

sra

Sugar Research  
Australia

OUR BIENNIAL  
MILLING MAGAZINE

# MILLING MATTERS

*Winter 2021*



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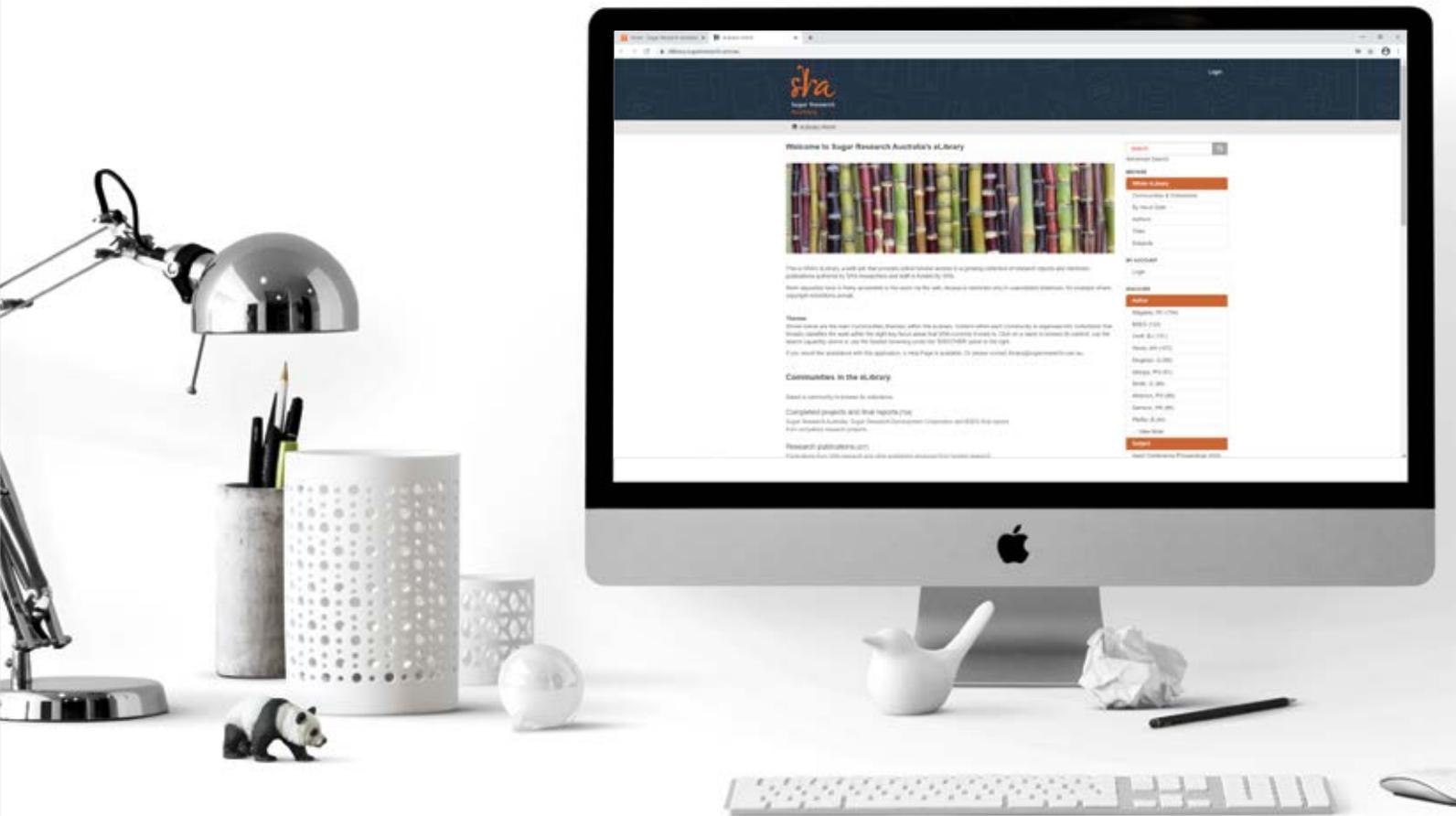
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*(Cover page) Sugar crystals by SRA's Dr Stephen Mudge, Research Missions and Strategy.*

*Design: Yolanda Van Wijk, SRA.*





# MILLING RESEARCH INFORMATION AT YOUR FINGERTIPS

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

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

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

## WHAT IS IN THE ELIBRARY

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

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

## HOW TO USE IT

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

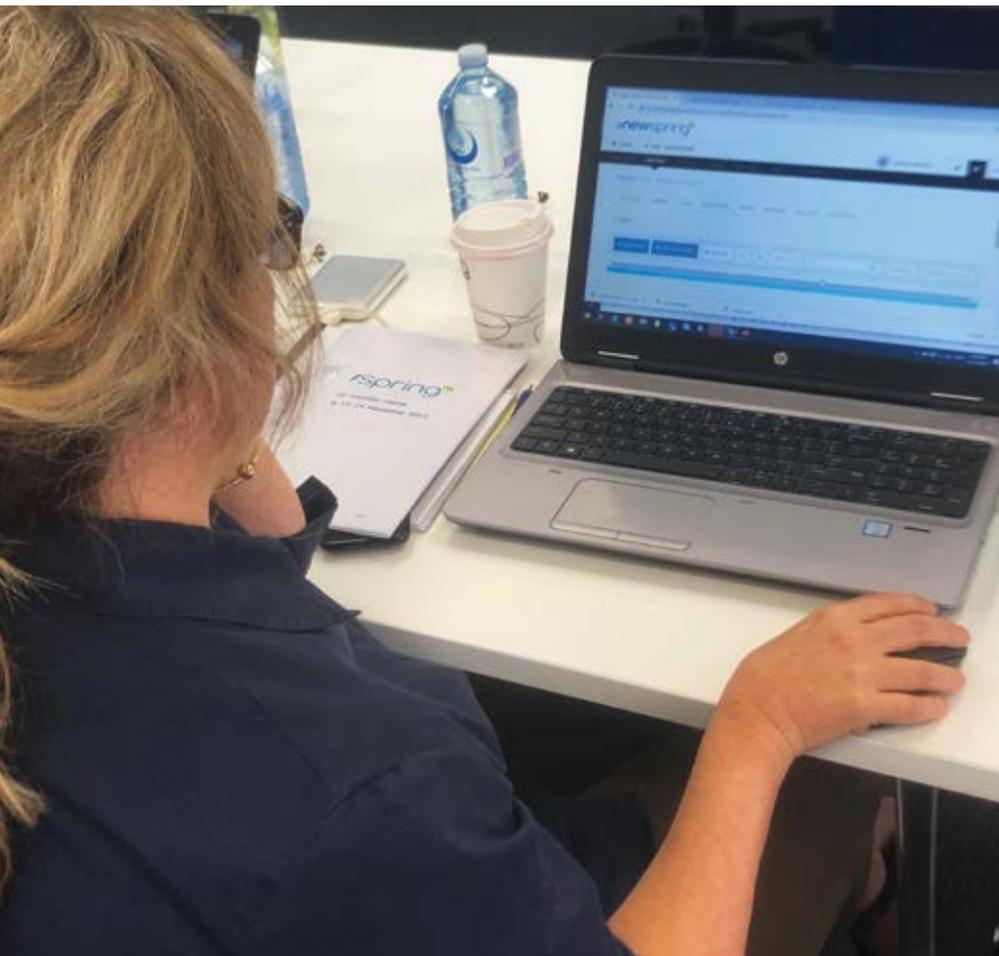
Using the search function, you can enter a key word or words and get a one page summary and, then, if you want further

information, another click will give you a complete report.

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

## QUESTIONS AND COMMENTS

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



**T**he Australian Sugar Industry Training Learning Management System (ASIT LMS) is now available for use by all individuals within the Australian sugar industry. The ASIT LMS provides a training platform for all sugar industry based courses. Courses have currently been developed for specific training needs of factory-based positions, with structured training programs for the agricultural and harvesting sectors planned.

#### TRAINING COURSES CURRENTLY AVAILABLE WITHIN THE ASIT LMS

##### Training courses that contain the reference material from previous paper-based courses

Introduction to sugar factory processing

Fugalling and sugar drying

Clarification and mud filtration

Juice heating and evaporation

Pan boiling

Extraction

Steam and power generation

##### Training courses mapped to the national competencies

High grade fugals and sugar drying

Low grade fugals

Cooling crystallisers

Traffic officer training

Juice clarification

Mud filtration (Release date May 2021)

Evaporation (Release date May 2021)

Evaporator cleaning (Release date May 2021)

Crystallisation (Release date May 2022)

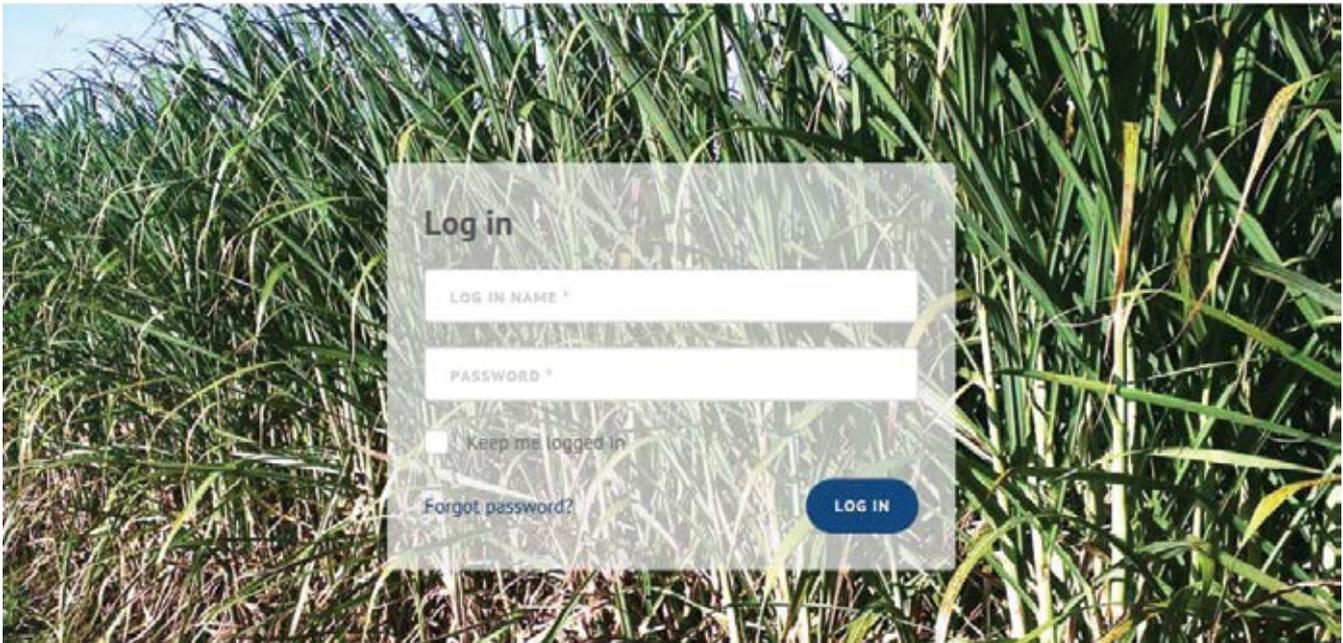
##### Video-based training courses

SRI Videos

# ONLINE SYSTEM OFFERS NEW OPTIONS FOR SUGAR INDUSTRY TRAINING

*(Above)* Mill staff at training in how to develop modules for the LMS.

*(Top right)* The login screen of the LMS, available for the Australian sugar industry.



## HOW THE TRAINING MATERIALS MAY BE USED

The training courses that are mapped to the national competencies are specific courses that can be used to train staff and assess them against a minimum knowledge standard.

The courses can be used to assess a potential employee's suitability for a new role, prior to interview or to substantiate their employment suitability in that role from a knowledge perspective. Experienced operators can go directly to the assessment, if they feel that they have the knowledge base to satisfactorily complete the safety and content assessment questions.

This project was led by QUT's David Moller, in partnership with Bruce King from the Sugar Research Institute.

Mr Moller said that the system had a range of uses and advantages.

"Ensuring that all operators have satisfied an industry level assessment before the start of each season may develop evidence to assist in reducing insurance premiums and maintaining safety and operational knowledge," he explained. "We also see the potential for the system to evolve and expand over time, moving into new areas of training, creating new

options for expanding the skills and knowledge of the people within the sugar industry."

## OTHER USES OF THE SYSTEM

The ASIT LMS allows each company to develop their own training courses within the system. Their training courses can only be accessed by people within that company (each company has been provided with a separate unique sub-environment on the LMS platform).

Mr Moller said that some companies were using the LMS for online training such as; staff inductions, contractor inductions, safe use of oxy-acetylene equipment, safe working at heights and fire safety knowledge training.

"As the ASIT LMS provides an auditable assessment system, with all answers from each individual stored, companies are able to mentor, monitor and provide constructive feedback to users of courses," he said.

## OTHER EXAMPLES OF HOW THE MATERIALS MAY BE USED

### *Toobox talks (SRI Videos)*

The Sugar Research Institute (SRI) videos are about five to eight minutes long and each explain an aspect of sugar milling operations.

These videos may be useful in starting discussions for toolbox talks. An appropriate video may be selected as a follow-up to recent incidents or issues faced by the team. Each video highlights terminology, processes and safety within a particular part of the process stream of raw sugar production.

### *Reference materials (SOTrain and TOTrain)*

These reference documents are word searchable and give detail to many of the processes in the production of raw sugar. They are aimed at a higher level of understanding and incorporate the chemistry, physics and mathematics that are applied to gaining the correct balance in optimising production.

## ACCESS TO THE LEARNING MANAGEMENT SYSTEM

The human resources and training departments at each company have been shown how to add users to the new system and assign them access to the required course/s. ■

**If assistance is required, please contact: David Moller at QUT via [david.moller@qut.edu.au](mailto:david.moller@qut.edu.au) or Bruce King at SRI via [b.king@sri.org.au](mailto:b.king@sri.org.au).**

# A NEW STRATEGY FOR SRA – DELIVERING GREATER VALUE AND SERVICES FOR YOU

BY ROSLYN BAKER, CHIEF EXECUTIVE OFFICER, SRA

**Throughout 2020, SRA worked broadly with the Australian sugarcane industry to co-create a new strategy for your industry-owned research company.**

This strategy development occurred at a critical time for SRA and the industry. In recent years, our industry has continued to face a tough external environment and reached a tipping point where we must innovate to ensure that we remain a centrepiece of economic activity in Queensland and northern NSW.

SRA has reached a tipping point, too. Almost eight years since our creation, the time has come to revitalise our services, lift our engagement with industry and partners, and bring greater focus to our research investment so that we offer more value to you as growers and millers.

At the same time, the world around us is rapidly changing and this change creates opportunity for our industry.

We are already renowned for our ability to efficiently grow one of the highest biomass crops in the world and for being an early adopter of innovative technology. As the next wave of changes take place around the green economy and circular economy, we have developed a new

strategy for SRA to capture the abundance of opportunities available to our industry.

Likewise, we are also focussed on continuing to assist with the immediate productivity issues that the industry faces today.

All of these factors – along with valuable feedback and guidance from industry – has led to the creation of a new vision for SRA.

## OUR VISION

**A trusted partner, shaping the future prosperity of the Australian sugarcane industry and regional communities through innovation and ingenuity.**

You can read a one-page summary of the SRA strategy on the opposite page, including detail about our strategic pillars and our new mission-based program of research.

Many of the core components of SRA will become even stronger under our new strategy. For example, we are maintaining our focus on plant breeding and biosecurity, while also continuing to implement innovations and new technology in these areas.

We have specific plans to restore the overall financial balance of SRA in a way that allows us to rebuild the research investment portfolio.

Further to that, will be strengthening SRA's approach to commercialisation and innovation, and we are also making a dedicated investment in regional engagement and productivity improvement through a new business unit called Industry Services.

Throughout 2021, we will be busy implementing this exciting new strategy for SRA, including the organisational structure and business model to support this strategy.

As we rapidly transition into our new strategy this year, I look forward to sharing more detail on our regional structure and approach in the next edition Milling Matters. ■

*(Below) Meeting with growers and millers during the SRA strategy roadshow in December 2020.*



## OUR VISION

A trusted partner, shaping the future prosperity of the Australian sugarcane industry and regional communities through innovation and ingenuity.

## OUR RESEARCH MISSIONS

- 1 Continuous improvement in farming and milling profitability.
- 2 Position the industry to stay ahead of climate, environmental and biosecurity threats.
- 3 Capitalise on changing consumer preferences, and the growing bio and green economies to develop product diversification opportunities.
- 4 Position the Australian sugarcane industry as leaders in profitability, environmental sustainability and resource-use efficiency.
- 5 Support the development of an adaptable, professional, commercial and entrepreneurial industry and research community.

## OUR PURPOSE

We keep the Australian sugarcane industry competitive, productive and sustainable through innovative research and product development.

**STRATEGIC PILLAR 1**  
*Strong foundations* **Evolve SRA** to keep pace with the changing industry landscape by developing a capable, engaged, and safe workforce, and a lean, agile and entrepreneurial organisation with an agile and efficient cost-base.

**STRATEGIC PILLAR 2**  
*A high-performing research portfolio* **Collaborate widely** across industry, research disciplines and agricultural, industrial, and technological sectors to target research, development and extension programs and partnerships that positively impact industry's most important opportunities and challenges.

**STRATEGIC PILLAR 3**  
*Translation expertise* **Translate** research findings into tools, products and services that save industry time and money, and improve environmental performance.

**STRATEGIC PILLAR 4**  
*World-class sugarcane varieties* **Accelerate innovation in variety development** to offer varieties that consistently underpin the success of the industry's current and future product objectives, crop production and protection while lowering development costs and shortening cycle-times.

**STRATEGIC PILLAR 5**  
*Commercial benefits and rewards* **Take our research work and investments to the next level** by securing investors and funding and extracting commercial value from our intellectual property, research capability, facilities and strategic partnerships.

## HOW WE OPERATE



We actively engage with industry.



We constantly seek opportunities to innovate and improve.



We take a long-term view.



We create opportunities for collaboration.



We act ethically and responsibly.

Proposed strategy (for submission to the Commonwealth govt).

# SMALL PROJECTS DELIVER VALUABLE INDUSTRY KNOWLEDGE

**T**he Small Milling Research Project (SMRP) investment scheme is an initiative to invest in lower cost, short-term, industry-identified and preferably industry-led research projects to develop a product, service or process that will solve targeted problems in sugar mills and deliver tangible outputs with almost immediate outcomes.

Three SMRP projects have completed and submitted final reports since the last edition of Milling Matters. These projects are:

**PROJECT NAME:** EVALUATE THE PERFORMANCE OF THE FALLING FILM TUBE EVAPORATOR AT BINGERA MILL

**MILLING COMPANY:** BUNDABERG SUGAR

**RESEARCH AGENCY PARTNER:** QUT

#### SUMMARY OF FINDINGS AND OUTCOMES:

For the 2018 season Bundaberg Sugar installed a 4000m<sup>2</sup> falling film tube evaporator (FFTE) of the BMA design at No 1 evaporator position at Bingera Mill. This was the first installation of a FFTE into the Australian industry. An evaluation program was undertaken during the 2019 season to assess the performance with respect to heat transfer efficiency, effect of scaling rates on heat transfer, de-entrainment efficiency of the juice droplets from the vapour outflow stream and the general operational performance. As well tracer studies were undertaken to determine the distribution of residence times for juice in the evaporator. Measurements were also undertaken to determine the extent of sucrose degradation occurring within the evaporator. Overall the evaporator performed well with respect to the above list of test parameters. However, the effect of scaling on heat transfer efficiency was only able to be evaluated for typically 120 hours of operation as the mill was restricted to five-day crushing operations each week due to the small drought-affected crop. A chemical clean of the evaporator was undertaken on shutdown each week.

During the two seasons of operation the FFTE at Bingera Mill has performed very well. The evaluation trials have shown the heat transfer performance is comparable to the better performing Robert No 1 evaporators in the industry, and also the test program has not shown any major disadvantages of the FFTE compared with a Robert evaporator.

The main outcome of this project has been to provide the mill production staff and project engineers with the information to assess the suitability of a FFTE for their factory's circumstances when they need to install a new evaporator.



**PROJECT NAME:** EVALUATE THE SUITABILITY OF THE FIXED ELEMENT CRYSTALLISER FOR WIDESPREAD ADOPTION IN AUSTRALIAN SUGAR FACTORIES

**MILLING COMPANY:** SUNSHINE SUGAR

**RESEARCH AGENCY PARTNER:** QUT

#### SUMMARY OF FINDINGS AND OUTCOMES:

The fixed-element design of a horizontal cooling crystalliser is relatively new to the Australian industry and the installation at Broadwater Mill for the 2017 season proved to be an economical solution to refurbish the mill's first unit in a continuous-flow station of three crystallisers.

The crystalliser consists of 12 fixed cooling elements and 14 rotating paddles. A variable-speed drive was installed to allow a rotational speed of the paddles up to 1.45 r/min, depending on the massecuite viscosity and imposed torque. Apart from fabrication of the fixed elements, the mill's staff undertook the complete installation. During the 2019 season, trials were undertaken which demonstrated good overall



Final reports from these projects have been published in the SRA elibrary: [elibrary.sugarresearch.com.au/](http://elibrary.sugarresearch.com.au/)

performance with respect to heat transfer, residence time distribution and molasses exhaustion.

The good performance is attributed to the paddles providing strong flow of massecuite transversely and also longitudinally to generate flow across the cooling surface.

Torque control of the variable speed drive is recommended as this allows rotation of the paddles at maximum speed for the prevailing viscosity of the massecuite, while limiting the stresses on the drive components.

The fixed-element design proved to be an economical solution for Broadwater Mill to refurbish their No 1 crystalliser. The design is well suited for new crystallisers and to replace the internals of horizontal crystallisers at all positions within the crystalliser station.

The main outcome of this project is the provision of a design of internals for horizontal cooling crystallisers which, relative to the conventional coil design, provides superior performance (with respect to heat transfer, exhaustion and flow profile through the crystalliser), is cheaper to install and provides several practical advantages. The design is suitable for new crystallisers or

refurbishing defunct crystallisers. The application of the design provides increased sugar production and less cost in manufacture, resulting in increased profitability. The fixed element design is suitable for continuous flow or batch crystallisers.

**PROJECT NAME: REDUCING IN SURGING IN SHREDDERS**

**MILLING COMPANY: MSF SUGAR**

**RESEARCH AGENCY PARTNER: QUT**

**SUMMARY OF FINDINGS AND OUTCOMES:**

Cane shredders and the level of cane preparation achieved by them play a significant role in the performance of every mill's extraction train.

Feeder rolls are currently installed in half of the Australian sugar mills. However, there are several challenges with operating feeder rolls, including inconsistency in feeding rate.

A specific problem has been occurring at Tableland Mill where the cane shredder experiences surging.

The major consequence of surging is lower cane preparation because, to

prevent stalling, the shredder grid setting is increased. This issue is particularly of concern in shredders driven by electric motors, since electric motors have less inertia to overcome increases in torque due to surging and the peaks in torque have a greater impact on motor life than they do on turbine life.

The project constructed a 1:3.4 scale model of Tableland's shredder feed rolls. This model was used to explore the effect of feeder roll geometry, setting and speed and their relationship to sugarcane billet size.

The experiment found that higher rates were obtained with teeth spaced further apart, a larger setting and smaller billets. The conditions found to reduce surging were smaller setting, lower speed and longer billets.

The results have been used to propose design guidelines for shredder feeder rolls that aim to reduce surging and also give consideration to feeder roll capacity and feeder roll power consumption. Tableland will be using these guidelines to address their surging problem. ■



*(Left) Four new SMRP projects commenced in 2020.*

## NEW SMRP PROJECTS ON THE GO

**A**s mentioned on the previous page, the Small Milling Research Project (SMRP) investment scheme is an initiative to invest in lower cost, short-term, industry-identified and preferably industry-led research projects to develop a product, service or process that will solve targeted problems in sugar mills and deliver tangible outputs with almost immediate outcomes. 2021 projects will be announced soon. Since the last edition of Milling Matters, four new SMRP projects commenced in 2020. These projects are:

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**PROJECT NAME:** INVESTIGATING THE CORROSIVITY OF EVAPORATOR CONDENSATES AND THE CONTRIBUTING FACTORS

**MILLING COMPANY:** ISIS CENTRAL SUGAR MILL

**RESEARCH AGENCY PARTNER:** QUT

**PROJECT SUMMARY:**

In recent years some Australian factories have experienced high corrosion rates in condensates at the tail end of the evaporator set, requiring premature replacement of pipework and valves. Of greater concern is whether the evaporator tube plates are also being corroded at accelerated rates. The asset value (replacement cost) of evaporators in Australian mills is estimated at \$500m and premature failure of tube plates would be a crippling cost to the industry.

Two recent projects (SRA 2015/043 and SRA 2017/007) have determined that when factories operate steam efficient evaporators sets, condensate pH reduces significantly late in the set ( $\text{pH} < 5$ ). One cause is the exacerbated degradation of monosaccharides to acids under steam-efficient operations. The studies to date indicate processing conditions including the presence of scale on the tubes, and composition of impurities in the cane affect the pH.

This project will measure average and instantaneous corrosion rates, using coupons and sensors respectively, in final condensates at four factories. The latter measurement will indicate the level of corrosion rate variability for correlation to the concurrent processing conditions. The results will define the magnitude of the problem, identify the initiating circumstances and enable identifying alternative construction materials and processing solutions.

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**PROJECT NAME:** IMPROVING PAN STAGE PERFORMANCE BY ONLINE MONITORING OF C SEED GRAININGS USING THE ITECA CRYSTOBSERVER

**MILLING COMPANY:** SUNSHINE SUGAR

**RESEARCH AGENCY PARTNER:** QUT

**PROJECT SUMMARY:**

Pan stage crystallisation is largely undertaken without direct control of the main process parameters. For example, there is no supersaturation measurement and no crystal sizing on-line system. Indirect measures such as conductivity and ad hoc checking of proof samples under a microscope are currently used. Tighter control of the pan stage operations would provide benefits in sugar recovery, sugar quality, pan stage throughput, steam and water consumptions.

One of the critical steps of the pan stage is the C seed graining to produce the foundation crystals for the stage, from slurry. This project investigates the use of the ITECA Crystobserver to monitor the crystal development in the C seed pan.

The Crystobserver provides online measurement of crystal numbers, mean aperture and coefficient of variation with the capability to measure crystals as small as five microns. The key parameters provided for production staff are (1) the delay time from slurry injection until the crystals reach a certain size e.g. 20 microns (2) the number of crystals in the field of view and (3) crystal growth rates from say 20 microns to 50 microns.

Improved consistency and quality of the C seed will improve the operations and performance of the whole stage.

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**PROJECT NAME:** EVALUATING THE SUITABILITY OF TWO MUD LEVEL SENSING TECHNOLOGIES FOR JUICE CLARIFIERS

**MILLING COMPANY:** WILMAR SUGAR

**RESEARCH AGENCY PARTNER:** QUT

**PROJECT SUMMARY:**

Clarifier mud level measurement remains a challenge to the Australian sugar industry.

Currently there is no accepted method to measure the mud/juice interface in clarifiers and the operator must visually (and hopefully regularly) check the position of the interface through the sight glass windows and make adjustments such as alter the mud filtration rates to keep the interface at a 'safe' operating position.

Unwanted excursions where the interface is too high causes carry-over of mud particles into the clarified juice (with subsequent impact on evaporation and crystallisation).

If the interface is too low then rat-holing of juice to mud occurs (impacting mud filtration and increasing filtrate recycle).

Sugar mill juice clarifiers present a harsh environment for in-situ interface monitoring owing to the high temperature (100°C) and rotating stirrer equipment inside the vessel.

Instrument suppliers now claim to have overcome these in-situ challenges. The project will evaluate the upgraded in-situ transducer and an externally mounted system using point monitoring of the interface through the sight glasses.

Substantial processing benefits would be achieved if more reliable and consistent control of the mud/juice interface was employed by mills. These benefits would only be achieved with suitable online measurement.

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**PROJECT NAME:** INCREASED SUGAR RECOVERY THROUGH IMPROVED MILL SANITATION AND BIOCIDES APPLICATION

**MILLING COMPANY:** BUNDABERG SUGAR

**RESEARCH AGENCY PARTNER:** QUT

**PROJECT SUMMARY:**

Undetermined sucrose loss during the processing of sugarcane to sugar is estimated between 1-2%, being a large financial loss to the industry.

There is apparent loss (for example, analytical errors) and real loss due to physical, microbial, chemical and enzymatic processes.

Microbial infection of sugarcane juice results from the microorganisms that enter the mill with the cane supply, and those from the factory recovery stream and the filtrate. The growth and accumulation of these microorganisms lead not only to sucrose loss, but the formation of increasing proportions of non-sucrose impurities which affect crystallisation rates and sucrose yield.

Effective cleaning and sanitation procedures are needed to reduce microbial degradation in a factory. In Australian sugar mills, the hygiene practices vary from mill to mill. Conducting an audit to identify the habitat of the microorganisms and assess the cleaning practices will provide the preferred corrective actions for sugar mills.

Biocides are used in many overseas sugar factories but are not routinely used in Australian mills. The effectiveness of biocides will be assessed in laboratory trials and in two Australian factories. ■



# Q240<sup>®</sup> continues to rise in popularity

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

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

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

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

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

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

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

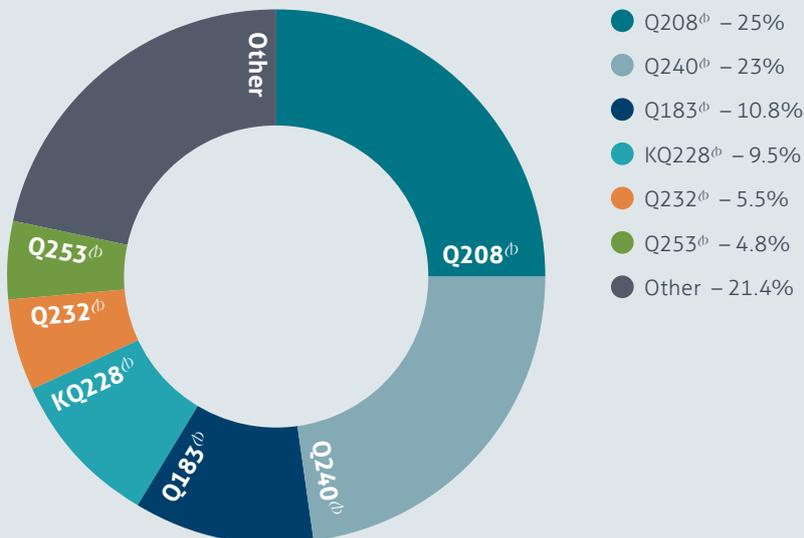
In the Northern region, Q200<sup>®</sup> (14.6%) was the next most widely grown variety after Q208<sup>®</sup>, and Q253<sup>®</sup> (10%) moved into third place with an increase of 4.3% from 2019.

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

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

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

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



# LIFE CYCLE ANALYSIS PROJECT NOW UNDER WAY

PROJECT CODE: 2020/001

END DATE: 01/03/2023

R&D PROVIDER: Integrity Ag and Environment Pty Ltd

WORKING GROUP: SRA, DAF, CANEGROWERS, ASMC, ACFA

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

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

**Stage 1: Environmental Risk Assessment of the sugarcane value chain**

**Stage 2: Life Cycle Assessment (LCA) of the Raw Sugar Manufacturing (cradle to processor gate)**

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

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

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

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

The findings of the assessment will be used by SRA to consult with industry and inform efforts to minimise environmental impacts and exploit opportunities for improving resource use efficiency, support diversification, influence policy and improve social licence to operate as well providing data useful in supporting government trade negotiations in markets such as the EU. The LCA outcomes will also be crucial in the development of an Australian Sugarcane Sustainability Framework. ■



# SPINNING STRAW INTO GOLD: THE TRANSFORMATION OF BAGASSE INTO NEW FEED INGREDIENTS FOR LIVESTOCK

**R**esearchers from Queensland University of Technology (QUT) have developed technologies to transform bagasse into livestock feed. These technologies have recently been tested through animal feeding trials, which have demonstrated that livestock will eat feed containing bagasse-based ingredients and that those ingredients are safe.

Bagasse is the fibrous residue remaining after sugarcane is milled to extract sucrose and is normally burned as fuel to generate steam in sugar mills.

However, a number of mills had surplus bagasse last season, which has renewed interest from the industry in alternative uses for bagasse. Bagasse is a large-scale, reliable, and regional source of plant fibre, and is therefore a very attractive potential feedstock to turn into livestock feed.

The Biorefineries for Profit – Phase 2 project was initiated in 2019 in response to strong interest from the sugar industry in product diversification opportunities for sugarcane growers and millers and the livestock sector in alternative sources of livestock feed ingredients.

The aims of the project are to demonstrate pilot scale production of livestock feed ingredients from bagasse and test their performance in livestock feeding trials.

Unprocessed bagasse has relatively low functional and nutritional value in the diet of livestock. The QUT team, led by Associate Professor Mark Harrison, has scaled-up production of bagasse-derived livestock feed ingredients from the laboratory to pilot-scale at the QUT Mackay Renewable Biocommodities Pilot Plant.

The QUT team has made enough of the feed ingredients to test their palatability, safety, and efficacy in chicken and pig feeding trials, and the results are promising. Chicken and pig feeding trials were undertaken first because functional feed ingredients are a relatively high-value diversification opportunity. Additional pig feeding trials are planned for later this year and there is strong interest from the red meat sector in expanding production capacity even further to enable sheep and cattle feeding trials. ■

The Biorefineries for Profit – Phase 2 project is supported by Sugar Research Australia through funding from the Australian Government Department of Agriculture, Water and the Environment as part of its Rural R&D for Profit program.



## MILLING AND PRODUCT DIVERSIFICATION RESEARCH PROJECT INVESTMENTS

Reducing boiler maintenance costs and deferring capital expenditure through improved technology	2016/020	QUT	Floren Plaza	01/06/2021
Investigations to mitigate the effects of juice degradation in factory evaporators on sugar recovery and quality, corrosion and effluent organic loading	2017/007	QUT	Darryn Rackemann	01/03/2022
Pan design and operational changes to suit Australian pan stages operating on low pressure vapour	2018/012	QUT	Ross Broadfoot	01/11/2022
Australian Sugar Industry Training – Development of factory training modules – Phase 2	2019/006	QUT	David Moller	30/06/2022
Strategies to minimise impacts of processing existing soft cane varieties, and industry cost/benefit analysis	2019/005	QUT	Floren Plaza	01/05/2021
Evaluating the suitability of two mud level sensing technologies for juice clarifiers	2020/201	Wilmar/QUT/ Bundaberg Sugar	Robert Stobie	14/05/2021
Improving pan stage performance by online monitoring of C seed grainings using the ITECA Crystobserver	2020/202	Sunshine Sugar/ QUT	Ashley Curran	01/05/2022
Increased sugar recovery through improved mill sanitation and biocide application	2020/203	Bundaberg Sugar/QUT	Anthea Fernando	30/06/2021
Investigating the corrosivity of evaporator condensates and the contributing factors	2020/204	Isis Central Sugar Mill/QUT	Phil Woods	30/06/2021
Biorefineries for Profit – Phase 2 (R&D for Profit Round 4)	2019/902	QUT	Ian O'Hara	30/03/2021





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