant."

Mark first became aware of SRA34$^{\phi}$ when it was growing on the SRA Bundaberg farm and was brought to the attention of the RVC in 2020.

Mark doesn't plant every new variety that comes along:

But he usually does have "a bit of a look" and he was impressed with the disease resistance characteristics of SRA34$^{\phi}$. It is resistant to Pachymetra, Fiji disease, leaf scald and mosaic, with intermediate resistance to smut.

"I was offered the opportunity to put in some of these plants as a trial," he said.

"The reason why I planted and I'm always looking at planting new varieties is because I'm relying very heavily on Q240$^{\phi}$.

"This isn't a bad thing at the moment because it's the one that makes the money from both tonnage and sugar. But everyone's growing it and we've got to keep looking for an alternative.

"I probably don't have as high a disease risk as some other growers because I've got my own harvester and planter. I rotate my varieties and I grow soybeans and potatoes as break crops which helps keep pathogens under control."

Mark usually plants in August or September. Some growers in the district plant in autumn (March) but that doesn't suit Mark because he's usually got soybeans in the ground and they are harvested at the end of April/May. Then he drills barley straight in afterwards for hay.

Bundaberg grower, Mark Pressler, is growing SRA34$^{\phi}$ on his farm. (photo credit: CANEGROWERS)

"It's reasonably easy to harvest. The trash comes off easily. It's had a pretty good growing season each year really."

- Mark Pressler, fourth generation sugarcane grower

Mark put in about 1.3 hectares of SRA34$^{\phi}$ together with SRA29$^{\phi}$ at roughly the same time. Q240$^{\phi}$ was also planted in the same block.

He has bought tissue culture in the past but he's not sold on it, preferring one-eye setts.

"Because I have been involved with the RVC we have always been really proactive in getting clean seed but these days I just buy my seed from Sugar Services because we have good staff who know their stuff. In my opinion, the vigour of one-eye setts is a lot better than tissue culture."

Mark grew SRA34$^{\phi}$ on his black soil: "We've got patches of black soil in the red. It's got higher clay content.

"The 34 germinated well – it came up like oats", Mark said.

"It's a medium weight cane, grows a good stick that stands up straight as a gun barrel."

SRA34$^{\phi}$ doesn't flower much and doesn't seem to sucker or lodge in wet conditions. It has good canopy closure for better weed control. Mark describes SRA34$^{\phi}$ as also having "good harvesting traits".

"It's reasonably easy to harvest. It's not brittle. The trash comes off easily. It wasn't a monster crop but that could have been because of the soil type."

Mark's farm is 100 per cent irrigated. SRA34$^{\phi}$ coped well in the couple of seasons it's had on the Pressler farm.

"It's had a pretty good growing season each year really. When it hasn't had rain on it, I've had plenty of water to give it. We had a really good harvesting season this year. It didn't rain which is why the CCS was high."

"I supply on four different farm numbers, we own two and lease two.

"SRA29$^{\phi}$ and the Q240$^{\phi}$ performed about the same. SRA29$^{\phi}$ went 17.6, Q240$^{\phi}$ was 16.6 and 16.8. The 34 wasn't quite as good but in saying that it is in a pretty ordinary sort of soil there. It may not like that sort of country.

"It would have been doing up to 100 tonnes/ha but a bit less CCS than SRA29$^{\phi}$."

While he doesn't think it is a 'wonder cane' nevertheless, Mark will continue with it. He recently fertilised it for the next growing season.

At the same time he has expanded the area of SRA29$^{\phi}$ to see if it's better in different soil types.

SRA34$^{\phi}$ IS POPULAR WITH GROWERS

Bundaberg Sugar Services Field Officer, Michael Turner, first saw the variety, like Mark, in trial plots in the district and on the SRA farm when it only had a seedling number.

"In 2020 we had the opportunity to plant a couple of rows as one-eye setts in a one-eye sett demonstration plot on Mark's farm," Mike said.

"This demonstration plot also had commercial varieties such as Q208$^{\phi}$, Q240$^{\phi}$, KQ228$^{\phi}$, plus two previously released varieties SRA19$^{\phi}$, SRA20$^{\phi}$ plus another new variety which still had a seedling number, later released as SRA29$^{\phi}$. Observation of SRA34$^{\phi}$ in this plot showed that it had a moderate stool (similar to KQ228) and was comparable to the other varieties in terms of height. Both plant cane and ratoons of this variety looked promising," he said.

"SRA trial results showed good disease resistance ratings with possibly good early sugar and average sugar throughout the rest of the season. It is a variety that may be of benefit for growers who are looking for a replacement for KQ228$^{\phi}$ as an early harvest cane. But as we know, it will take a couple of years of harvest and milling to see if it will be an early harvest cane."

SRA34$^{\phi}$ was released to Bundaberg growers in August/September this year as one-eye setts, together with two other new varieties SRA38$^{\phi}$ and SRA39$^{\phi}$.

"Uptake of SRA34$^{\phi}$ was as expected: Being a new variety, growers were keen to try it. Sales of SRA34$^{\phi}$ (377 trays or 12,064 seedlings) was the second most requested variety behind Q240$^{\phi}$ (432 trays or 13,824 seedlings)."

SRA34$^{\phi}$ SHOWS OUTSTANDING PERFORMANCE IN BURDEKIN TRIALS

SRA34$^{\phi}$ showed outstanding performance in the 2022 season Final Assessment Trials (FATs) in the Burdekin.

SRA34$^{\phi}$ had better tonnage and average CCS compared to the average for the district's standards (Q240$^{\phi}$, KQ228$^{\phi}$, Q208$^{\phi}$ and Q183$^{\phi}$).

The Regional Variety Committee chose the variety because of this performance in the Burdekin FATs. It also meets the disease resistance criteria for smut (intermediate) and leaf scald (resistant-intermediate) for the region.

On the back of these results, about 8,000 tissue culture plants were generated by SRA and hardened at Brandon.

These have been transferred to Burdekin Productivity Services (BPS) for multiplication. They will go to the distribution plot in 2024 and strip trials are planned to allow mill data to be collected.

The variety will be available to growers in 2025. There will be about 20 ha available per mill area.

The table below shows the performance of SRA34 in the Burdekin for yield and CCS in the 2018 series FATs and the 2020 series FATs, compared with KQ228$^{\phi}$, Q183$^{\phi}$, Q208$^{\phi}$ and Q240$^{\phi}$.

Variety: SRA34$^{\phi}$		***Parentage:** QC83-627 X Q222 / **Summary:** Good tonnes cane; average CCS.*										
TRIAL HARVEST YEAR	**CROP CLASS**	**YIELD (TCH)**					**CCS**					**# OF TRIALS**
		SRA34$^{\phi}$	**KQ228$^{\phi}$**	**Q183**	**Q208$^{\phi}$**	**Q240$^{\phi}$**	**SRA34$^{\phi}$**	**KQ228$^{\phi}$**	**Q183**	**Q208$^{\phi}$**	**Q240$^{\phi}$**	
(2018 series FATs): 2019	Plant	171	166	150	159	161	15.8	16.9	17.2	16.3	16.1	3
2020	1R	140	137	123	130	133	17.0	17.0	17.2	16.8	16.7	2
2021	2R	122	116	102	107	112	16.6	17.2	17.5	16.8	17.0	2
(2020 series FATs): 2021	Plant	149	141	127	145	142	15.9	15.9	15.8	15.1	14.9	4
2022	1R	135	128	116	129	125	17.6	17.5	17.2	17.1	16.6	4
Overall performance		**145**	**139**	**125**	**135**	**136**	**16.6**	**16.9**	**17.0**	**16.4**	**16.2**	**15**
Comments		In SRA FAT trials, SRA34$^{\phi}$ performed well with good tonnes and CCS just behind Q183 and KQ228$^{\phi}$. SRA34$^{\phi}$ is very similar in appearance to KQ228$^{\phi}$, with suckers and similar canopy structure. SRA34$^{\phi}$ has an "intermediate" rating for smut. SRA34$^{\phi}$ will be available from BPS plots in 2025. SRA34$^{\phi}$ can also be purchased as Tissue Culture. Contact SRA or BPS for ordering.										

SRA34$^{\phi}$ FACTS

SOUTHERN RESULTS

Shows a 7% and 12% tonnes advantage with Q240$^{\phi}$ and Q208$^{\phi}$ respectively.

Early season data suggest SRA34$^{\phi}$ is a promising high early sugar variety.

Fibre quality readings suggest safe milling properties and fibre content above Q240$^{\phi}$ and Q208$^{\phi}$.

SRA34$^{\phi}$ has an intermediate to resistant rating for Pachymetra and intermediate resistance to smut. It is resistant to Fiji leaf gall and Mosaic.

In final assessment trials (FATs) in the Southern region for plant crop, first and second ratoon crops, it showed a 4% and 9% sugar yield advantage over Q240$^{\phi}$ and Q208$^{\phi}$, respectively.

Interest in New South Wales

SRA34$^{\phi}$ was released in New South Wales as a one-year variety in 2021 following good results in the 2017 Final Assessment Trials (FAT).

Condong will have about 1300 metres of SRA34$^{\phi}$ for distribution next year.

However, Broadwater and Harwood didn't proceed with it because these mill areas are looking for varieties with good two-year performance.

APPLICATIONS OPEN FOR **SMALL MILLING RESEARCH PROJECTS**

Applications are open for SRA's Small Milling Research Project (SMRP) investment scheme. The scheme delivers investment in relatively low-cost, short term, industry-identified research projects for the milling sector.

General Manager Research and Business Development, Dr Tinashe Chiurugwi said the aim of the scheme was to solve industry-identified issues and deliver almost immediate outcomes that will be readily adopted.

"These projects should be targeted to develop a product, service or process to solve specific problems in sugar mills and deliver tangle outputs with almost immediate outcomes. In the process, the scheme aims to strengthen collaboration between industry and research through the direct investment of the milling sector in SMRPs while increasing research skills and capability in sugar mills.

"To maximise the likelihood of success, applications must be of high quality and clearly align with milling and SRA RD&A priorities. Projects should not repeat work that has been done before or appear to include business as usual activities."

SRA expects that all outcomes generated from SMRPs will be made freely available for adoption by the Australian sugar industry.

Applications from milling organisations, equipment manufacturers or suppliers, consultants, research organisations and other organisations are encouraged under the scheme.

SRA investment is capped at $75,000 per project, with $250,000 per year available. There is also a capital expenditure restriction on SMRP investments to a maximum of $5,000 per project. All successful projects are expected to be completed within 12 months of the starting date.

Projects will be competitively awarded or may, in exceptional circumstances, be specifically commissioned to solve a high priority industry-identified problem.

Applications close at 5pm AEST on 9 February 2024.

More information is available on SRA's website: sugarresearch.com.au/research/milling

Touring the Miriwinni Lime and Gypsum's Dolomite Processing Plant in Mt Garnet. From left to right: Wayne Morton, Vince Silvestro, Charlie Silvestro, Lido Tomasin, Don Colls, Chris Herrington, Rocco Palmeri.

GUIDED TOUR TO LEARN ABOUT LIME

Correcting soil pH and achieving balanced nutrition is essential for productivity. That was why a group of Tully growers and advisors headed to Miriwinni Lime and Gypsum's Mt Garnet Mine and Processing Plant last month.

The group were on a mission to learn more about lime and they were joined by graziers from the Malanda Beef Plan group. Everyone toured the facilities, where they had front row seats to limestone mining, processing, blending, and packing. The day included agronomic presentations by SRA's Dr Danielle Skocaj and Dan Willmann from Australian Agricultural Minerals (AAM), underscoring the importance of lime quality in correcting soil pH and meeting the crop's calcium requirements.

SRA would like to thank the entire team at AAM for hosting the group, who enjoyed the informative guided tours run by AAM CEO David Smith, SSE Mine Manager Chris Herrington, and AAM Sales & Marketing Manager Dan Willman. A big thank you also to Wottaview Tours, Rumours Diner and the Ravenshoe Hotel.

This event was jointly funded through the Mobilising the Murray project and the Australian Government's National Landcare Program.

The Mobilising the Murray project is funded by the Australian Government's Reef Trust and delivered by Terrain NRM in partnership with Sugar Research Australia.

Australian Government | National Landcare Program

Australian Government | Reef Trust

TERRAIN NATURAL RESOURCE MANAGEMENT | SRA Sugar Research Australia

In front of the limestone deposit. Left to right: David Singh, Maria Solis, Peter Becke, Nancy Rincon, Megan Cambus, David Smith, Danielle Skocaj, Ian Wilkins, Kevin Petersen and Frank Hughes.

WEED AND PEST MANAGEMENT UPDATE **WITH CENTRAL DISTRICT GROWERS**

Yellow Canopy Syndrome (YCS), canegrubs and soldier flies were on the agenda at the Weed & Pest Management Research Update last week in Mackay and Proserpine. Growers expressed particular interest in SRA Entomology Leader Dr Kevin Powell's presentation about the project exploring control alternatives to imidacloprid while his news that new research has commenced on soldier flies was well received.

Vine control and Balsam pear were the weeds top of mind for Mackay growers while vine control and itch grass preoccupied Proserpine growers. SRA Weed Scientist Emilie Fillols is leaving no stone unturned in investigating control options and was on hand to explain the most effective from her recent investigations.

For more on Balsam pear strategies see page 30.

SRA Entomology Leader Dr Kevin Powell and SRA Weed Scientist Emilie Fillols speaking with Central district growers.

EVENTS – HEADS UP

Sugarcane Disease Identification Workshops, Woodford

Group 1: 27-28 Februrary, 2024 **Group 2**: 29 February- 1 March, 2024

Contact Dr Shamsul Bhuiyan

E: sbhuiyan@sugarresearch.com.au M: 0400 771 304

Click here for more events: sugarresearch.com.au/resources-and-media/events/

PROFITABLE IRRIGATION: HOW MUCH MORE CANE WILL YOU PRODUCE?

Rising water and electricity prices are the key factors putting pressure on irrigation. To reduce the impact of increased costs, solutions available include improving irrigation timing to maximise productivity, and pumping efficiency to minimise costs. Read below to get a better understanding of how profitable irrigation can be for your farm.

Pumping Energy Costs

Before making any changes to your irrigation system, understand your current irrigation costs and profitability. CaneCalcs (www.canecalcs.com) is an online web tool that features a set of calculators for assessing irrigation systems in the Australian sugarcane industry. Following the steps shown on the opposite page you will be able to obtain your Pumping Energy Costs from the CaneCalcs calculator. **For this example we used the CaneCalcs tool and calculated a $79/ML expense for the pumping energy cost.**

Usage charges

Only add the usage charges when you're working out the profitability of irrigation on your farm – because allocation charges are fixed costs whether you use the water or not. You can get this cost from your most recent water bill. If you want to purchase additional water outside your current allocation, you then need to give consideration to how much that extra allocation charge is going to come into play. **For this example the usage cost is $20/ML.**

Labour: How much is your time worth?

If you have employees doing your irrigation this will be an easy number to use. If not, add what you would you earn in a job off-farm. We are assuming that it takes 1hr to setup and run the irrigator to apply 1ML of irrigation. **$40/hr is the number we will use for this example.**

Calculating income from crop response

How much additional cane will you produce from a megalitre of irrigation? The SRA Irrigation Manual has some average crop responses per megalitre of irrigation. A good average to use is an extra 8 tonnes of cane will be grown for each megalitre of irrigation. This crop response can be optimized using scheduling tools like soil moisture probes or software like Irrisat (free) or Irrigweb (subscription). For this example we've used a grower who has a mix of forward priced and harvest pool priced sugar, yielding a $700/t sugar price. With an average CCS of 13.5, this gives us $61/t of cane and we deduct a further $10/t for harvesting and levies, giving us $51/t of cane. **The crop response is 8t/ML of irrigation and the resulting income is $408/ML.**

Calculating your profitability from irrigation

Calculation	Value/ML ($/ML)
Income from crop response (after harvesting/levies are deducted)	+$408
Pumping energy cost	-$79
Water cost	-$20
Labour cost	-$40
PROFIT/LOSS (Income - Costs)	**$269 Profit**

"For this example, this Mackay farmer can expect to see a $269 profit from every megalitre of irrigation that is applied this year."

A key focus of SRA's Central District Productivity Plan is to increase profitable irrigation for growers in response to years of steady decline in irrigation. Central district growers can contact SRA District Manager, Dylan Wedel (pictured) if they'd like some assistance with calculating their irrigation profitability.

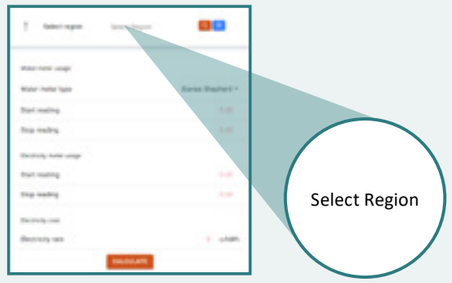
Dylan Wedel M: 0490 029 387 | E: dwedel@sugarresearch.com.au

CANECALCS.COM IS THE BEST STARTING POINT FOR WORKING OUT YOUR IRRIGATION COSTS

STEP 1

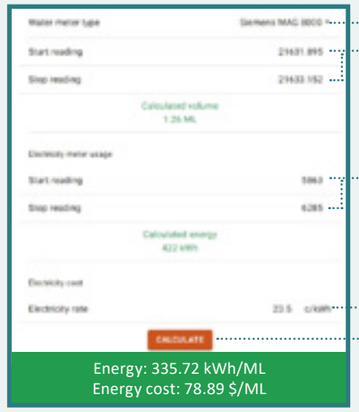
Go online to: www.canecalcs.com
Choose Pumping Energy Cost

STEP 2



Select your Region

STEP 3 - 7



STEP 3: Select Water Meter type

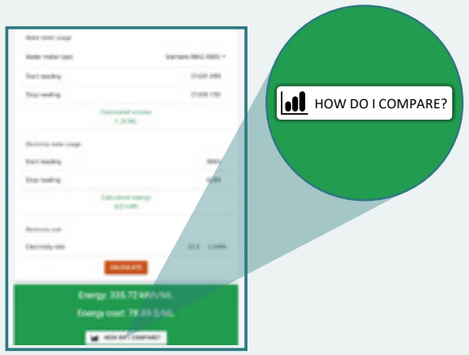
STEP 4: Add the readings for Start and Stop for irrigation run

STEP 5: Add the readings for Start and Stop for Electricty meter usage

STEP6: Add your Electricity rate in the Electricity Cost section

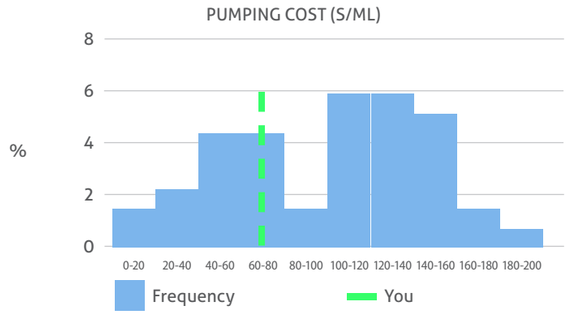
STEP 7: Click the 'Calculate' button and your cost per megalitre (ML) for pumping is displayed

OPTIONAL STEP



If you want to see how your costs compare to others in your region, you can click the 'How Do I Compare?' button.

HOW DO I COMPARE?



The data above from the 'How Do I Compare?' shows a range of pumping costs for the Mackay region. This is based on limited data. As more growers use CaneCalcs, this data will improve for each region. This graph currently includes flooding, low pressure and high pressure irrigation systems so even if you have a low cost per megalitre ($/ML), there is room for improvements. Tariffs are an easy way to reduce your pumping costs and there are a number of tools available to help compare them.

EXTRACTING MAXIMUM **SUGAR IN THE MILL**

- **Project conducted how to extract the most sugar from cane in the mill train by adding water**
- **Mills vary the water rate according to the rate of cane fibre**
- **Some mills also vary it with the cane sucrose content**
- **The standard mill practice of using a constant ratio of added water to cane fibre rate is the best practice.**

A project conducted last year at Tully Mill sought to determine when the water rate should change in the milling train to provide the greatest increase in sucrose extraction for the benefit of millers and growers.

The small milling project's chief investigator was Tully Mill's Assistant Mechanical Engineering Manager Michael Verri, who worked in collaboration with Geoff Kent from the Queensland University of Technology (QUT).

"The upper limit for water that can be added to sugarcane for maximum sucrose extraction is usually the evaporator station's capacity to evaporate the added water before crystal sugar production can occur," Geoff said.

"Australian mills commonly vary the added water rate according to the rate of cane fibre, however, some mills also vary it with the cane sucrose content, determined using a pol measurement, and have done so for about 20 years."

The Small Milling Research project sought to calculate an algorithm to optimise water addition for the greatest benefit for extraction. In other words, to know when to increase the rate when increased extraction can be expected and to reduce it when the benefit expected is less, using measurements of pol and fibre in cane.

An experiment consisting of 90 tests was completed between 23 August and 2 September 2022 where the added water rate was increased and reduced at different times when processing the same rake of cane.

"Some mills have cane analysis online using SRA's NIR-based Cane Analysis System to give the best indicator of cane fibre content. This is the case at Tully Mill," Geoff said.

Extraction in the experiment used NIR instruments to measure prepared cane and final bagasse. The mean added water rate at the low setting was at 210 per cent of the cane fibre rate, and at the high setting, 255 per cent fibre.

The changing water rates had an effect on torque in #3, #4 and #5 mills which was statistically significant. While the torque control system has the objective of keeping the torque constant, the control system was not sufficient to counteract the effect of changing the added water rate.

The results all indicated that a higher added water rate leads to lower torque, unless the torque control system can compensate for the change.

"Lower torque is known to result in lower extraction," Geoff said.

"It was surprising but no statistically significant increase in extraction rate through a higher added water rate could be identified.

"It seems likely that any increase in extraction due to a higher added water rate was counteracted by the reduction in extraction due to lower torque.

"The analysis also showed poorer feeding in #3 and #4 mills at a higher added water rate. Poorer feeding may be the mechanism which reduced torque under the higher added water rate.

"We believe the reason that extraction didn't change with an added water rate was because the mill torque also changed. Ideally, you don't want that to occur.

"The importance of torque control is well known. The knowledge that the added water rate affects torque is also reasonably well known, however this is the first time that the actual impact has been quantified," Geoff said.

At Tully Mill, the torque control is rated as good but it does not appear to have been sufficient to counteract the reduction in torque with the increase in added water rate over a period of about 15 minutes.

"The bottom line is that there is little value in increasing the added water rate for short periods. It does not suggest a need for better torque control," Geoff said.

"We found that the standard practice used in many mills is the best practice – using a constant ratio of added water to cane fibre rate," he said.

Cane fibre rate is calculated from the cane rate and a measure of cane fibre content.

The results were provided to mills during the 2023 Regional Milling Research Seminars, and a paper will be presented at the ASSCT Conference next year.

"The project has shown the value of increasing the added water rate when the fibre rate is higher (maintaining an added water rate per percentage of fibre) for the purpose of maximising sucrose extraction. Those mills that don't adopt this practice may do so now, if they have a suitable method of measuring the cane fibre rate," Geoff said.

Left to right: Michael Verri, Assistant Mechanical Engineering manager and Ian Marzona, Milling train Mechanical Maintenance leading hand. No.1 mill NIR in back ground on No.1 mill feed chute.

Tully Mill's Assistant Control Room Operator, Bruce Gillespie, managing the milling trains.

Left to right: Michael Verri, Assistant Mechanical Engineering Manager and Daniel Burtenshaw, Operations - Steam Plant Attendant at No.1 mill.

RESULTS FROM INDUSTRY SURVEYS 2023

Earlier this year growers and millers provided SRA with feedback on our performance.

Like last year, the surveys included questions to measure how we are performing and delivering against SRA's 2021-2026 Strategic Plan.

This feedback covered a range of topics including district support and events as well as district-level engagement, building familiarity and satisfaction with products and services, plant breeding, and communications from SRA.

SRA members were randomly selected across districts and production size groups and invited to respond. The Grower Survey was completed by 300 growers, an increase from 250 in 2022. The Miller Survey was completed by 31 representatives, an increase from 23 in 2022, across the nine milling companies.

More than one representative from each of the nine companies and from a range of senior roles were invited to respond. To ensure the results were balanced and not overweighted to those companies where there was more than one respondent, a 'company' average was estimated.

WHAT GROWERS TOLD US

Grower Profile in 2023

The 'average' grower survey respondent in 2023, is male, 59 years old, with 243 hectares of land (up from 189 in 2022), of which 77% is used to grow sugarcane.

Average tonnes of sugarcane harvested is 9,503 tonnes (up from 8,937) for an average commercial cane sugar (CCS) of 13.0 (down from 13.3). Average yield is 96 tonnes per hectare, up from 87 in 2022.

Confidence in the future

There is a much stronger outlook about the future of the Australian sugarcane industry over the next 12 months reported by growers than previously. The overwhelming majority of growers (83%) were positive about the future of the industry, up from 58% in 2022. There is little doubt the improved operating conditions and the current sugar price have contributed to this outlook. Growers in Far North Queensland and Burdekin districts were less positive in their outlook than growers from other districts.

Satisfaction with SRA

Growers report a strong improvement in satisfaction with levy investment of 6.6 (on a rating scale of 0 to 10). This represents an uplift of 0.4, a statistically significant improvement over the 2022 result.

Almost four in ten (37%, up 6% points) rate their satisfaction strongly (at 8 or above), and more than half of growers (53%, up 1%) report a modest rating (5-7), while just one in ten (10%, down 7%), rate at 4 or below.

Across groups, growers in the Herbert and Central districts report highest satisfaction on average, while growers in the Southern Queensland and New South Wales districts are less satisfied with SRA's performance.

Grower satisfaction with R&D levy investment by district

DISTRICT	2022	2023
Far North Queensland	5.7	6.6
Herbert	6.5	6.8
Burdekin	6.3	6.5
Central Queensland	6.2	7
Southern Queensland	5.8	5.9
New South Wales	6.3	5.9

Recommending SRA research products, services, and information

Growers report stronger advocacy of SRA's research products, services, and information in 2023 recording a score of -6, on a scale of -100 to +100, indicating an uplift from 2022 (-25). This suggests growers are more likely to recommend products, services, and information to other growers than previously. Moreover, this result indicates a positive shift with 23% of growers reporting to be promoters (up from 16% in 2022), 49% passives (up from 43%), and 28% detractors (down from 41%).

Growers in the Herbert district report highest advocacy (+20) compared to growers in Burdekin (-36) suggesting the latter are less likely to promote SRA to other growers. Moreover, small growers report higher advocacy (+2) compared to large growers who report the lowest (-33).

Satisfaction with industry interactions

The strong improvement in overall performance is largely explained by uplifts in grower satisfaction with industry-facing staff including District Managers and Researchers (up 0.8 and 1.0 respectively on a scale of 0 to 10), perceptions of staff engagement in industry matters (up by 12%), and satisfaction with the breeding program (up by 0.4).

Grower satisfaction with key industry interactions

The average satisfaction rating is provided underneath each area based on a scale of 0 (extremely dissatisfied) and 10 (extremely satisfied).

** In 2023, satisfaction was asked across 10 program areas of research compared to seven in 2022.*

WHAT MILLERS TOLD US

Confidence in future

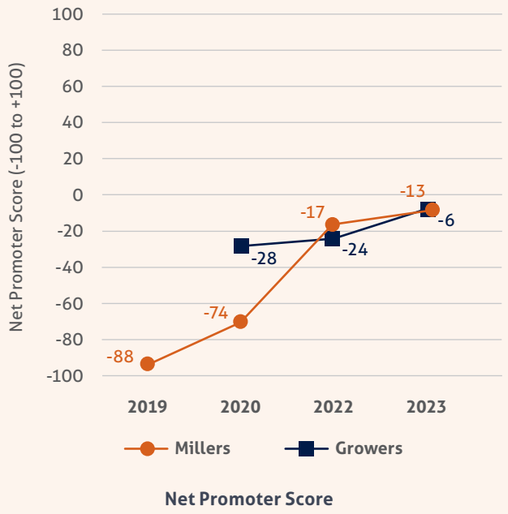
Like growers, there is a strong statement from milling companies about their confidence in the future of the Australian sugarcane industry over the next 12 months. Almost every respondent (97%) was positive about the future of the industry, up from 94% in 2022. The same market conditions likely explain this result as with growers.

Satisfaction with SRA

Milling companies report moderate satisfaction with levy investment of 5.7, on the same scale of 0 to 10, a slight improvement on the 2022 result (up 0.1). A breakdown of results by representatives suggests 19% (up 6% on 2022) rate their satisfaction strongly, 49% (down 3%) report a modest rating (6 or 7) and 32% (down 3%) rate between 0 to 5. The range of ratings likely reflects different awareness, knowledge, involvement, and experiences with SRA by companies.

Recommending SRA research products, services, and information

Milling companies report a score of -21, on a scale of -100 to +100, a modest improvement from 2022 (-28), and continuation of an upward trend since 2019. For the first time there are now more promoters (20%, rating of 9 or 10) and passives (39%, 7 or 8) than detractors of SRA research products, services, and information.



Satisfaction with industry interactions

Despite milling companies reporting small improvements in overall satisfaction and advocacy compared to 2022, millers signalled their dissatisfaction with SRA across several key industry touchpoints. Noteworthy decreases were recorded for satisfaction with District Managers and Researchers (down 0.8 and 1.0 respectively), perceptions of staff engagement in industry matters (down by 7 percentage points), satisfaction with SRA's Strategic Plan 2021-2026 (down 0.9), and satisfaction with research investment (down 0.4).

Miller satisfaction with key industry interactions

The average satisfaction rating is provided underneath each area based on a scale of 0 (extremely dissatisfied) and 10 (extremely satisfied).

** In 2023, satisfaction was asked across 10 program areas of research compared to seven in 2022.*

WHAT ARE WE DOING IN RESPONSE TO YOUR FEEDBACK

Interacting more with growers

The preference of growers across all districts is for consistent interaction with SRA staff regarding research priorities and activities. Growers who have regular interactions with industry staff in their district tend to express higher overall satisfaction, with an average satisfaction score of 7.1, on a scale of 0 to 10, compared to 5.0 for those perceiving staff inactivity.

In 2023, 66% of growers report active staff presence (up from 53% in 2022) while those suggesting otherwise decreased from 30% to 19%. This positive trend reflects SRA's commitment to enhancing grower engagement in the development of our District Productivity Plans and research investment planning, as part of our Strategic Plan. Interacting with growers remains a top priority in 2023/24 and we aim to exceed 2022/23 targets where we engaged with more than 1,000 stakeholders including more than 750 growers and millers.

Bringing more RD&A activities to Southern and New South Wales growers

In 2023, growers in Southern Queensland and New South Wales typically report lower satisfaction with SRA than growers in other districts. Feedback from these growers suggests they seek greater engagement by SRA about RD&A activities and interaction with our team. This reflects the alternate engagement model funded through SRA Service Agreements with NSW and Rocky Point to manage their own engagement projects in conjunction with SRA-led grower events. The 2024 District Productivity Plan will continue to leverage these agreements and will outline new SRA projects and capability to complement existing projects and activities.

Delivering targeted milling research

Milling companies are less satisfied this year with SRA's engagement about research investment planning (down 1.0 from 2022). Satisfaction with SRA's research portfolio has also decreased (down 0.4) reflecting comments that projects do not address milling priorities and more funding is required to deliver impacts to the sector. In response, SRA has implemented separate investment planning for milling companies and already this year we have held three dedicated forums. This will continue and we will actively ensure each of the nine milling companies operating in Australia are represented. Moreover, we have allocated funding to investigate the feasibility of a centre of excellence in milling research to identify targeted research opportunities.

Consistent involvement with every milling company

Analysis of results suggests milling companies strongly differ in their satisfaction with SRA (from 3.5 to 7.6 on a scale of 0 to 10). This range may differ in awareness, knowledge, involvement, and experiences with SRA. In 2023/24, SRA will target consistent engagement with all nine milling companies to help close this gap via our investment planning, activities and events. Moreover, we aim to build greater familiarity with our objectives and plans by improving communications to companies about SRA's Strategic Plan and District Productivity Plans.

AUSTRALIAN AND INDONESIAN SUGARCANE INDUSTRIES SIGN BIOSECURITY AGREEMENT

Interim CEO Shaun Coffey, SRA Chair Rowena McNally and KPN Corp Deputy Executive Director Andy Indigo sign the agreement.

A landmark agreement has been signed between the Australian and Indonesian sugarcane industries in a frontline effort to increase biosecurity protection for Australian farms.

Sugar Research Australia Chair Rowena McNally and Indonesian company, KPN Corp, Deputy Executive Director Andy Indigo have signed an agreement to establish a research and development collaboration between the two countries.

This will see six major Australian sugarcane varieties propagated in plantations across the Indonesian archipelago. These varieties will be monitored for their resistance to a range of pests and diseases in a frontline biosecurity effort to protect sugarcane production in Australia, a relatively short distance away.

Six current SRA varieties representing about 65 per cent of crop production in Australia will be licensed for Indonesian commercial production in a diverse range of environments and locations.

This will enable SRA to assess the resistance of these varieties to exotic pests and diseases that are currently non-existent in Australia.

General Manager Variety Development, Dr Jason Eglinton said one of SRA's fundamental services to the Australian sugarcane industry was biosecurity research.

"In 2023/24, $4.3 million will be invested to support the management of endemic pests and diseases and to prepare for the potential incursion of exotic pests and diseases," Dr Eglinton said.

"Experience has taught us that the best form of pathogen control is varietal resistance which provides the necessary scale and reliability of control at a comparatively low cost to individual growers.

"Australia has been successful over the years in deploying genetic resistance to manage biosecurity threats such as gumming disease (eradicated), Fiji leaf gall (potentially eradicated), orange rust (well controlled) and smut (minimal losses).

"An integral part of testing Australian varieties' reaction to exotic biosecurity threats must be undertaken offshore. For example, screening for smut resistance began in 1997 at the Indonesian Sugarcane Research Institute, funded by the Australian industry. The information gleaned about the susceptibility and resistance of varieties became crucial in the response to the arrival of smut in 2006."

Indonesia is host to insects, bacteria, fungi, phytoplasmas, nematodes, oomycetes and viruses that are already recognised in the Australian biosecurity threat summary tables maintained by the federal Department of Agriculture, Fisheries and Forestry, with risk ratings ranging from very low to extreme.

There are also a significant number of pests and pathogens of unknown risk and unknown potential economic impact to the Australian industry.

"These have not been scientifically identified and characterised," Jason Eglinton said.

"Evaluating varieties under commercial conditions across the range of environments in Indonesia we will see the impact of known and unknown biosecurity threats. The results will provide a baseline of the risks to the current Australian crop.

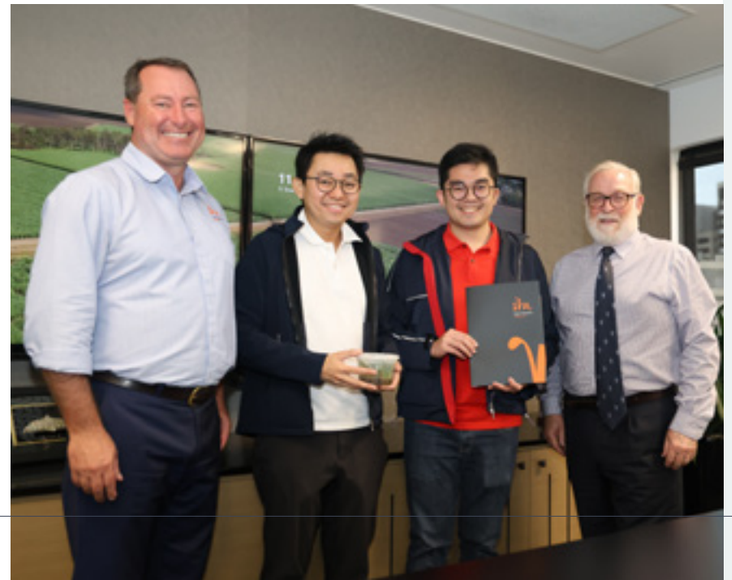
"The six varieties have also been used extensively in the SRA breeding program so their reactions will also provide insight into the strengths and weaknesses of the future variety pipeline."

Under the license arrangements, regular reports will be provided to SRA on the varieties' reaction to pests and diseases in both propagations and commercial production. In addition, a production-based royalty payment will be paid which will be invested in the Australian sugarcane industry's research priorities.

Benefits to the Australian industry are:

- Sentinel crops will be established and monitored across Indonesia at no cost to the Australian sugarcane industry.
- The varieties' resistance to a large range of biosecurity threats will be monitored.
- The information will enable SRA to develop a scientific analysis of the key threats to the Australian crop from exotic pests and diseases.
- The project will also provide information on any potential biosecurity weaknesses and strengths in the breeding pipeline.
- Any serious susceptibility will inform future specialist research and breeding efforts.
- If the varieties prove to be commercially successful, SRA will invest the financial returns in Australian industry research priorities.
- If the pilot is successful it could lead to increased collaboration in sugarcane research and development which may include biofuels.

SRA General Manager Variety Development, Jason Eglinton and KPN Corp Deputy Executive Director, Andy Indigo and Head of Business Management and Strategy, Clifton Theodore and SRA Interim CEO, Shaun Coffey are pictured after the agreement was signed.



Picture (supplied by TSL): The delegation views a block of new seedlings starting their field evaluation journey towards commercial release. Left to right Mr Darcy Li Tully Sugar Ltd Commercial Manager, Mr Andrew Yu Tully Sugar Ltd CEO, Mr Victor Tang COFCO Sugar CFO, Dr Felicity Atkin, Mr Minghua Li COFCO Sugar Chairman, Dr Jason Eglinton, and Mr Hans Han Tully Sugar Ltd Executive Assistant.

COFCO VISIT TO MERINGA

SRA hosted a visit by COFCO Sugar Chairman Mr Minghua Li and COFCO Sugar CFO Mr Victor Tang at Meringa on Wednesday 25 October. COFCO Sugar, as the sole shareholder of Tully Sugar Limited since 2011, is one of the largest sugar traders in China and provides full coverage of logistics and storage services for Chinese sugar trade players.

The delegation received an overview of SRA governance, strategy, R&D portfolio, and an introduction to the breeding program. The strong performance of the new varieties SRA26$^{\Phi}$ and SRA28$^{\Phi}$ at the Tully mill during the 2023 season was discussed. The dominant varieties at Tully are Q208$^{\Phi}$, Q253$^{\Phi}$, and Q240$^{\Phi}$ which account for 70% of the crop.

For the season to date, SRA26 and SRA28 have averaged 0.8 units of CCS higher and 1.1 tonnes of sugar per hectare higher than the dominant varieties. Collaboration and cooperation between all partners of the Tully Variety Management Group, which includes Tully Sugar and SRA, to increase adoption of the new varieties was acknowledged as a key opportunity to increase profitability for the local industry.

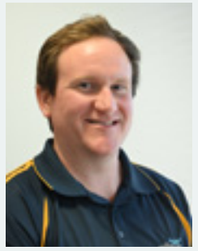
THREE NEW MILLING PROJECTS FOR 2023/24

Three projects were approved under the Small Milling Research Projects scheme for 2023 and got underway in July this year. These projects aim to solve industry-identified issues in sugar milling and will be of benefit for both growers and millers. The projects are expected to be completed within 12 months. Applications are also open for Small Milling Research Projects for the 2024/2025 year (see page 11 for more details).

RESEARCH MISSION 1 **Profitable and Productive**

Project 2023/201
Bagasse fly ash system performance benchmarking

Jonathon Gilberd, Wilmar Sugar Pty Ltd



Project rationale

All sugar mills produce boiler fly ash and have a need of processing this into a suitable waste product in a cost-effective manner. However, there is little information available on modern processing technology and expected equipment performance when processing bagasse fly ash.

The boiler ash system has become increasingly important for sites to meet their environmental obligations for both boiler flue gas particulate emissions and for effective wastewater treatment.

Ash systems provide a clean water supply for wet scrubbers and the quality of the water is important in the performance of the scrubbers. Boiler ash water can also have significant impacts on the health of activated sludge wastewater treatment plants so close management of the plant is required to prevent ingress of ash water into effluent to maintain effective wastewater treatment performance.

There are many different designs of boiler ash systems, all with inherent advantages and disadvantages. However, there is little information available that can aid in the selection and design of appropriate equipment for a given factory.

This project seeks to close this knowledge gap to provide the industry with an up-to-date source for design heuristics and information when selecting and designing bagasse fly ash processing equipment.

Expected outputs and industry benefits

The output of this project will include a documented manual for bagasse fly ash system design. This manual will be available to the Australian sugar industry to use as needed.

Environmental

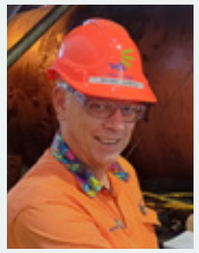
- Improved wet scrubber operation leading to reduced flue gas particulate emissions
- Improved system specification accuracy to prevent operational issues that cause ash water ingress into factory effluent systems.

Economic

- Improvement to ash water quality control may lead to reduced wear and fouling to wet scrubber components leading to pre-mature replacement
- Improved accuracy in ash system design leading to less re-work and operational issues post installation
- Improved consistency of solid ash product leading to reduced handling and transport costs
- Increased life of ash system assets with increased knowledge of corrosion rates and suitable materials of construction.

Project 2023/202
Evaluating the suitability of measuring massecuite dry substance for control on Australian pan stages

Bryan Lavarack, Mackay Sugar Limited



Project rationale

Australian sugar factories currently use massecuite conductivity to control the feed rate of syrup and molasses to pans. Conductivity control is inexpensive and works well, although it does require close attention from pan operators.

Microwave transducers to measure massecuite dry substance (DS) are now being used in several overseas refineries and factories for control of the massecuite condition in pans.

The advantage of DS over conductivity is that it is an absolute and meaningful value in terms of the massecuite concentration.

The overall aim of this project is therefore to evaluate the measurement of massecuite dry substance as a superior process variable for controlling pan boiling operations in Australian factories. Improved control will result in cost reduction due to less manual interaction than currently required with conductivity control. Steam savings resulting from tight control are also expected.

Expected outputs and industry benefits

If massecuite DS measurement proves to be reliable and accurate, the main potential benefits are tighter control of individual pans, less likelihood of forming fine grain, and reduced manual input from pan stage operators.

The massecuite DS measurement should prove to be a process variable that is less impacted by changes in cane supply as is currently the case with conductivity.

Greater consistency in pan control will have benefits for milling operations in terms of:

- Minimising the 'manual checking' of pans by operators, thus providing opportunities for increased automation of the process.
- Reducing the incidence of fine grain formation, thus providing benefits of:
  - Increasing the capacity of the pan stage by avoiding the non-productive fine grain washing step, providing
  - Steam savings of up to $82,500 per crushing season for a single high-grade pan.

The technology would be applicable for use in all Australian mills for pan control and enhance the competitiveness of Australian factories in the international market. Research collaborators include Queensland University of Technology.

Project 2023/203
Billet quality assessment

Barton Wixted, Griffith University

Project rationale

Sugar losses due to billets being harvested too short and/or damaged during harvesting are well understood. Excessive trash adds to transportation and milling costs. Measuring these losses using manual techniques is expensive.

By automating the measurement of incoming billets, data can become available to mills, growers, and harvesters as loads are delivered in near real-time. This information can then help to optimise the trade-offs between speed of harvesting, harvester tuning, quality of harvest (Extraneous Matter content), ease of transportation and sucrose loss.

Sunshine Sugar and Griffith University have developed a system for measuring billets on the shredder infeed conveyor using computer vision.

Expected outputs and industry benefits

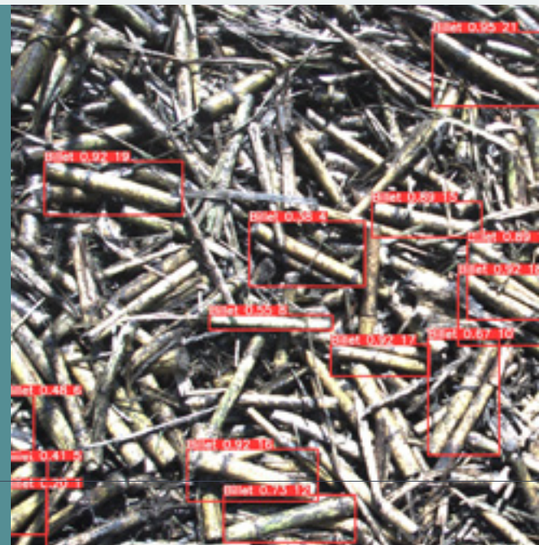
The project outcomes will expand the capabilities and industrialise the concept that was proven during a trial at Condong Mill in 2022. This will be achieved by expanding capabilities from burnt cane billet measurement to accurately measure:

- billet lengths for green-cut cane
- billet damage (split, smashed, or broken).

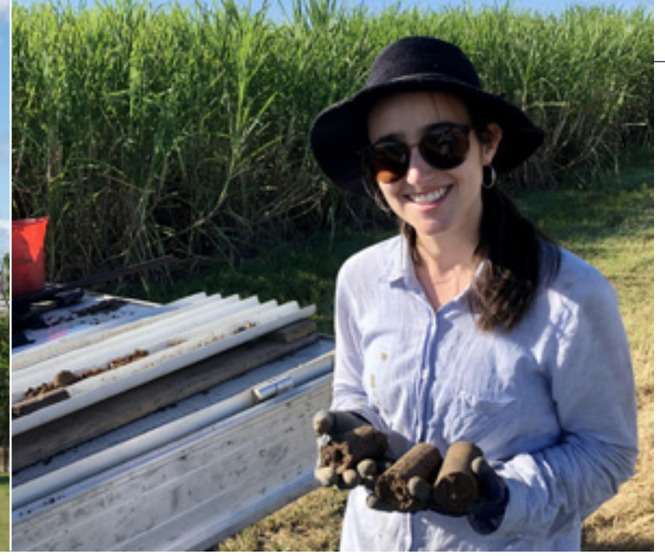
The project will industrialise the concept, aiming for a robust, reliable, easy-to-install system to increase the potential for adoption across the industry. It will also explore how the measurements made by the system can be best used for the continuous improvement of processes and practices.

By measuring the billet length in near real-time, corrective actions can be taken far sooner than would otherwise be possible. While conditions vary across the industry, SRA trials have shown that a 2 cm increase in the average billet length has the potential to increase yield by up to 2 per cent, with a direct and significant impact on profitability.

The project will investigate the means for industry-wide adoption, including long-term support and maintenance. Research collaborators in this project include Sunshine Sugar, and Norris Energy Crop Technology.



(Pictured) A computer program developed by Griffith University and Sunshine Sugar detected and measured unobstructed billets on the conveyor during a recent trial at Condong Mill.



Hannah Green on a farm near Clare in the Burdekin River Irrigation Area.

RESEARCH MISSION 5 **Resourced and Skilled**

"If we can understand how mill ash and mud can be used for soil nutrition we can reduce the amount of fertilisers that are being added on top of that."

Project 2021/101

Optimising mill mud and ash applications for soil improvement and carbon sequestration

Hannah Green, University James Cook Universty

Objectives

- Assess the carbon dioxide removal potential of various mill ashes via enhanced weathering, compared to a well-studied basalt
- Investigate the impact of soil conditions and mill ash properties on carbon dioxide removal.

Potential outcomes for industry

- Improved runoff water quality through increased nutrient use efficiency
- Increased crop productivity through improved nutrient supply.

Progress Report

In this third milestone period, Hannah submitted the geochemical modelling paper that she worked on during the first two milestone periods. This work highlighted that carbon dioxide removal via weathering of sugarcane-mill ash is likely to be limited in acidic tropical soils but shows high potential in neutral soils.

These results informed the design of an incubation experiment for testing. This experiment was set up during July and August, including collecting, measuring, and adjusting soil from the Herbert and Burdekin regions. The experiment will be monitored for 12 months and has been analysed twice. The field trial established in the last milestone period was sampled regularly until the end of the wet season and work has begun analysing these samples.

"Overall, mill ash shows high potential for carbon dioxide removal via enhanced weathering, especially if lifecycle benefits are considered, although this must be validated in the field," Hannah said. "As part of this research, we found that weathering rates of mill ash were high but in acidic tropical soils, this did not necessarily result in removal of carbon dioxide and storage as bicarbonate."

Hannah's Sugar Industry Postgraduate Research Scholarship to carry out this project is funded by Sugar Research Australia.

"I can see myself keeping on working on sugarcane. There's lots of opportunity to make improvements and have a really positive impact on the people who live here and the environment."

- PhD student, Hannah Green

SUGARCANE BIOSECURITY AT THE FIRST NAPCARN ROUNDTABLE

Entomology Leader, Dr Kevin Powell and Research Mission Manager Dr Stephen Mudge represented SRA at the Inaugural NAPCaRN Northern Plant Biosecurity Roundtable held in Cairns in October. The sugarcane industry was also represented by CANEGROWERS Sustainability Manager Dr Mick Quirk.

The Northern Australia People Capacity and Response Network (NAPCaRN) was formed this year in recognition that Northern Australia is a biosecurity 'frontline' with numerous plant pest/disease detections in the past 10 years, many of which have been significant in terms of costs to industry and communities.

These have been largely due to remoteness, close proximity to Papua New Guinea and Indonesia where a number of exotic pests and diseases are located, and the presence of unregulated pathways (e.g. where foreign vessels can break biosecurity regulations without being detected due to isolation).

It was reported that from 2010-2022, Queensland had almost twice as many biosecurity interceptions (4,117) as NSW (2,227) and more than 41 per cent of total interceptions in Australia (9,995).

NAPCaRN was developed under the Australian Government's Northern Australia Biosecurity Strategy, which sets out key biosecurity objectives and priority actions for the region.

The first NAPCaRN Roundtable brought stakeholders together from government, industry and indigenous organisations to generate initiatives to build biosecurity capacity and capability across northern Australia.

The main gaps in the biosecurity system in northern Australia were identified by participants as a lack of:

- Connection, communication and collaboration across existing programs and initiatives, resulting in some duplication of activities
- Co-ordination across different stakeholder groups to support initiatives focused on planning, response and recovery
- Experienced staff with expertise and the ability to retain this expertise in the medium term
- Leadership training and knowledge
- Data sharing, and policies and procedures that ensure that data collected by industry is fit for purpose and meets regulatory requirements
- Community engagement
- Understanding about risk and risk pathways
- Resources, including infrastructure.

Commenting on the presentations at the Roundtable, Stephen Mudge said key points made included:

- Staff retention and capability are on-going issues in the North
- Communication between stakeholders and jurisdictions will be critical to avoid duplication of activities when resources are limited
- What happens under the Emergency Plant Pest Response Deed (EPPRD) after an incursion is typically poorly understood by industry. An informative exercise was held to boost understanding during the Roundtable
- Approximately 90 per cent of the northern coastline is Aboriginal land so indigenous engagement, particularly with the established Indigenous Ranger Program, will be critical
- Formal surveillance activities are costly and are therefore resource-limited.

Early detection surveillance is undertaken by the Federally funded Northern Australia Quarantine Strategy (NAQS), whose target list includes several high-risk exotic sugarcane insect pests. In contrast, state governments are primarily responsible for delimiting surveillance to understand pest spread following an incursion.

Representatives of Plant Health Australia, biosecurity surveillance organisations, NT, WA, Qld and Australian Governments, agriculture departments, Research and Development Corporations, universities, and industry organisations representing sugarcane, cotton, horticulture, grains, honeybees and forestry.

At the AFI's ESG Conference workshop.

WHAT FARMERS NEED TO KNOW NOW **ABOUT ESG**

- **Australian farmers need to understand global policy trends on ESG and how they influence their trading and operating environments**
- **The banking sector as a whole invests more than $90 billion in agriculture**
- **Banks will be supporting farmers to make ESG related decisions rather than telling them how to farm and decarbonise.**

Farmers know sustainability better than bankers. For generations they have been the custodians of their land, water and soil, in order to feed their communities and provide for the success of the next farming generation.

Therefore, some Australian farmers may think that ESG – environmental, social and governance reporting – is a term only used by the investment community. However, Australian Farm Institute Executive Director Richard Heath warned that ESG was now an "unstoppable force" in increasingly competitive global and domestic markets.

Earlier this year a conference about ESG Goals and Targeting held by the Australian Farm Institute presented some significant world trends developing in ESG reporting for Australian agriculture.

The International Sustainability Standards Board (ISSB) launched new international financial reporting standards: S1 (general) and S2 (climate). S1 covers disclosure requirements for companies to communicate to investors their sustainability-related risks and opportunities over the short, medium and long terms, while S2 sets out specific climate-related disclosures.

At the launch ISSB Chair, Emmanual Faber said that up until that point economics had not recognised nature. For example, he said while businesses paid for water, they did not pay the real value of water. "Investing in the true value of nature and how to protect these ecosystems that are essential for our economic lives, for our ways of life as human beings, is critical in economics."

At the AFI conference, Richard Heath referred to Emmanual Faber's remarks, saying Australian farmers need to understand the global policy trends on ESG and how they influence their trading and operating environments.

A guest speaker at the conference was Nicholas Wandke, Head of Climate at Westpac, which is an Australian bank that signed up last year to the UN-convened Net Zero Banking Alliance (NZBA).

The NZBA consists of 129 banks in 41 countries controlling US$74 trillion and 41 per cent of global banking assets. The banks have three years to set ESG targets for all sectors, including agriculture, which represents 22 per cent of global greenhouse gas emissions while also playing a big role in the removal of carbon emissions through soil and vegetation.

"Net Zero does tend to overshadow everything at the moment but we are still very focused on understanding how farmers are managing their biodiversity or environmental impact on farm; and their social risk," Nicholas Wandke said.

"The starting point for us is to understand how our farm customers might be thinking about transition and whether they've already calculated the carbon footprint of their farms. What's their baseline for an emissions footprint? What are some of the levers they can pull to improve it?

"Some of our customers are quite advanced in their thinking about this which is fantastic because we can showcase great practice."

Agribusiness Sector Lead, Net Zero Implementation at Westpac, Alison Osborne spoke about agriculture's future as being bright in a decarbonising economy. "We are keen to grow with and support this vital transition with our customers. We won't be telling farmers how to farm or how to decarbonise but we will be supporting them to make those decisions."

Australian farmers also have some new overseas friends. The Australian Farm Institute this year joined with other independent farmer organisations – the Canadian Agri-food Policy Institute, the Farm Foundation (US) and the Forum for the Future of Agriculture (Brussels) to form the Global Forum on Farm Policy and Innovation (GIFFI). The aim is to understand the key gaps and opportunities that will deliver better farm sustainability outcomes.

AFI has also developed the Australian Agricultural Sustainability Framework (AASF) after consultation with farmers, government, industry organisations, RDCs, financiers and supply chain organisations. Informed by an expert reference group, parallel discovery projects and an extensive review of domestic and global sustainability frameworks and literature.

Ongoing funding has been provided by the Australian Government managed by the National Farmers Federation to expand understanding of Australian agriculture's evidence-based sustainability credentials and narrative.

"There is a confusing array of systems, platforms, methodologies and criteria out there at the moment. We believe the AASF will help cut through that by providing a base reference point for Australian agriculture and a co-ordinating mechanism to develop and align understanding about how ESG goals and targets can be met over time," Richard Heath said.

"Net Zero does tend to overshadow everything at the moment but we are still very focused on understanding how farmers are managing their biodiversity or environmental impact on farm; and their social risk."

- Westpac Head of Climate, Nicholas Wandke

FINDING A CONTROL STRATEGY **FOR BALSAM PEAR**

Identifying and developing control strategies for emerging and troublesome weeds is a key priority for the Far North District Plan.

Of the many weeds that can be found in cane fields of the Far North, Balsam pear, navua sedge and itch grass have been identified as troublesome to control and increasing in impact. The activities delivered through the Far Northern District Plan has focussed on these three weed species, with the post-emergent (or knock-down) herbicide trials for Balsam pear recently coming to an end.

Balsam pear-infested patches in the crop will pull the cane down because of the vine's weight, leaving it open to rat attack and nearly impossible to harvest. Yield reduction in these patches is estimated to be more than 70 per cent.

To address the issue of effective Balsam pear management, Weed Scientist Emilie Fillols set up three herbicide replicated pot trials, focusing on knock-down control.

The efficacy of the identified treatments for this weed was also tested on calopo, and red and pink convolvulus which are major vine weeds often found mixed with Balsam pear in cane crops, also drastically affecting cane production.

An auxin is a plant hormone that impacts cell regulation. An example of a synthetic auxin is 2,4-D.

The aim of the trial work was to find what auxins work the best by themselves for each weed species and then whether mixing the most effective ones, where allowed by the labels, boosts efficacy. Product formulations under the different brands can also make a difference.

"Amicide 700, Comet 400 and Commander 75-D contain the three auxins growers most commonly use in their mixtures to control Balsam pear. However, I wanted to find out which auxin was doing the heavy lifting," Emilie said.

In each pot trial, plant mortality was recorded two months after the post-emergent spraying.

POT TRIAL 1 Summer 2022 - Balsam pear

- Amicide Advance® 700 (2,4-D)
- Comet® 400 (fluroxypyr, brand now discontinued)
- Amicide Advance® 700 mixed with Comet® 400
- Amicide Advance® 700, Comet® 400 and Commander™75-D (2,4-D and picloram).
- Each tested at low, medium and high label rates.
- Activator® was added to the Amicide 700 alone, while LI700® was added to all mixtures containing Comet 400.
- NB: Commander 75-D (picloram) is registered for a particular use - controlling sicklepod - therefore it can only be used in cane blocks where sicklepod is also present.

The three-way mix of fluroxypyr, picloram and 2,4-D (0.715L/ha Amicide 700 + 0.65L/ha Comet 400 + 1.5L/ha Commander 75-D), showed the most visual damage to plants.

It also generated the highest mortality with 72 per cent dead plants and 17 per cent plants with severely inhibited growth.

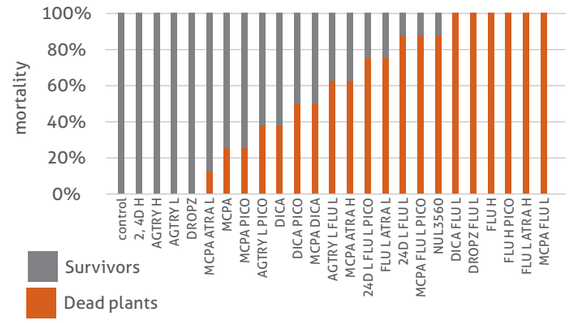
"The best mixture in this trial (a three-way recipe) was commonly used by growers but they commented it was a bit hit and miss. Sometimes it achieved good control, other times, not," Emilie said.

"These results agree with the growers: no herbicide combination was efficient enough in this trial and there was room for improvement. Amicide 700 on its own was found to be inadequate to control Balsam pear and another auxin product partner needed to be explored."

POT TRIAL 2 Winter 2022 - Balsam pear

- Fireball 400 (fluroxypyr)
- Commander™ 75D (2,4-D, picloram)
- Agritone750 (now called MCPA Amine 750) (MCPA)
- Dicamba 500 (dicamba)
- Agtryne® MA (terbutryn and MCPA)
- Amicide Advance® 700 (2,4-D in dimethylamine and monomethylamine salts)
- Dropzone® (2,4-D in dimethylamine and monomethylamine salts).

Due to the high number of treatments, each individual herbicide was sprayed separately with its recommended adjuvant at a water rate of 200L/ha.



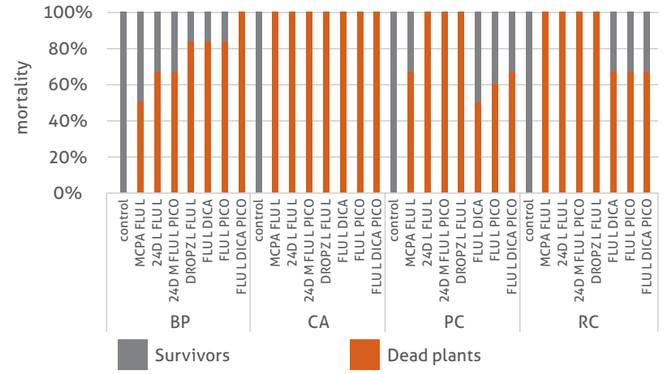
In this trial established in winter, the plants suffered from downy mildew and army worms in the weeks after herbicide application and were treated for these conditions.

"Several herbicide treatments fully controlled Balsam pear in the trial, applied during winter. This is an interesting finding, however, it must be remembered that external factors (downy mildew and armyworms) helped achieve these results because they limited the recovery process of the sprayed plants," Emilie said.

"Since Balsam pear usually becomes a problem in cane crops from November to April and spraying is usually done in the summer, it was important to confirm these results in another trial carried out in the correct conditions."

POT TRIAL 3 Summer 2023 - Balsam pear, calopo, red convolvulus, pink convolvulus

- Amicide Advance® 700 (2,4-D)
- Fireball 400 (fluroxypyr)
- Dropzone (2,4-D)
- Dicamba 500
- Picoflex® (picloram) and
- Agritone750 (now called MCPA Amine 750) (MCPA).
- NB: Picoflex® (picloram) is registered for a particular use - controlling sicklepod - therefore it can only be used in cane blocks where sicklepod is also present.



The most effective treatment for Balsam pear was the three-way mixture 0.65L/ha Fireball 400 + 0.56L/ha Dicamba 500 + 0.47L/ha Picoflex with 100 per cent plant mortality.

The issue with this mixture is that Picoflex is only registered to control sicklepod and it can only be used in mixes with 2,4-D. Using Picoflex mixed with dicamba and fluroxypyr is not permitted under the label because 2,4-D is the compulsory mixing partner, so switching to Commander 75-D (picloram and 2,4-D) when mixing with dicamba and fluroxypyr is necessary. It is also possible to use only 0.65L/ha Fireball 400 + 0.56L/ha Dicamba 500, which achieved 83% Balsam pear control and was not significantly less efficient than the three-way mixture with picloram in the trial.

The Dropzone formulation of 2,4-D provided increased efficacy compared to the formulation of Amicide 700. The mixture of 1L/ha Dropzone + 0.65L/ha Fireball 400 (graphed as DROPZ L FLU L) achieved a robust control of Balsam pear of 83%, while controlling also 100% of calopo, red convolvulus and pink convolvulus.

Overall results

The three-way mixture of fluroxypyr, dicamba and picloram seemed the most effective treatment for controlling Balsam pear.

The trial confirmed the efficacy benefit of using dicamba instead of 2,4-D for Balsam pear control. Picloram seems to make a fluroxypyr-dicamba mix more robust in terms of efficacy but 2,4-D must be added to meet picloram's label requirements, and sicklepod plants must also be present in the cane block.

The Dropzone formulation seemed to perform better than Amicide 700 at equivalent rate per active per hectare and, with picloram, is an effective mix against all tested vines and sicklepod.In the presence of convolvulus and Balsam pear (and sicklepod), Dropzone mixed with fluroxypyr and picloram may be the best compromise.

SRA would like to acknowledge Nufarm's help in this project.

SRA will continue investigating pre-emergent herbicide solutions to enhance the control of Balsam pear. A paper will be presented by Emilie Fillols at the ASSCT Conference next year.

DISTRICT PRODUCTIVITY PLANS - CURRENT PRIORITIES

INITIATIVE	COLLABORATORS	PROPOSED OUTCOME	STATUS – December 2023
Far North District Manager: Gavin Rodman E: grodman@sugarresearch.com.au M: 0476 807 355.			
Mulgrave CCS and Mossman Productivity Improvement Projects	CANEGROWERS Cairns Region, MSF Sugar and Mulgrave growers. CANEGROWERS Mossman, Far Northern Milling Pty Ltd, Mossman Agricultural Services and Mossman growers.	Improve CCS through monitoring and measuring crop indicators. Development of new datasets. Identification of management strategies. Identify the impact of current practices on CCS, including those impacting upon extraneous matter.	The Mulgrave CCS Improvement Project has recently shared with the industry in the Mulgrave and Babinda areas initial insights on potential CCS impacts. These include; crop age at harvest, increasing ash %, timing of planting and harvest scheduling, use of growth regulators/ripeners, topping practices, row profile and crop presentation, and Pachymetra root rot. More recently, the impacts of suckers have been further investigated and information will be shared in coming weeks. Pachymetra and row profile surveys have been completed for Mossman. A permit for aerial baiting for rats using Ratoff® has been submitted and is pending approval.
Development of application parameters for ripeners	MSF Sugar, Far Northern growers.	Develop in-field parameters to support successful applications of sugarcane ripeners to improve profitability.	Year 1 results shared with Far Northern industry at SRA March update events. 2023 sites selected, treatments applied and monitoring ongoing. Some sites have been harvested in 2023. Strong linkages to CCS and Productivity Improvement Projects.
Strategies for emerging weeds	Nufarm, Queensland Department of Agriculture and Fisheries, Federation University and Far Northern growers.	Investigate efficacy of herbicides registered for vine control and aerial application. Identify and develop germination protocols for itch grass to support pot trials. Develop management strategies for post-emergence of Balsam pear, itch grass and navua sedge.	Year 1 results shared with Far Northern industry at SRA March update events. Balsam pear trial #3 complete. Other vine species trial complete. Navua sedge monitoring ongoing at two sites with one field walk completed and a third trial currently being established. Collection of itch grass seeds for germination protocol development underway.
North District Manager: Phil Patane E: ppatane@sugarresearch.com.au M: 0431 818 482			
Local Expert Analysis (LEA) South Johnstone	Innisfail Babinda Cane Productivity Services, CANEGROWERS Innisfail, local growers, MSF Sugar, Cassowary Coast Reef Smart Farming Project and local industry organisations.	In mid-2021 a Local Expert Analysis (LEA) was initiated in the South Johnstone District. A general LEA industry reference group was formed for the area which included local industry scientists from agronomy, pathology, machinery, variety development and NIR. The group objectively considered local constraints influencing yield and milling operations. The LEA is embedded in the South Johnstone District Productivity Plan.	The initial LEA analysis suggested that the most significant constraints affecting productivity were poor nutrition in older ratoon crops, severe Pachymetra root rot, widespread incidence of RSD, low uptake of Pachymetra resistant varieties, poor adoption of highly productive new varieties, less than ideal extension materials and insufficient quantities of approved seed. There is also opportunity to adopt tools, such as Harvest Mate, to optimise economic returns for industry. Targeted actions have now been assembled to address the known constraints. Recent activities have included reviewing the results of a district wide soil and leaf survey (which has been supported by the Cassowary Coast Reef Smart Farming project), increasing the availability of Pachymetra resistant varieties through tissue culture, implementation of a Regional Variety Trial (assessing clones, standard varieties, and newly released varieties on marginal soil) and the installation of RSD sterilisation unit on a commercial harvester.
Local Expert Analysis (LEA) Tully	Tully Cane Productivity Services Ltd, 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.	The initial LEA analysis suggested that the most significant constraints affecting profitability included 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. Current projects such as the Mobilising the Murray (funded by the Australian Government's Reef Trust), Smart Farms Small Grants Soil Extension (funded by the Australian Government's National Landcare Program) and Cassowary Coast Reef Smart Farming Project (Tully basin) have assisted with identifying and addressing some of the productivity constraints identified through the Tully LEA.
Variety observation plot and CCS maturity profiling	SRA Plant Breeding.	Variety demonstration plot and CCS maturity profiling.	Completion of CCS maturity curves for the 2023 season data analysed and added to the 2022 season dataset. Results will be presented to local industry and added to the Herbert Variety Guide.
Sterilisation unit for harvesting	Fire Suppression Services QLD PTY LTD.	Prototype automatic spray unit to clean a commercial harvester to minimise RSD transmission.	Two units have been installed in Mackay and South Johnstone. From the improvements made to the two units commissioned a third unit will be installed during the 2024 offseason in the Herbert region.
Refining nutrient recommendations for ratoon crops following application of surface banded mill by-products to manage the effect on yield and CCS	Wilmar Sugar Australia, Reinaudo Farming Company.	Improved understanding of nitrogen requirements to manage CCS following application of mill by-products.	Three trials implemented. One trial implemented at the Orient - mud/ash was subsurface banded in fallow at 80 wet t/ha and then planted. Sampling completed for this trial. Two additional trials established during the 2023 season for surface banded mill by-products on ratoon cane.
Rat Management Program	Animal Control Technologies Australia, Herbert Cane Productivity Services Limited, CANEGROWERS Queensland, CANEGROWERS Herbert River, QCAR and ACFA.	Management of increase in ground rat population.	Permit to Allow Emergency Use of a registered Agvet chemical product for control of Australian Native Ground Rats in ratooning sugarcane crops. Establishment of three trial sites to assess five different types of attractants on sachets of RATOFF product.

INITIATIVE	COLLABORATORS	PROPOSED OUTCOME	STATUS – September 2023
Burdekin District Manager Terry Granshaw E: tgranshaw@sugarresearch.com.au M: 0457 650 181			
Burdekin Irrigation Project (BIP)	Burdekin Productivity Service (BPS), Agritech Solutions, Farmacist, Burdekin Bowen Integrated Floodplain Management Advisory Committee (BBIFMAC), James Cook University, Department of Agriculture and Fisheries, North Queensland Dry Tropics, Wilmar and growers. In-kind from Sunwater.	Reduce energy costs, improve water costs and irrigation efficiencies. Measure water quality benefits. Modernisation of farming systems e.g. smart farming technology. Improve productivity/ profitability which has a direct effect on environmental outcomes.	All BIP demonstration sites have been successfully harvested and preliminary results look very good. All sites have had all sensors and infrastructure put back in place to capture irrigations in the ratoon crop. Growth measurements will commence this week. XXXX project demonstration sites have recently been installed. N drip installed as a comparison to furrow irrigation on a highly permeable soil in plant cane in Home Hill. Automation of irrigation on a legume crop comparing application volumes applied and scheduling. Yield and quality will be assessed.
Reducing herbicide usage on farm with precise weed control	Autoweed, James Cook Univeristy, Queensland Department of Agriculture and Fisheries.	Reduce herbicide use by comparing efficacy of weed control and evaluate economic savings.	Spray trial 8 and 9 target paddock was a late ratoon with dense infestation of nutgrass, grass and broadleaf weeds. The paddock was sprayed with SRA's four-row trailed boom sprayer using Irvin legs. Sempra was sprayed on the 06-11-23 and a pre-emergent trial was sprayed on the 08-11-23 in the same paddock. Only 14% of the sprayed area was nutgrass, whilst grass and vines were as high as 80%. For the spray trial, two treatments (spot and blanket), 8 rows in each treatment replicated twice. WQ measurements were taken on the 10-11-23 with SRA weed researcher Emilie Fillols running the trial.
Burdekin phosphorous response trial	Wilmar and Burdekin Productivity Services.	Investigate phosphorous management for sugarcane crops growing in alkaline soils.	Site 1 has been successfully harvested and the first ratoon fertilised. 3-month bio massing will commence in the coming weeks. Unfortunately, site 2 was adversely impacted by unseasonal rainfall and severe waterlogging immediately after planting. Poor germination has made the continuation of the experiment uncertain. Additional field experiments will be established in 2024.
Mill mud/ash trials in outer regions of the district	Queensland Department of Agriculture and Fisheries	Measuring economic impact of applying low rates of mill mud/ash.	Trial plan developed, growers engaged, and mill mud ash pads established. No mud has been applied due to the unavailability of spreading equipment.
Central District Manager Dylan Wedel E: dwedel@sugarresearch.com.au M: 0490 029 387			
Increasing irrigation utilisation	Sugar Services Proserpine, Plane Creek Productivity Services Ltd, Mackay Area Productivity Services, Eton Irrigation, Greater Whitsunday Alliance Water in Agriculture Working Group and growers.	Increase utilisation of irrigation to increase profitability and productivity. Note: Seeking more growers to work with in the irrigation space.	Field walks at our demonstration sites are underway showcasing low-cost scheduling and system control tools in action. These provide interested growers with the opportunity to try the Chameleon Soil Moisture probes to access live soil moisture data on their phones. This assists growers with the adoption of low cost irrigation tools to make their irrigation systems less labour intensive e.g. remote pump starting and auto shutoff, monitoring dam levels – there is a solution to most challenges!
Supporting complementary fallow cropping	Productivity services companies and growers.	Improve productivity by breaking the monoculture and profitability with a complementary cash crop.	The SRA soybean planter has been returned to service and is available to growers to trial complementary fallow crops. Earlier this year several paddocks were successfully planted – through trash, ratoon drills and cultivated beds. Two growers who used the planter have successfully taken their crop through to grain profitably.
Improving Early CCS: Crop Ripener	Productivity services companies and growers.	Improve CCS when cane is harvested earlier in the season.	Several growers have taken advantage of crop ripeners this season with positive responses. Local growers are encouraged to contact SRA if they would like us to assess paddocks for the application of crop ripener to improve CCS. Samples from paddocks are collected and processed with the mobile maturity trailer to determine crop moisture to aid in decision making.
Southern District Manager Lisa E: Devereaux ldevereaux@sugarresearch.com.au M: 0456 590 497			
Bundaberg/Wide Bay	Bundaberg Sugar Services, Isis Productivity Ltd, CANEGROWERS Maryborough	Identification of unrealised industry constraints.	Bundaberg and Maryborough Soil Data reports analysed. Discussion points for further work plan to be addressed early 2024. Soil and leaf survey samples waiting results. Soldier Fly project (2022/004) project commenced. Document brief and communication plan shared with industry. The pilot Bundaberg Researcher in Residence program with Dr Seona Casonato is scheduled for November. Submitted tender application for QDES Sugarcane Practise Change program for the Burnett Mary River region with IPL and Maryborough.
Rocky Point Pest and Disease Management Surveys	CANEGROWERS Rocky Point	To deliver district-based activities that improve productivity, profitability and sustainability outcomes for the Rocky Point district.	The Service Agreement was renewed between Rocky Point and SRA for a further 2 years to support collaborative projects that will assist the productivity of the local industry. A 2024 Strategic planning day was completed on review of the previous 12 months and direction for the following year. New projects considered include an observation trial of mineral mulch; updated pest management plan with linkages with university collaboration and research input and the irradiation of fire ants when harvesting. Waiting results from the nematode project sampling.
NSW multi-year productivity program	NSW Agricultural Services NSW Sunshine Sugar	Improved profitability and productivity through various projects including harvesting 2yr cane to 1yr cane.	The Service Agreement was renewed between NSW and SRA for a further 2 years to support collaborative projects that will assist the productivity of the industry. Project commenced August 2023. The initial phase is to understand the criteria, trends and drivers suited for growing 1 year old cane in the Harwood and Broadwater areas.
Six Easy Steps Online Sugarcane Nutrient Management Program	Department of Environment and Science, CANEGROWERS	Enable all Australian sugarcane growers to access nutrient management training that will improve the efficiency and productivity of their farms if applied.	The program receives new registrations weekly through wider promotional activities. Participants who finish the program receive a certificate of completion.

RESEARCH PROJECT INVESTMENTS

PROJECT IDENTIFIER	TITLE	CHIEF INVESTIGATOR	RESEARCH AGENCY	END DATE
Research Mission 1: Profitable and Productive				
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	The University of Queensland	1/10/2023
2020/003	Maximising cane recovery through the development of a harvesting decision-support tool	Phil-Anthony Patane	Sugar Research Australia	1/12/2023
2022/012	Use of machine learning to determine the extraneous matter and billet length in cane consignments	Geoff Kent	Queensland University of Technology	1/02/2027
2022/014	Australian Sugar Industry – Development of factory training modules – Phase 3	Bruce King	Sugar Research Institute	1/03/2027
2022/201	Feasibility study of using mill waste streams by a 5 ha micro-algae facility for supplemental income	Craig Wood	Isis Central Sugar Mill Co Ltd	6/10/2023
2022/202	Optimising milling train extraction through added water control using online NIR cane and bagasse data	John Edwards	Tully Sugar Limited	1/06/2023
2023/201	Bagasse fly ash system performance benchmarking	Jonathon Gilberd	Wilmar Sugar Australia Limited	30/06/2024
2023/202	Evaluating the suitability of measuring massecuite dry substance for control on Australian pan stages	Bryan Lavarack	Mackay Sugar Limited	1/07/2024
2023/203	Billet Quality Assessment	Barton Wixted	Grifith University	30/06/2024
Research Mission 2: Resilient and Enduring				
2018/010	Moth borers - how are we going to manage them when they arrive?	Kevin Powell	Sugar Research Australia	1/06/2025
2020/002	Developing an integrated device for on-farm detection of sugarcane diseases	Muhammad Shiddiky	Griffith University	21/03/2024
2020/004	Beyond Imidacloprid - Chemical and Biorational Alternatives for Managing Canegrubs	Kevin Powell	Sugar Research Australia	31/01/2024
2020/007	Environmental DNA Technologies and Predictive Modelling for Rapid Detection and Identification of Sugarcane Priority Pests and Diseases	Andrew Weeks	EnviroDNA Pty Ltd.	1/06/2024
2020/008	Transformational crop protection – Innovative RNAi biopesticides for management of sugarcane root feeding pests	Neena Mitter	The University of Queensland	30/06/2024
2022/002	Updating the Sugarcane Industry Biosecurity Plan	Stuart Kearns	Plant Health Australia	1/06/2027
2022/003	Fiji Leaf Gall (FLG) Eradication Strategy: Peri-urban surveillance for area freedom	Rob Magarey	Sugar Research Australia	1/12/2023
2022/004	Soldier fly diagnostics, distribution, and development of an artificial diet	Kevin Powell	Sugar Research Australia	1/05/2025
2022/005	Assess weed impact/distribution for prioritisation	Emilie Fillols	Sugar Research Australia	30/06/2024
2022/006	Development of a resistance screening method for chlorotic streak	Chuong Ngo	Sugar Research Australia	1/06/2026
2022/007	Delivery of a pest and disease diagnostic step change for the sugarcane industry (RSD - NIR)	Rob Magarey and Steve Staunton	Sugar Research Australia	1/12/2025
2022/015	Delivery of a pest and disease diagnostic step change for the sugarcane industry (RSD-LAMP)	Jimmy Botella	The University of Queensland	1/05/2026
2022/016	Viruses to aid biological control of major root-feeding pests of sugarcane	Michael Furlong & Kayvan Etebari	The University of Queensland	1/08/2027
2022/901	Agri-climate outlooks	Danielle Skocaj	Agricultural Innovation Australia Limited	30/12/2024
Research Mission 3: Diversified and Adaptable				
2022/018	Building industry engagement capability for a diversified and adaptable Australian sugarcane industry	Madeline Smith	Queensland University of Technology	30/06/2024

PROJECT IDENTIFIER	TITLE	CHIEF INVESTIGATOR	RESEARCH AGENCY	END DATE
Research Mission 4: Sustainable and Efficient				
2020/802	Mackay Whitsunday Cane to Creek	Simon Clarke	Sugar Research Australia	31/10/2023
2020/804	Reducing herbicide usage on sugarcane farms in reef catchment areas with precise robotic weed control	Emilie Fillols	Sugar Research Australia	30/06/2024
2020/805	Increasing Industry Productivity and Profitability Through Transformational, Whole of Systems Sugarcane Approaches that Deliver Water Quality Benefits	Simon Clarke	Sugar Research Australia	30/06/2024
2021/008	Develop a Sustainability Framework for Australian Sugarcane and Sustainability Report in collaboration with stakeholders	Ingrid Roth	Roth Rural Pty Ltd	1/11/2024
2021/804	Mobilising the Murray	Simon Clarke	Sugar Research Australia	31/12/2023
2021/805	Soil specific management for sugarcane production in the Wet Tropics	Danielle Skocaj	Sugar Research Australia	23/04/2024
2021/806	DES122685 Sugarcane Nutrient Management Training	Lisa Devereaux	Sugar Research Australia	30/06/2023
2022/010	Industry wide leaf and soil survey to detect hidden macro and micronutrient constraints	Barry Salter	Sugar Research Australia	31/03/2024
2022/011	Understanding phosphorous requirements for sugarcane crops growing in alkaline soils	Danielle Skocaj	Sugar Research Australia	30/06/2027
2022/801	XXXX Lower Burdekin Smart Irrigation Project	Simon Clarke	Sugar Research Australia	1/05/2025
2022/802	Lower Burdekin Cane Major Grants Project	Simon Clarke	Sugar Research Australia	1/05/2024
Research Mission 5: Resourced and Skilled				
2018/015	Sugar Milling R & D Capability Building Program	Geoff Kent	Queensland University of Technology	30/09/2023
2019/102	PhD Scholarship - Genetic solutions for determining fibre quality traits in sugarcane	Angela O'Keeffe	The University of Queensland	31/03/2024
2019/806	Advancing techniques for diagnosis of yellow canopy syndrome	Kevin Powell	Sugar Research Australia	25/06/2023
2021/101	PhD Scholarship - Optimising mill mud and ash applications for soil improvement and carbon sequestration	Hannah Green	James Cook University	30/04/2025
2021/102	PhD Scholarship - Systems biology for sustainable agriculture: evaluation of plant growth-promoting bacteria to produce high-performing biofertilisers	Ian Petersen	The University of Queensland	30/04/2025
2021/401	Research Award - Risk assessment for the newly discovered parasitic nematode *Pratylenchus parazeae* in the Australian sugarcane industry	Shamsul Bhuiyan	Sugar Research Australia	1/04/2024
2022/101	PhD Scholarship - A novel biosensor device for on-farm sugarcane disease diagnosis	Simon Strachan	Griffith University	29/02/2024
2022/401	Research Award - Harnessing the SynBio potential of Australia's stingless bees, the first step.	Natasha Hungerford	The University of Queensland	31/03/2024
2022/402	Research Award - Genomic prediction of ratoon yield robustness	Eric Dinglasan	The University of Queensland	14/05/2024

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Sugar Research Australia Limited

ABN 16 163 670 068

Brisbane Office Level 10, 300 Queen St, Brisbane QLD 4000 Australia

Postal Address GPO Box 133, Brisbane Qld 4001

T 07 3331 3333

E sra@sugarresearch.com.au

sugarresearch.com.au