Sugar Research Australia

Cane Matters

Winter 2022

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ISSN 2653-4843 (Online) ISSN 2653-4835 (Print)

(Cover page) Northern Variety Officer Rhylee Pendrigh and Northern Variety Development Manager Dr Felicity Atkin at the SRA Tully Field Day. | Picture by: Helen Cook | Design: Eli Lin

WELCOME TO *Cane **Matters***

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

The weather has not been kind this year, between flooding in northern New South Wales and unseasonal rain across much of Queensland, which has caused delays to the harvest across multiple districts.

Over recent months, SRA has held a series of events, including five field days across our footprint. In this edition, you'll find coverage of the field days plus interviews with a number of our researchers who delivered presentations. Our teams have also been active at regional shows and an industry booth at the Brisbane Ekka.

Other events this quarter included the annual Women in Sugar conference, at which SRA was a sponsor. Along with our coverage of the event, we chat with three women in sugar, Maryann Salvetti, Lisa Parker and Teresa Fox, about their passion and confidence in the future of the industry.

In other developments, the first shared industry vision and roadmap has been released outlining an exciting future: ***Sugar Plus - fuelling the future of food, energy and fabrication***. The roadmap has been a collaborative effort involving industry representative organisations and extensive engagement across the industry supply chain. Read about the roadmap and the opportunities being explored for the future on pages 14 to 17. We also examine a feasibility study into green hydrogen and compostable bioplastics to understand how the economics stack up.

On the varieties front, we look at how SRA26$^{\phi}$ is performing in the Herbert for local farmer Chris Bosworth. The variety showed similar sugar yields to the popular Q208$^{\phi}$ and Q240$^{\phi}$ in field trials, with higher CCS and equivalent yield and an excellent disease resistance profile to major diseases in the district.

Social licence is increasingly important in the agricultural sector, and we explore findings on research into community trust in rural industries to understand shifts in community expectations.

It's a bumper edition - happy reading.

You can reach me at cweis@sugarresearch.com.au if you have feedback or story ideas for our next edition of *Cane **Matters***.

Cathy Weis
Head of Strategy, Insights and Engagement

BOARD VISITS FAR NORTH

The SRA Board has continued its series of regional visits, meeting at Meringa checking in with the SRA team, and undertaking an industry visit to Mourilyan.

Visiting South Johnstone, Directors heard from local growers and the mill about productivity and profitability challenges.

A local expect analysis (LEA) process is under way in the region in an effort to identify causes of yellowing crops, declining yield and CCS in the area over recent years.

After meeting with representative organisations, Directors and members of the Executive team caught up with local growers and milling representatives over a barbecue lunch, hosted by Joe Marano.

(Top) *SRA Director Peter Russo on barbecue duty with Mourilyan farmer and CANEGROWERS Innisfail Chairman Joe Marano.*
(Bottom) *Innisfail CANEGROWERS' Deb Telford with SRA Chief Executive Officer Roslyn Baker.*

FIELD DAYS MAKE THEIR RETURN TO SRA CALENDAR

In recent years, SRA field days have been absent from our events calendars. This year we were excited to be planning their revival and pleased with the outcome and attendance, as hundreds of growers and industry partners shared the days with us.

The five events, held from far north Queensland to the Burdekin between May and July, were planned as an opportunity for District Managers to share and address their district management plans and launch the annual regional variety guide giving growers direct access to SRA's expert researchers.

Visitors to the events heard from a range of presenters on topics including varieties, harvest optimisation, pests and diseases, soil health and nutrient inputs, and irrigation. They were also able to visit stalls and talk to service providers from a range of industry organisations.

The first of the field days kicked off at SRA's station in Ingham on 4 May. District Manager Herbert Phil Patane reflected on the event.

"Presentations from SRA experts and industry partners focused on addressing the current constraints cane growers face and supporting the adoption of new technologies and sound agronomic practices," Phil said. "But the opportunity to ask questions and workshop the topic at the presentations was important.

"Field tours and stalls across all the field days allowed for one-on-one follow-up discussions with presenters," Phil said.

SRA's Tully Station was host to its first field day in over a decade with a bus travelling down from Innisfail for the event and a group of students from Tully High School amongst the attendees.

Meringa's big day had to be the wettest but that didn't deter growers from as far afield as Mossman and the Atherton Tablelands attending.

"With the amount of rain forecast it was touch and go, whether we would hold the event," District Manager Far North Gavin Rodman said. "But thanks to a wet weather Plan B and resilient local service providers and SRA staff, growers were appreciative that the day went ahead."

HERBERT FIELD DAY

Growers and industry personnel gathered under blue skies, at the Victoria Plains Clean Seed Plot for Mackay Area Productivity Services (MAPS)/SRA field day on a warm and sunny afternoon in June, postponed from an earlier very wet day in May.

"A highlight of the day included a talk by SRA's Variety Development Manager Central Dr George Piperidis," District Manager Central Dylan Wedel said.

The Burdekin event was the finale of field days in this Autumn series and drew in the crowds but with notable exceptions as COVID kept key players away, including District Manager for the region Terry Granshaw.

"Terry you missed out on a really good field day," was one of many complimentary text messages Terry was happy to receive after the event.

A presentation from SRA scientist Dr Sijesh Natarajan, who spoke about the use of drones and technology to improve plant breeding outcomes, proved popular at the Burdekin event. You can read more about that in the following pages along with other highlights from SRA presenters.

Our thanks to all exhibitors, presenters, visitors and our co-hosts and sponsors for making all these field days a success.

If you're in the Bundaberg region we look forward to welcoming you to our field day in November and until then bringing more in person events and online webinars to address the issues and questions raised by growers. It's great to see old and new faces at all these events.

Keep an eye on SRA's website or subscribe to our enewsletter for information on all upcoming events.

(Top Left) *Dr Fengduo Hu spoke about and answered questions on the Herbert Region Plant Breeding Program.*

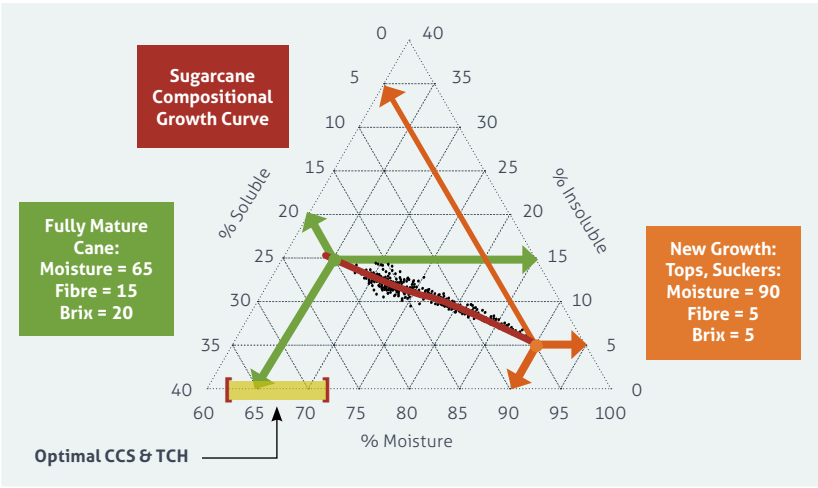
(Top Right) *A plant breeding field tour with SRA Variety Officer, Juan Briceno was a highlight of the Herbert Field Day.*

(Bottom Left) *District Manager Herbert Phil Patane and Brendon Northard from the Department of Agriculture and Fisheries demonstrated the harvesting decision support tool at the Herbert field day.*

(Bottom Right) *Luke Venables, a member of the Ingham plant breeding team, welcomed visitors to the event.*

(Left) *Steve Staunton was more than happy to get out of the office and into the shed to talk to growers about cane maturity and growth regulators on a very wet Meringa day.*

***Diagram**: How does crop composition change while growing?*



MEASURING CANE MATURITY AND MAKING INFORMED DECISIONS

SRA's Near Infra Red (NIR) Service Leader, Steve Staunton grew up on family-owned sugarcane farms in Mackay.

These days his work at SRA is mostly a desk-job, as he consults with and advises 14 Australian and five overseas sugar mills through their online NIR Cane Analysis System (CAS).

He says being involved in the field days and talking to growers about cane maturity and ternary relationships was encouraging and satisfying.

MERINGA FIELD DAY

SRA Pathology Senior Technician Laura MacGillycuddy is always ready to talk about plant diseases.

SRA Pathologist Dr Rob Magarey presented sessions on pathology and disease at each field day.

SRA Entomology Leader Dr Kevin Powell was on hand to talk with growers one-on-one and presented to a full room on 'Beyond imidacloprid and yellow canopy syndrome.'

In 2022, SRA has become a partner in the Mobilising the Murray project *funded by the Australian Government's Reef Trust. Project Agronomists Nancy Rincon and Erin Headon attended the Tully event to talk to growers about how the project can support them in identifying constraining factors on their farm.*

SRA Agronomist Julian Connellan participated in the field days to talk directly with growers about the recent findings of the 'EEF60 project.'

TULLY FIELD DAY

Through his presentation and poster delivered at the Ingham, Tully and Meringa field days Steve was able to share and explain the mathematical modelling he has developed, and answer questions from interested growers.

"The modelling we have carried out can be explained through a ternary plot graph. Ternary come from the Latin for three that makes the whole. Our graph shows the three things that make up cane as it grows; brix, fibre and water," Steve said.

"A grower put the question to me 'why does my CCS fall in a rainfall event?' With the help of the graph, and the growth curve, I was able to explain what was possibly happening. If your cane growth was limited due to water and then it rained, giving it the water it needed to grow, then it would grow. That growth would be at the beginning of the growth curve, which is high in moisture and low in sugar. If there was enough of it, that would cause your average maturity state to go backwards, which would cause a drop in CCS. And he got it.

"I was then able to explain that if this was what the grower was seeing, then one way to stop this from happening is with a growth regulator."

Steve was pleased that the feedback he received from the field days and through recent phone calls was that growers wanted this information and advice.

"Growers want to be able to make informed decisions around whether they spend money on growth regulators or not, depending on the maturity state of the crop, and that's where our work can help," Steve said.

The Meringa station shed was the perfect wet weather Plan B hang out for well attended and engaging talks.

It might have been wet but these northern growers were ready for a good day out at the Meringa Field Day.

OPTIMISING NUTRIENT INPUTS AT TIMES OF HIGH FERTILISER PRICES

Sugarcane growers who understand their soils and keep good records are in an excellent position to be able to refine their nutrient inputs for specific situations without affecting yields. This is beneficial at times of high fertiliser prices.

SRA Principal Agronomist, Dr Danielle Skocaj gave this advice in her presentation at the Ingham, Tully and Meringa field days.

"To state the obvious to anyone who has been buying fertiliser recently, the cost has gone through the roof," Danielle said.

"It is really important to optimise fertiliser inputs and ensure balanced nutrition – this year particularly, but every year – without affecting productivity."

Danielle pointed out that the SIX EASY STEPS® program was designed to advance growers' understanding of soils and crop nutrient requirements so that they could make better nutrient management decisions on their farm.

"If you have used the full SIX EASY STEPS program you will know that STEPS 1 and 2 focus on knowing and understanding

MACKAY FIELD DAY

SRA Weed Scientist Emilie Fillols attended all the SRA field days to talk with growers about the control of weed pests including balsam pear and navua sedge (read more on page 29).

District Delivery Officer Stephanie Duncan and District Manager Central Dylan Wedel chat to growers in Mackay.

The sun shone on the MAPS/ SRA Field Day in early June after it was rescheduled from a very wet week in May.

SRA Pathologist Rob Magarey and UQ Post Doctoral Research Fellow Dr Sriti Burman were on hand at the Mackay field event to show growers the prototype of a new detection method for Ratoon Stunting Disease (RSD) which may one day be able to be used directly in the paddock.

Variety Development Manager Central George Piperdis talks to growers about variety trials with MAPS CEO Anthony Schembri looking on.

the soils on your farm, identifying and managing nutrient process and losses.

"STEP 3 is about soil testing. I can't stress enough how important soil testing is. The more you can afford to do, the better, as this provides essential information for developing and fine-tuning your nutrient management program.

"STEP 4 uses the SIX EASY STEPS guidelines to determine crop nutrient requirements and alleviate soil chemical constraints, but it is STEPS 5 and 6 that I really want to emphasise.

"They are about checking on the adequacy of nutrient inputs, using your on-farm experiences and reviewing the detailed records you are already making to fine-tune fertiliser inputs for specific circumstances on your farm. In the process you may be able to save money without loss of yield.

"Technically, under the Reef Regulations, you can soil sample one block rather than all blocks of the same soil type with similar management history prior to planting.

"However, different blocks, even of the same soil type, may have different nutrient requirements. This can only be determined if each block is sampled individually. Increased soil sampling improves the identification of crop nutritional requirements and may also identify opportunities for fertiliser savings.

"For example, one block may need 20 kg/ha of phosphorous but another of the same soil type, none at all. Why pay for this phosphorous at $9.35/kg (which is the equivalent of $187/ha) if you don't need it? This saving easily covers the cost of an additional soil test and will allow you to better identify blocks requiring phosphorus and those that don't."

Danielle said following the full SIX EASY STEPS program is also beneficial for identifying opportunities for continuous improvement.

"There may be reasons why a crop is less likely to respond to fertiliser inputs. If these situations are identified, it may be possible to improve productivity or reduce fertiliser inputs."

Principal Agronomist Dr Danielle Skocaj presents at the Meringa Field Day.

OTHER OPPORTUNITIES FOR MODIFYING NUTRIENT INPUTS HIGHLIGHTED AT THE FIELD DAYS INCLUDED: REVIEWING PLANT CROP NITROGEN RATES, OMITTING PHOSPHORUS FERTILISER INPUTS WHERE SOIL TEST LEVELS ARE HIGH, AND OPTIONS FOR SHORT-TERM REDUCTIONS IN POTASSIUM FERTILISER RATES.

Danielle noted that plant crops after a fallow are less responsive to nitrogen than ratoon crops.

"This, together with evidence of limited crop responsiveness to nitrogen in the first year where fertiliser rates were reduced in our trials, suggests a further, small, reduction to N rates on fallow plant crops, below the SIX EASY STEPS guidelines may be possible without impacting yield."

For phosphorus Danielle showed trial data which supported the guidance that phosphorus fertiliser is not required when the BSES P soil test value is greater than 50 mg/kg. If growers have sites with this level of soil phosphorus they should not apply phosphorus and save some money, particularly when it is costing more than $9/kg.

"There's a concern that omitting phosphorus from plant crops will impact crop establishment," Danielle said. "In our trials, where the BSES P soil test value was greater than 50 mg/kg we found germination was identical, despite different rates of phosphorous fertiliser being applied at planting. That's proof that the phosphorus which is already there in the soil is available," she said.

"With potassium there is potential to use some of the soil's reserves. If you take a soil test and the soil has a high nitric potassium (Nitric K) value, you could consider reducing the rate of potassium fertiliser applied.

"However, if you decide to take advantage of soil reserves and reduce potassium fertiliser inputs, do not omit it completely as most of the crop response is associated with the first 50 kg K/ha.

"If you've identified an opportunity to reduce potassium rates and save some money, consider an initial reduction from 100 to 70-80 kg K/ha, rather than going down to zero."

Danielle also noted that "all of these adjustments can be done in consultation with a trusted adviser and trialling on your farm."

For further information, consult the nutrient management section on the SRA website where you can also find the SIX EASY STEPS TOOLBOX.

MODERNISING PLANT BREEDING WITH DRONES AND DATA SCIENCE

A presentation at the Burdekin Field Day shared insights into how unmanned aerial vehicles (UAVs) – or drones – are helping to modernise plant breeding.

Phenomics scientist Dr Sijesh Natarajan explained how drones and other innovations can improve variety assessment and selection at various stages of the variety development program.

"Sugarcane is a unique crop in that it is really hard for breeders to get a sense of how it's doing because it goes for 12 months," Sijesh said.

"Unlike other crops, our breeders cannot easily score their plots for height or the specific traits we are looking for by visual observation.

"In a way, the drones act as a third eye for the breeder so they can fly over the crop at different stages and capture high resolution pictures and they can use that information to make selection decisions."

Sijesh said SRA drones carry a range of cameras, with machine learning algorithms used to process images and support decision making about the data collected.

"We have our usual visual cameras, with which we can get high-resolution images of the plants, and also multispectral cameras which tell us how the plant is performing in terms of its health and its photosynthetic capacity.

"And we have thermal cameras, which tell us how much soil water the plants are using, and we can use that information to learn a lot about how the plants are performing in their growing conditions.

"We're putting all this information together in statistical models that the breeders can use to make informed selection decisions."

Sijesh said visitors at the field day enjoyed the presentation and were interested to understand how SRA is using technologies to improve genetic gains and provide benefit.

(Top) *The location of the various cameras on the drone.*

(Middle) *Images captured from the visual, multispectral and thermal cameras.*

(Bottom) *Dr Sijesh Natarajan presents at the Burdekin Field Day.*

UNDERSTANDING THE SCIENCE

What are genomics and phenomics?

SRA has set an ambitious target to achieve two per cent genetic gain in its sugarcane varieties year-on-year by 2026. To achieve the target, the plant breeding team works across two key areas of biology - genomics and phenomics.

Genomics relates to the study of genes, or the genetic make-up of plants.

By examining the genetic composition, scientists get a sense of how a clone is going to perform and also learn something about the plant's disease profile even before they are put into the field.

Phenomics on the other hand, is about observable characteristics and the measurement of the plants' physical and physiological traits. The use of drones and machine learning algorithms provides data on how different clones and varieties are performing.

Burdekin Variety Development Manager Xianming Wei and Variety Officer Catherine Kettle speak with industry attendees about variety development.

Joseph Magatelli, Marian Davis and Chris Vidler from Burdekin Productivity Services.

Mika Rowston from Farmacist, Isabel Bryce from the Queensland Department of Agriculture and Fisheries and Chris Doblo from Farmacist.

Frank Viero and Justin Minuti from Tracpower with SRA's Jeff Blackburn.

ONE PLATFORM FOR ONLINE TRAINING **THROUGHOUT THE SUGAR INDUSTRY**

The Australian sugar industry now has a dedicated website and training platform which can provide online training throughout the industry.

Thanks to the completion of the second phase of an Australian Sugar Industry Training (ASIT) project, juice and sugar operator training modules are now available for use online by the milling sector. This covers the processes from the mixed juice tank through to the final product of raw sugar. Eight operator self-paced training modules have been developed and mapped to nationally recognised training criteria.

All mills are using the learning management system (LMS) and, as new training modules have been developed, usage has been steadily increasing.

Some mills are adding to the provided materials and modules, using the LMS to develop their own internal courses for knowledge and assessment activities. This results in a one-stop training LMS for the milling company and easy single login access for the staff.

By using courses online, the company is able to provide training conveniently 24/7 via any digital device.

Each company has their own unique sub-environment on the LMS and courses developed by a company are only accessible by their staff. A user login provides system access to any resources endorsed by their HR manager.

Chief Investigator David Moller of Queensland University of Technology (QUT) led development of the platform and said online courses could be coupled with practical on-the-job training.

"Just because you've learnt to drive by studying the manual doesn't mean you can drive a car. And there are some high-risk activities which still require external qualifications," he said.

"Face-to-face courses are offered by QUT and the Sugar Research Institute (SRI) each year to the milling sector to enhance and promote further understanding and discussion for operators, supervisors and technologists."

The completion of this project at the end of May 2022 saw the development of five new training courses:

- Juice clarification
- Mud filtration
- Evaporation
- Evaporator cleaning
- Crystallisation.

Other courses developed through earlier programs are:

- Traffic officer
- High grade fugals and sugar drying
- Low grade fugals
- Cooling crystallisers.

The digital platform and website behind the ASIT was selected by the industry from more than 60 on offer. aNewSpring was chosen for its suitability for the sugar industry and its cost effectiveness.

The LMS is managed by the milling company's training and human resources staff. They are able to manager the users' login and assign relevant modules to them.

Bruce King of SRI is responsible for the mapping, development and production of modules, with QUT and Industry expertise used to check the validity of all content. All modules are initially mapped to national competency standards for the sugar industry and developed by Bruce using diagrams, charts, tables, photos and videos to assist the user in gaining a clear understanding of the content that is written in a readable format.

Industry training modules are completed according to a path developed in the previous SRA project (SRA2017/013). Six steps are followed to produce a usable, engaging, industry approved training modules:

1. A training module matrix is developed to address each of the defined national competencies to be presented and assessed.
2. Diagrams, flowcharts, photos and videos are developed or obtained from Australian mills.
3. Industry representatives provide feedback and comments on the matrix prior to module development.

Mackay Sugar is continuously adding new training modules via the platform as employees get used to the convenience of online training. (Left: View of Racecourse Mill.)

4. Content for the training module material is identified and can include texts, previous training course material and presentations used in industry face-to-face training courses. A common language and definitions are encouraged throughout the industry.
5. Checks are made that the module content follows a logical order, and engages the learner. The module content is reviewed by a subject matter expert to ensure it is correct. Quiz questions are used throughout each module to reinforce the key learning objectives. A practical assessment checklist is provided to enable evaluation of members who have completed modules.
6. The module and assessment process are thoroughly tested prior to publication. Each learner must pass 100 per cent of safety questions and 80 per cent of general knowledge questions to complete the module.

During the latest project personnel from several milling companies were trained in how to use the platform to develop internal training courses. These are designed and approved to the company standards and their own milling procedures.

Each user of the LMS is linked to their company sub environment and has a unique login name and password.

"We are keen to see the whole industry use the platform, with all training in one place," David Moller said.

To date the growing and harvesting sectors have not yet taken up use of the LMS. The opportunity to develop harvester, haul out, siding inductions, laboratory, safety and best practice courses online are possibilities for the non-milling sectors.

Using this platform you don't need a registered training organisation licence to develop courses.

Each user's login per year gives the user access to any number of courses that are available in that company's environment and an infinite amount of time online.

"SRA funding has facilitated the development and implementation of online operator modules and we hope to continue the development of further modules in the areas of extraction, boilers, and laboratory procedures as further funding becomes available."

INCREASING INTEREST IN **ONLINE TRAINING PLATFORM**

Charl Grobbelaar

Mackay Sugar reports that more than 920 people have already completed training modules using the online LMS this year, up from 829 for the whole of last year.

Mackay Sugar's Human Resources Advisor Charl Grobbelaar said the milling company expects to see a growth in the number of users every year as new packages are rolled out and employees continue to experience the benefits.

"Feedback from users has been very positive," Charl said.

"The company is continuously adding new training modules as employees get comfortable with this way of personal development and experience the benefits of online training. Users enjoy having courses available that they can complete at their own pace and at whatever time suits them best.

"Our operator training consists of the completion of the basic online courses before a face-to-face training session. This gives the new operators a baseline knowledge of terminology and processes. This is a huge step to assist the trainer as it puts everyone on the same page at the start. The face-to-face training can then proceed at a much faster pace and be more effective. After the face-to-face training is completed we then follow up with more advanced online training, where required.

"We are also using the platform for various training courses which we design ourselves and import into the platform via a Shareable Content Object Reference Model.

"We have partnered with an external online training module platform to give us access to all types of online training content which we can deliver to specific employees on demand in order to satisfy individual development needs.

"The internal courses we develop include the theory and assessment components of Authority to Operate (ATO) signoffs, inductions for employees and contractors, and more."

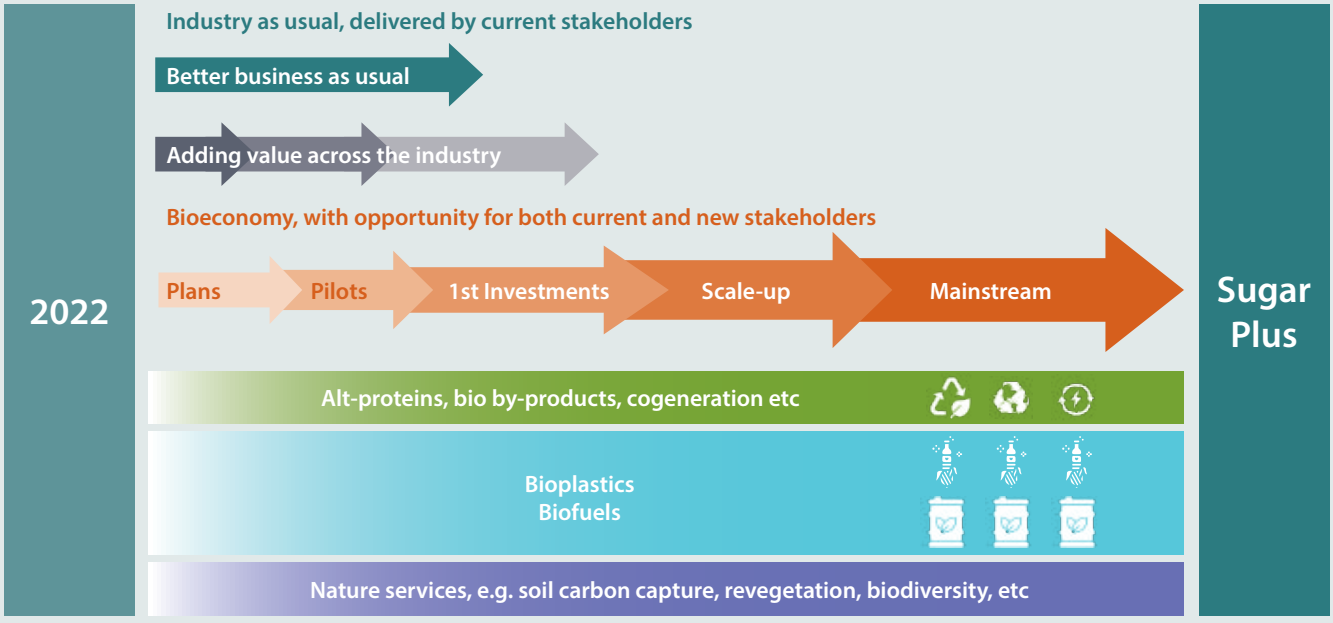
PLAN UNVEILED FOR SUGARCANE INDUSTRY TO DRIVE BIOECONOMY BOOM

The sugarcane industry could become the backbone of an Australian bioeconomy superhighway under the Sugar Plus vision and roadmap.

The Sugar Plus vision and roadmap was developed in partnership by sugar industry organisations with support from the Cooperative Research Centre for Developing Northern Australia (CRCNA) and the Queensland Department of Agriculture and Fisheries.

CRCNA Chief Executive Officer Anne Stünzner said **Sugar Plus** outlines an important role for the industry in **Fuelling the Future of Food, Energy and Fabrication.**

> ***"The sugarcane industry has identified an exciting and transformational future of sustainably producing sugar and bioproducts at the heart of regional communities."***
>
> Anne Stünzner, CRCNA



The path to realising the Sugar Plus vision involves better business as usual, adding value across the industry and new revenue streams through the bioeconomy.

"The roadmap outlines opportunities for a substantially larger industry. A growing bioeconomy industry will enable Australia to become increasingly self-sufficient, improving economic resilience and national security."

Ms Stünzner said analysis undertaken in developing the roadmap indicated enormous opportunity.

"Australian demand for heavy fuels and plastics is substantial. Even modest adoption of biofuels and bioplastic equates to a substantial amount of sugar equivalent alternative products. Australia's current domestic market alone would create massive demand for alternative protein feedstock, aviation fuel and bioplastics," Ms Stünzner said.

Sugar Research Australia Chief Executive Officer Roslyn Baker congratulated industry organisations for the strong partnership and collaboration in developing the roadmap and their commitment to innovation and growth.

- Food is where it all starts. Raw sugar will continue to play an important role in feeding the world. Sugar is also an important feedstock for the new generation of animal free foods.
- Energy that builds on current cogenerated power and ethanol, provides the next generation of sustainable mobility and power. The sugarcane plant is one of the best natural sources for transforming into renewable energy and biofuels for heavy transport and aviation.

"The roadmap includes initiatives to support better business-as-usual in the near term, add value and create new revenue streams in the medium term, and become a bioeconomy powerhouse in the longer term."

Roslyn Baker, SRA

- Fabrication for the future is about making products that enable a more sustainable way of life, including replacements for the many plastic items produced and used every day.

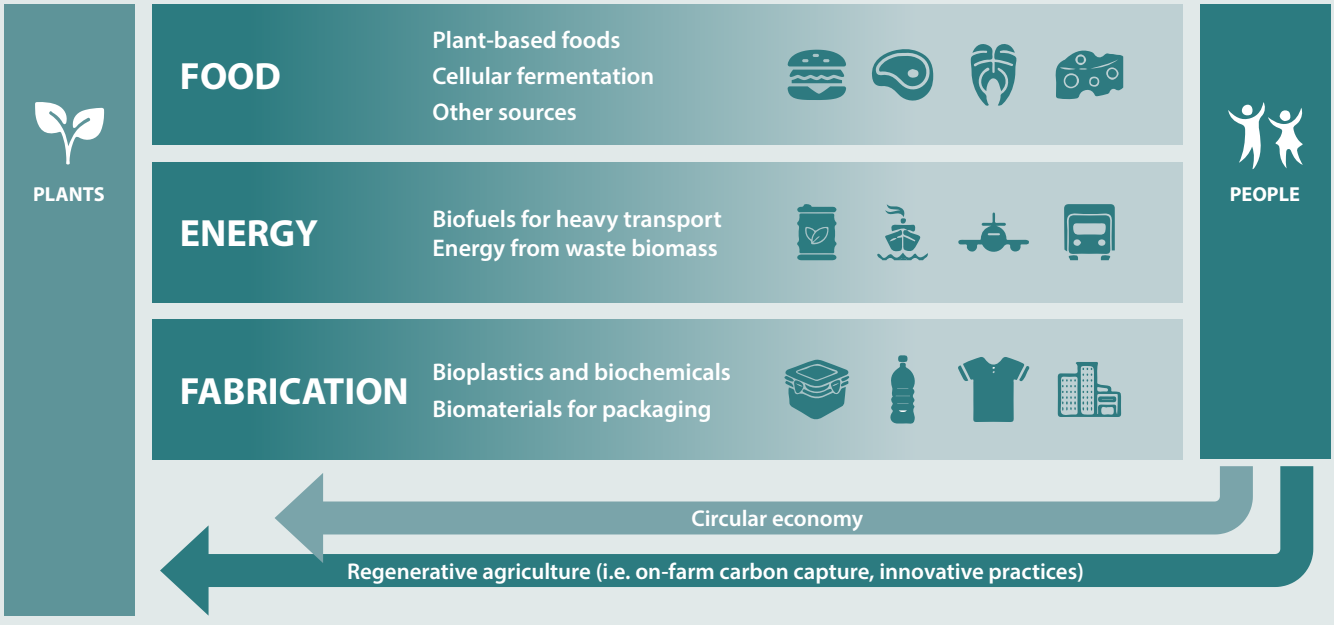
"The roadmap outlines the actions needed across a range of levels, from individual farms to local communities through regional coordination or support of a mill and national leadership," Ms Baker said.

Minister for Agricultural Industry Development and Fisheries and Minister for Rural Communities Mark Furner said Sugar Plus highlighted the sugar industry's important role in supporting long-term economic development in Queensland.

"Queensland produces almost 95 per cent of Australia's sugar cane which is worth almost $4 billion dollars a year to the nation's economy and supports 23,000 direct and indirect jobs from Mossman in far north Queensland, through to northern New South Wales," Mr Furner said.

"That is why the Queensland Government supported the development of this industry-led initiative, backing the industry to come together to make the Sugar Plus vision a reality.

"We look forward to the ongoing implementation of key priorities that align with those of the Queensland Government and will work with industry to responsibly grow the bioeconomy in regional Queensland."



Positioning Australia as a bioeconomy powerhouse.

INDUSTRY TO FORM WORKING GROUPS TO DRIVE ROADMAP IMPLEMENTATION

Organisations representing the Australian sugarcane industry will form a series of working groups to implement their first whole-of-industry vision and roadmap.

Australian Sugar Milling Council Chairman John Pratt said the roadmap demonstrates the industry has an exciting future, with the regional bioeconomy offering enormous potential.

"We see that if we can exploit opportunities to add value to raw sugar production, that the industry will be stronger and have a very bright future indeed," Mr Pratt said.

"We can do a whole lot more with co-generation and bioethanol. Then there's precision fermentation, bioplastics, and sustainable aviation fuels. They are all possibilities into the future given the right policy settings and working in close collaboration with industry."

The roadmap sets out a series of actions in the near, medium, and longer term, to strengthen and build the industry while charting a path to a bigger, bolder future.

CANEGROWERS Chairman Owen Menkens said industry organisations are committed to ongoing collaboration to implement the roadmap and realise the Sugar Plus vision.

"By working together, we can increase profitability and keep the industry growing," Mr Menkens said.

"We can be an industry that the state and nation are proud of, that communities want to support, and young people want to start their career with."

Australian Cane Farmers Association Chairman Don Murday said the industry can be the backbone of Australian bioeconomy superhighway, reducing reliance on international manufacturing to improve economic resilience and national security.

"Our greatest asset is the fact that we have this incredible amount of feedstock biomass with the logistics to bring it all into central areas. We are in a strong position to take advantage of these new technologies and it's good that the appetite is there within the industry to do that".

AgForce Cane President Ricky Mio said the industry has a proud history of innovation that will continue as the industry pursues its vision.

"The world is changing. We need to be in front of the change, not behind. This opportunity comes around in our life so very few times and I'll be as proud as punch when we achieve what we've set out to do."

Read the full report

THE ROADMAP REFLECTS THREE CORE PRINCIPLES

Implementation should not be disruptive to today's industry and is not designed to displace existing sugarcane and raw sugar production. Rather, the objective is to increase value added per hectare over the near to medium term, and through this maximise the opportunity to expand sugarcane production substantially over the medium to long term to meet emerging demand for new sustainable hydrocarbon sources.

1. Economically sustainable for all stakeholders

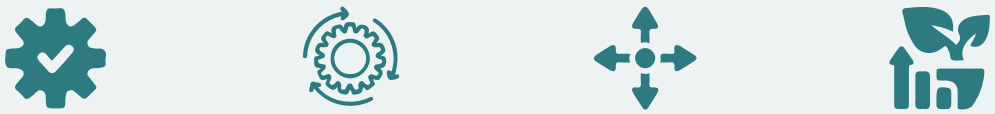
All proposed developments must be economically sustainable for all relevant stakeholders over the medium to long term

2. Environmentally responsible along the entire value chain

The extent of expansion of agriculture that would be required to enable Australia to reach net zero emissions highlights the importance of ensuring that the natural environment is protected

3. Near-term measures improve reliability and efficiency to create significant long-term opportunity

This document summarises the near-term steps required to meet the industry's collective goals



The roadmap was developed through a nine-month engagement process across the Australian sugar industry supply chain. It was jointly funded and supported by the Cooperative Research Centre for Developing Northern Australia, Sugar Research Australia, CANEGROWERS, the Australian Sugar Milling Council, AgForce, Australian Cane Farmers Association and the Queensland Department of Agriculture and Fisheries.

The CRCNA is funded as part of the Australian Government's Cooperative Research Centre Program (CRC-P)

INVESTIGATING SUGAR INDUSTRY DIVERSIFICATION OPPORTUNITIES

A technical and economic study of green hydrogen and compostable bioplastics production to assess the feasibility of producing both from sugarcane, commissioned by SRA and the Department of Agriculture and Fisheries, has been completed.

Abe du Pont is a Process and Technology Development Leader at PROCOM Consultants and the Chief Investigator for this project which finished in May this year.

The future for green hydrogen made from sugarcane is promising. The study identified that it is cost-competitive to produce green hydrogen from sugarcane compared with alternatives such as water hydrolysis (based on known technologies), however it would require a large investment.

The final report said that production of green hydrogen from sugarcane would be able to employ existing industry players, a 'largely robust mature technology' with competitive pricing and so could potentially be part of an early adopter program for green hydrogen production.

"A potentially viable facility could be developed in a large sugarcane and other biomass production region by careful development of the plant and economics, including securing a major hydrogen consumer," Abe said.

"By co-locating the gasification facility alongside a hydrogen customer hydrogen transport cost would be minimised. Integrating with an existing hydrogen-producing (methane to hydrogen) facility would minimise capital cost by sharing existing infrastructure."

The study looked at setting up an industrial scale gasification plant running in campaigns of up to three years, which would require a stockpiling capability of up to about 700,000 tonnes bagasse and/or tops and trash (where available) to process outside the crush during each year of operations.

"Crops would need to be identified that could be harvested during the non-crush period to reduce feedstock storage infrastructure and increase general feedstock availability," Abe said.

The study also recommended using a dedicated bagasse-fed boiler to generate steam and electricity for the hydrogen facility to reduce gasification capacity and oxygen demand, to in turn reduce both capital and operating expenditure. By using waste heat in the flue gas from mill boilers to dry bagasse, feedstock transport cost to a separate hydrogen facility could be reduced, while also improving the efficiency of the mill boilers, making more bagasse available for hydrogen generation.

"I need to emphasise that the unit cost of producing green hydrogen would still be higher than conventional non-green technologies, notably technology using methane with no carbon dioxide capture," Abe said.

"Ways of ensuring the financial feasibility for early adopters will need to be worked out. More robust and inclusive long term pricing information and experience of green hydrogen supplied at an industrial scale are needed."

SUGAR MILL AND HYDROGEN FACILITY

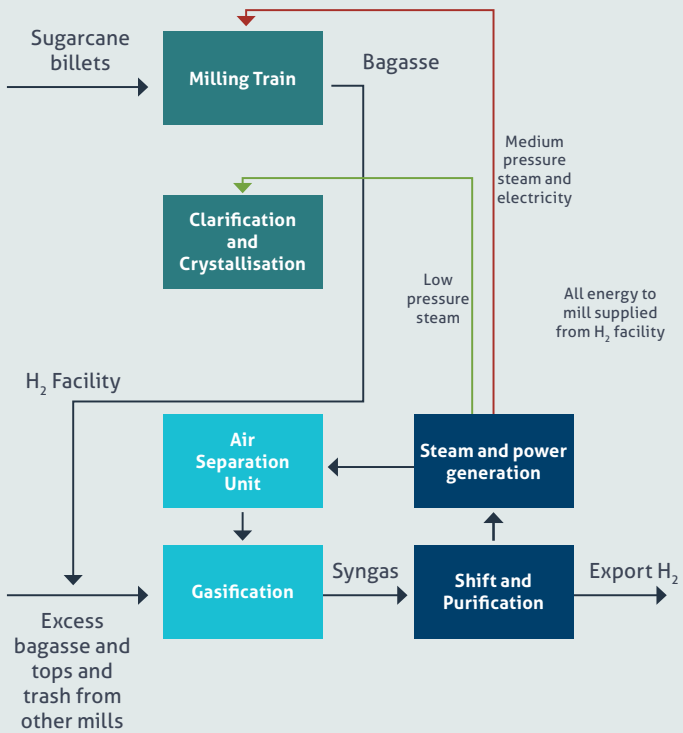


Diagram: A hydrogen facility and mill configured with an integrated energy supply.

COMPOSTABLE BIOPLASTICS STUDY IS LESS OPTIMISTIC

The case for compostable bioplastics is much more complicated.

The study concluded production was technically viable, however there was uncertainty about the economics.

Two types of bioplastics, Polyhydroxyalkanoate (PHA) and Polylactic Acid (PLA) were considered in the study. Both are biodegradable and originate from renewable sources.

However, PLA quickly proved to be a more realistic focus because of the complexity of PHA's biological synthesis of the polymer; the lack of financial data publicly available for this alternative; and the fact that the production technology is not readily available commercially.

"By comparison, PLA production technology is much more available commercially," Abe said. "PLA manufacture involves biological production of a basic monomer (lactic acid) followed by a simpler and more controlled polymer production method using conventional chemical processing techniques.

"Another positive is that PLA-derived bioplastic production capacity and product application is growing and being pursued by large international oil companies such as French company, Total, soon to be rebranded TotalEnergies."

However, the study noted that technology for bioplastics production is still developing and there has been a high failure rate in bioplastics start-up companies.

"The production cost of bioplastics is significantly higher than for conventional plastics and a major input cost is the raw material – sugar," Abe said. "Of course, that's where existing sugar industry players have an opportunity since they can obtain refined sugar feedstock at cost, or can use semi-processed sugar products (clarified juice or raw sugar) at even lower cost."

The economic analysis presented in the study was based on PLA production using generic, high-level inputs from a single PLA technology vendor, and based on industrial pricing using refined sugar as feedstock with estimates included of the potential benefit of using cane juice or raw sugar.

The minimum commercial scale PLA plant capacity was set at 30,000 tonnes/annum, consuming an estimated 20 per cent of the production of a 500 tonnes/hour sugar mill.

At this scale, the output was estimated to boost Australia's current production between two and three times, oversupplying Australia's current usage of bioplastics which in 2018-19 was about 6,000 t/a.

"Due to changing world views concerning the use of fossil fuels, the longer-term outlook for bioplastics seems likely to improve beyond that level."

The licensor who supplied the capital and operating expenditure inputs used in the report estimated a wide selling price range of US$3,870 (AUD$5,533) – US$5,160 (AUD$7,377) per tonne of PLA.

The breakeven selling price for PLA was estimated at US$3,090 per tonne (AUD$4,280 per tonne) using refined sugar as feedstock. Applying raw sugar as feedstock potentially reduced the breakeven price by US$80 per tonne of PLA while using sugar cane juice further reduced the breakeven price by US$70.

The researchers accepted that the estimated figures were too wide to support meaningful decision-making. However, developing accurate financial indicators would require confidentiality agreements between interested parties and the technology licensor.

As far as market demand is concerned, a positive is the growing support from the State Government which since September last year has banned single use plastic e.g. the supply of single-use plastic straws, stirrers, plates, unenclosed bowls, and cutlery, and expanded polystyrene (EPS) takeaway food containers and EPS cups. In September next year, more items will be added to this list.

PLA is increasingly being used for simple one-use applications such as coffee cups, stirrers and cutlery.

"It can be recycled by breaking it back down to the monomer and reprocessed. This offers the opportunity for a truly circular economy," Abe said.

While high temperatures are required to expedite the decomposition, existing commercial composting processes which are required to remove pathogens can successfully compost the PLA. It will also compost in a home compost, although this takes longer.

"In theory, PLAs can be included in the same bin as food waste and composted, diverting both from landfill. However, no community collection infrastructure currently exists for composting this waste and establishing that would come at considerable cost."

Nevertheless, this type of technology will be important to respond to the Government's removal of single use plastics and the move to more environmentally friendly sources of plastics.

Project Chief Investigator Abe du Pont.

Queensland Government

This project has been jointly funded by the Department of Agriculture and Fisheries and Sugar Research Australia.

SRA26$^{\phi}$ – ONE TO WATCH

The development of a new sugarcane variety typically takes 12 years, and in this context SRA26$^{\phi}$ was no different, originating as a northern seedling planted in 2008 with its first commercial release in the North in 2019 followed by the Herbert in 2020.

But as Northern Variety Development Manager Dr Felicity Atkin and Northern Variety Officer Rhylee Pendrigh explain SRA26$^{\phi}$ is not your run of the mill variety and definitely one we all need to watch.

"There was early excitement about SRA26$^{\phi}$, or QN08-2282 as it was then known, when it was first trialled in the Northern and Herbert Final Assessment Trials (FATs) in 2014," Felicity said.

"The feedback from the team on the ground was 'Felicity, keep an eye on this one'. And they weren't wrong."

As smut was threatening varieties on the east coast, including the Herbert and Far North, QN08-2282 was progressing through the variety development pipeline as an experimental clone. From an early stage it was competitive with current popular commercial varieties and showed good overall resistance to all major diseases. It is also performed well in later stage trials planted over several years across the Northern and Herbert regions.

"After 2006 we did lose some very productive Pachymetra resistant varieties to smut susceptibility across the North and Herbert," Felicity said.

"At the time there weren't profitable variety choices that were also smut, Pachymetra, and leaf scald resistant. Growers had no choice but to plant varieties intermediate to Pachymetra. Subsequently we have seen an increase in average spore counts of Pachymetra over time across the Northern Coastal and Herbert regions."

The reason why the Northern and Herbert teams were so excited about SRA26$^{\phi}$ was because this new variety looked like it could fill that gap.

"This new variety was ticking all the productivity and disease boxes, and it looked like real cane," Felicity said.

"SRA26$^{\phi}$ has always presented well in its visual appearance and to the harvester," Rhylee said.

"During all our trial harvests from plant to second ratoon, we collect stalk samples to measure commercial cane sugar (CCS) and weigh each plot for cane yield, but we also do what is called an Appearance Grade where we record any agronomic traits that are undesirable, including the amount of flowering, suckering and lodging. We also look out for any side-shooting, smut and any other diseases: basically, anything that a farmer wouldn't like to see in a variety.

"SRA26$^{\phi}$ has always looked very consistent and impressive in its appearance across all crop classes and years it has been tested," Rhylee said.

"It always looks healthy. It has a pale green but clean top with a large dense canopy, even when other varieties have either Brown Rust or Yellow Spot - SRA26$^{\phi}$'s canopy is always clean. It's quite a hairy cane that makes it quite distinguishable. It has nice, mostly short regular internodes, which we hope makes it more ideal for billet planting as well.

Download the SRA26$^{\phi}$ Factsheet

SRA26Φ seed plot being cut for propagation July 2022. Helen's Hill, Herbert.

"It doesn't sucker much either, even in a high suckering year like we saw last year. It rarely flowers so it will keep growing during autumn and early winter months and presents well to the harvester," Rhylee said.

"And if is anyone is looking for a variety that's good for weed control, particularly in the current climate of high fertiliser prices, it is SRA26Φ with its impressive canopy closure even when planted in wider rows," Felicity said.

Disease resistant and a consistent appearance and performer but do the numbers stack up for SRA26Φ?

Since SRA26Φ's approval in the North in 2019 and the Herbert in 2020, further SRA trial results as well as limited data from the northern mills have all supported its initial FAT results.

"Throughout SRA26Φ's journey we have collected a lot of data. It has been trialled in Northern and Herbert FATs since 2014 with a total of 57 FAT harvest results from the two regions and all the results have been consistent over the years; its' CCS, yields, overall appearance and harvestability," Rhylee said.

SRA Herbert Variety Development Manager Dr Fengduo Hu and Variety Officer Herbert Juan Briceno have also been keeping a keen eye on SRA26Φ and the numbers.

"FATs in the Herbert region have supported results seen in the north," Fengduo said. "In those trials SRA26Φ performed well and looks promising. Now we need to see how it performs in the commercial world and in different environments."

"Limited field observations indicate that SRA26Φ grows well in better-drained soils," Juan said. Slow growth has been observed in the wet pockets of the seed banks, recovering later in the season."

And Felicity is keeping an eye on the numbers at the Mulgrave mill.

"We're starting to see good commercial quantities of SRA26Φ come through the northern mills this season and expect larger volumes through the mills in the coming weeks/months as SRA26Φ is best harvested mid or late in the season," Felicity said.

"The rate of adoption here in the north since its release has been impressive, and there seems to be equal, if not greater, enthusiasm over SRA26Φ in the Herbert as well. It was also their highest selling variety in 2021," Felicity said.

"Everything about SRA26Φ looks good to me."

"Maybe I'm a little biased because SRA26Φ was the first variety I commercially released as a Variety Officer," Rhylee said. "Yes, I'd say it is my personal variety favourite and one we're all going to keep a very close eye on".

SRA26Φ ATTRIBUTES & FEATURES

- Has shown a 5% sugar yield advantage over Q200Φ and Q208Φ in SRA Northern trials and is competitive for sugar yield with Q200Φ and Q208Φ in SRA Herbert trials.
- Is a non-arrowing variety which will keep growing throughout the season.
- Has excellent canopy closure even on wider rows for good weed competition.
- Is a more profitable variety choice especially for growers with higher Pachymetra spore counts.
- Has internodes of even length and protected eyes making it an ideal variety for billet planting, but if whole-stalk planting SRA26Φ, just be wary as it is very hairy.
- Is a reliable germinator with a semi-prostrate early growth habit, often up to and including fill-in stage, but will straighten up to stand erect providing good harvester presentation.
- Exhibits similar ratooning ability as Q200Φ and Q208Φ.
- Has similar maturity profile to Q200Φ – recommend harvesting SRA26Φ mid- to late-season.
- If considering harvesting early-season then maturity testing or use of crop ripeners are advised.
- SRA26Φ dominated clean seed sales of Productivity Service organisations across the Northern coastal and Herbert regions in 2021.
- SRA26Φ was approved by the Central Regional Variety Committee for commercial release in 2022 and is available to Proserpine and Plane Creek growers in small quantities from 2022 and will be available to Mackay growers from 2023. Tissue Culture plants of SRA26Φ can also be ordered by all Central growers in 2022 for a Spring 2023 delivery.

Commercially billet-planted SRA26Φ at Packers Camp, Mulgrave, on 1.8m rows.

Chris Bosworth.

THE TIME'S RIGHT FOR SRA26

Chris Bosworth owns and manages a cane farm of 140 hectares in the Herbert, 'about six kilometres from Victoria Mill towards Forrest Beach'.

A fourth-generation cane grower Chris has been a farmer all his life and believes farming is all about timing. He explains.

"I find in farming you keep an eye on what's going on and take the appropriate action; and it's the same with varieties.

We target 100 tonnes of cane a hectare as an average. It's not always possible but it's my long-term average.

> ***"I've got a couple of hectares planted this year. I've got it on quite good soil at the moment, I follow the SIX EASY STEPS®, I'll start planting it out into different heavier clays and see how it goes there. "***
>
> ***Chris Bosworth.***

TALKING VARIETIES IN THE FIELD

All regional variety guides are available on the SRA website

The 2022/23 Northern Variety Guide was launched at SRA's Tully and Meringa field days held in May where the Northern Variety Development team were happy to answer any questions put to them by growers, Northern Variety Development Manager Dr Felicity Atkin said.

"Through the annual Variety Guide and our new Variety Information Factsheets we're sharing the most up-to-date information we have, about our new and recently released varieties," Felicity said.

"We do this to support growers in making the most informed decisions; in what new varieties to collect from the clean seed plots, what they're going to plant on their farms in more commercial quantities, and when the best time to harvest might be.

"While these documents are all available on SRA's website, we love getting out and talking with the growers in person about the new and current varieties; to answer any questions a grower may have specific to their farm, and get invaluable feedback on how they see the new varieties are behaving and performing. Field days, shed meetings and workshops allow us to do this, and to get to know the grower.

I think like most growers I am always on the lookout for a new super variety but some of the older varieties are still performing quite well in the Herbert.

Q124 was a standout variety for the whole of the sugar industry. It was one of those super varieties that come along probably once in-a-while. At the time you don't know it's going to be a super variety – it just happens to become one.

Other standout varieties for me have been Q174 and Q115, Q117 was good too – but then smut came along, and it was heavily impacted.

But we're coming out the other side of that and I believe we're on the cusp of getting some really good new varieties; SRA26$^{\phi}$ looks very promising in that regard although my first-hand knowledge of the variety is only first ratoon.

I assess my varieties on how it looks in the paddock and this looks good.

It strikes well, it's a nice sound stick; large in diameter compared to some and it forms a very dense crop. It's fairly erect, until it gets very large; and then like most cane in the north this year, it's fallen over, but we won't hold that against it.

We were a bit late getting on board with SRA26$^{\phi}$ here. It had been released further north and we aware of its potential. But we've got it now and it looks very promising."

Cutting SRA26$^{\phi}$ at Meringa to include in Northern FATs to trial as a new potential commercial standard in the Northern selection program.

"One important part of my role is to critically analyse trial data and make selection decisions which impact the direction of the Northern Variety Development program. But it is just as important for me to ensure I am making the right decisions for both the growers and millers. This is why it is important I continue interacting directly with industry, which isn't hard as it is something I really enjoy doing," Felicity said.

Felicity, Rhylee and SRA District Manager Gavin Rodman, recently attended and presented at a walk-and-talk event organised by Mossman Agricultural Services at one of their clean seed distribution plots.

"This was a well-attended event with up to 70% of Mossman Coastal's overall cane production represented," Felicity said.

"It was an opportunity for growers to get a good look at the three new varieties the Northern Regional Variety Committee has approved for commercial release this year and at the same time take the opportunity to ask Rhylee and myself any questions they had. The feedback was it was a very valuable day for everyone."

Growers got a good look at new varieties in the field, thanks to a walk-and-talk event organised by Mossman Agricultural Services.

PROJECT UPLIFT CELEBRATES SUCCESS

Launched in July 2017, the five-year, $4.5 million federally funded *Project Uplift* drew to a close in June this year leaving a legacy of productivity and profitability benefits to the sugarcane industry and improving the quality of water entering the Great Barrier Reef catchment.

Funded through the Australian Government's Reef Trust and facilitated by MSF Sugar the project is being hailed as the most successful 'Practice Change Supporting Water Quality' project the Australian sugar industry has seen.

Throughout its lifespan the project has worked with participant growers to change their farming systems on 18,000 hectares of land under cane, in such a way that soil health is improved, reducing operational time and cost and improving water quality through reduced sediment, dissolved inorganic nitrogen and pesticides.

Government modelling has the project preventing an estimated 32,000 tonnes

(Left) *Grower award winners at MSF Sugar's Project Uplift Awards in Cairns in late March.*
(Centre) *MSF's Thitichaya Poontanasombat with inspirational guest speaker, Paralympian Grant 'Scooter' Patterson at the Project Uplift award dinner in Cairns.*
(Right) *Grower award winners at MSF Sugar's Project Uplift Awards in Maryborough in early April.*

Mulgrave cane grower Paul Gregory (left) was an early participant in Project Uplift. Pictured here with Graham Cripps, Extension Officer MSF Sugar.

of sediment and 125 tonnes of dissolved inorganic nitrogen from reaching the Great Barrier Reef lagoon.

Project Uplift encouraged growers to adopt minimum tillage, controlled traffic, and green cane trash blanketing. It has distributed grant funding to growers for drainage improvement and farm redesign works, in addition to MSF-funded interest free loans for equipment purchases and machinery modifications.

Project Uplift awards events were held earlier this year in Cairns and Maryborough to celebrate the success of the collaboration in achieving the hectares target.

MSF Sugar's Thitichaya Poontanasombat congratulated all project participants at the Cairns dinner.

"This project has shown that mill owners, growers and governments can work together and achieve outcomes for industry and community that are genuine win-wins," Ms Poontanasombat said.

Mulgrave grower Paul Gregory was an early participant in the project and spoke at the Cairns dinner about his experience.

"I was finding under the old way of farming I wasn't able to get the 40 hectares ready to plant every year," Paul said.

"I was looking for a way to farm in a more efficient way, and I jumped at the opportunity to become part of the pilot program for Project Uplift. I have now transitioned 100% of the farm using the Project Uplift guidelines underpinned by the Improved/SRA Farming System and Smartcane BMP accreditation program," Paul said.

"The funding and loans available through the project enabled us to change our farm layout and drainage and purchase capital equipment to change our farming systems. And that has made us more efficient all-round."

The Project Uplift team would like to acknowledge the contributions of the six advisory committee members who provided representation from each of the four sugar milling regions and who ensured the project's success. These were

- Sam Spina (Chair)
- Jeffery Atkinson
- Stephen Calcagno
- John Gallo
- Paul Gregory
- Joseph Marano

All Project Uplift participants received a crystal memento showing a 3D model of a Mulgrave grower's setup for wider track spacing and extended elevator.

Australian Government | Reef Trust

More about Project Uplift SCAN QR CODE

NOURISH TO FLOURISH IN THE BURDEKIN **FOR WOMEN IN SUGAR CONFERENCE**

More than one hundred women from across the sugar industry attended the Women in Sugar Conference in the Burdekin in late May discussing a range of topics under the theme 'nourish to flourish'.

SRA District Manager Burdekin Terry Granshaw provided a short update on SRA projects and innovations at the event at which SRA was a bronze sponsor.

Queensland Sugar Limited's (QSL) Shannon Guy spoke about More than Sugar, discussing increased community expectations around environmental, social and governance (ESG) matters that affect the sustainability of companies, including their long-term profitability and social licence to operate.

Attendees also heard updates about water distribution in the Burdekin, succession planning, budgeting and district updates.

Burdekin Councillor Kaylee Boccalatte urged attendees to find their passion and how they want to contribute to the industry.

"Nourish yourself and find your passion. Nourish your industry. Nourish your colleagues. If we can do these things, we will flourish," Councillor Boccalatte said.

Manager of Burdekin Cane and Agriculture Organisation Lisa Parker said the event was a valuable opportunity to connect with other women in the industry.

"I think one of the main things that I took away from the conference was the essential contributions that women make to the cane industry. Women are involved in a diverse array of roles in the industry, to which they bring different skill sets, dynamics, communication, collaboration and leadership," Lisa said.

She said the QSL presentation was a highlight for her.

"I think QSL is proactively investigating other support and avenues of revenue for our growers that fit within the ESG expectations and I am very interested to see the outcome of those investigations," Lisa said.

Some of the attendees at this year's Women in Sugar Conference in the Burdekin.

WOMEN IN SUGAR: LISA PARKER

Lisa Parker was among more than 100 women from across the sugar industry at this year's Women in Sugar Conference in the Burdekin. She juggles multiple industry roles with professionalism and good humour, counting her blessings for a strong support network.

As manager and in-house counsel for Burdekin Cane and Agriculture Organisation, Lisa manages a business that supports around 100 local growers and recently underwent significant change.

"We've undergone a huge process of change, with a complete rebranding and the development of new strategic plan and we're looking for other opportunities outside the box that we can provide to our growers," Lisa said.

A qualified solicitor, Lisa is also mum to three young children, a Director on the Burdekin Water Board and with husband, Ross, operates two cane farms.

"I'm personally invested in the industry. My husband and I have a farm at Brandon and have recently leased another farm close by," she explained.

Lisa and Ross returned to the Burdekin in 2017 after Ross spent time managing a cattle property. As they considered their next venture in agriculture, sugarcane proved most attractive.

Lisa said she is excited about the future of the industry, particularly given the recent launch of the Sugar Plus vision and roadmap.

"Very positive. I think there is so much opportunity in this industry and with this plant," Lisa said. "It will take significant collaboration and cooperation from all stakeholders to ensure that we are all able to access the benefits of realising the future opportunities in food, energy and fabrication."

Lisa is also passionate about environmental sustainability and social licence to operate, spurring her commitment as a Director on the Burdekin Water Board.

"I joined that organisation because water is one of the most important resources in this region and I wanted to do my part to ensure the continued health of the aquifer in the lower Burdekin area in which we farm," Lisa said.

She's also involved with the Burdekin Bowen Integrated Floodplain Management Advisory Committee (BBIFMAC) and the Local Marine Advisory Committee (LMAC) choosing to be on the front foot

Maryann Salvetti.

WOMEN IN SUGAR: MARYANN SALVETTI

Getting to know your business builds confidence and reaps opportunity," says Maryann Salvetti, Co-Managing Director Salvetti Farming Co and Chair, Far Northern Milling Pty Ltd.

In 1977 Maryann Gauci holidayed in Far North Queensland, an escape from her native Melbourne and its unpredictable seasons. Two years later she would marry third generation Atherton Tablelands farmer Dennis Salvetti.

Over the next four decades (and counting) along with her husband Maryann would establish several successful agriculture businesses and become the first chairperson of Far Northern Milling Pty Ltd.

"I am a person who thrives on challenges. What motivates me is succeeding in things that other people wouldn't try and do," Maryann said.

"For instance, buying Mossman Mill with a group of growers. No one else was interested, but I could see that the community needed the mill to stay alive. Forming a cooperative to control our own destiny really drove me, it excited me to change the face of the milling industry and give longevity to the industry in both Mossman and the Tablelands."

Leaving family behind in Victoria in the '70s was hard for Maryann but she immediately embraced life on her new husband's Tolga farm.

"In the early years I didn't have a big role in the farm because I was raising children. But it was all an adventure.

"I did spend a lot of my time answering the phone, which of course was a landline, there were no mobile phones then. People would call during the day to talk to 'the farmer. They didn't want to speak to me, so I found myself taking lots of messages for Dennis. I soon learnt that if I wanted to spend some quality time with my husband, I had to make sure he wasn't on the phone all evening returning those calls.

"That's probably where my passion for farming started. With Dennis' support I got involved in making decisions. I started to run the seed side of the business, doing all the marketing and building up sales."

In 1996 when a call went out to form a much-needed canegrowers organisation in the area Maryann stepped forwarded.

"I thought, yeah, I'll have a go at that, it's something different. We hadn't been in cane long at that point but I knew enough and I was keen to know more. Doing that, stepping up, opened up my world."

Maryann admits that she hasn't found being a woman in agriculture a hurdle and credits her confidence and ability to 'give anything a go' to her father, along with the support of her husband.

"I think the hardest thing for women is having the confidence to get up at meetings and have their say," Maryann said.

"To do that you need to know what you're talking about. It's important for women to get involved and understand how their business runs, and how the industry runs.

"I know a lot of women who tend to sit back and not have their say because they're scared of what people will say. But most women in agriculture are there because they have a passion for it, and that's how it should be, I don't agree with people being there because 'it's their right', male or female. But if you're there, you have to be invested, stand up and have your say; let your ideas be heard; or take your place at a boardroom table and make decisions for your growers. You'll be so pleased you did."

A mother of three and grandmother of seven Maryann says she has no intention of retiring (but don't tell Dennis).

"I'm thoroughly enjoying my role as chair of Far Northern Milling and I hope I've still got quite a number of years' there to do what I want to achieve. Outside of the mill, my main goal is to make sure that the businesses that my husband and I have set-up continue to grow with my children.

"My sons both work in the businesses, and for the last two or three years my daughter and daughter-in-law have come to work with us, and in that short time I can see the confidence building in them as they understand what we do and their role in it.

"With confidence comes opportunity. And when opportunity is available you've got to be able to run with it. And a lot of women are very good at that. They are multiskilled, they can multitask.

"As far as I'm concerned if you're a confident person you can take on the world, but you don't have to do that on your own, there are plenty of people out there – male and female - who can and will help you. Just don't be afraid to ask."

to understand and be informed about water quality issues and the impacts of climate change.

"I'm passionate about it and I think involvement in all of these organisations gives me a better understanding of these industry issues. I think knowledge is power, and the more accurate knowledge you can obtain, the better equipped you are to contribute to collaborations and to respond to questions."

It makes for little in the way of spare time, yet Lisa still manages to create space for some early morning horse riding at the start of the day and is grateful for the support of a strong family network from her in-laws locally and her parents in New South Wales.

"They are wonderfully supportive in any way they can possibly be, so we're very, very lucky. I feel incredibly fortunate to be in the situation that I'm in."

Lisa Parker.

WOMEN IN SUGAR: TERESA FOX

Young women who have grown up on the family cane farm and want to develop their own career while forging a farm business role, need look no further than Teresa Fox as their guide.

Teresa and her brother are the third generation on their family's sugarcane farm situated between Mackay and Proserpine in Central Queensland.

Teresa enjoyed the freedom and space of growing up on a sugarcane farm, with the normal weekend farm kid jobs - shifting irrigation pipes and winches, rock picking, and helping with planting.

That changed when she entered boarding school in town for her secondary school years, only coming home to the farm on weekends.

"I enjoyed business subjects in grades 11 and 12 but realised I also loved the farm and agriculture so started looking for ways to combine the two."

On leaving school, Teresa studied a Bachelor of Agribusiness majoring in Economics at the University of New England.

"It was a fantastic experience studying interstate. I knew no-one and even had to google where Armidale was. I stayed in college on campus and volunteered for things that interested me to make friends and explore NSW."

During this time, Teresa met her partner, Cameron, whose family lives in Sydney.

On graduation Teresa moved to Sydney to work in export grain coordination for Sanwa Pty Ltd, then entered a supply chain graduate program with BE Campbell, a large pork manufacturing plant, later securing a permanent role as the Livestock Buyer.

An interest in the larger agricultural picture saw Teresa take a position a position at the national agricultural policy think tank, the Australian Farm Institute, as a Research Officer in 2019. Communications was later added to her role.

She has worked on a wide range of agricultural issues including currently helping develop a carbon opportunity decision support tool as well as working on the development of the Australian Agricultural Sustainability Framework.

However, while living in Sydney was exciting, Teresa missed the farm and her family.

She also wanted to become more involved in the farm business, eventually – "not jumping in with both feet, just a toe or two to begin with," Teresa said.

In March last year she got her opportunity when she returned to Mackay and began working remotely.

"I'm very grateful for the support of my employers in making the move to full-time remote working possible."

Teresa gets out to the farm every couple of weekends and attends local industry events when she can.

She has also secured a voluntary position on AgForce Queensland's inaugural Young Producer Council.

"I've really enjoyed working with the passionate, interesting and hard-working group of young farmers and ag professionals on the Council. We're working on ways to help more young farmers purchase a property - one of the biggest challenges to starting farming. We also want to raise awareness of the opportunities and career choices available in the industry.

"I think opportunities for women in sugar are expanding. There is a greater awareness that it's a strength to have diversity in your workforce, on your board or on your voluntary committee. But there are still barriers we need to overcome to feel included."

Teresa Fox.

(Left) *Emilie Filiols and grower Ray Abela examine a weed sample found in the Mackay area.*
(Below Left) *Emilie Filiols' display of weeds at the Field Day - can you identify them.*

DISTURBING NEWS ABOUT TWO WEED PESTS OF SUGARCANE

Following a tipoff, SRA Weed Scientist Emilie Fillols parked her car at the Puma Farleigh petrol station near Mackay and slowly walked near the highway inspecting the drains.

She was soon able to find what she wanted – a fully grown healthy Navua sedge. She placed it carefully in a plastic bag and sealed it securely. Later that week she showed it (still in its plastic bag) to sugarcane growers at the MAPS/SRA Field Day at Victoria Plains, asking them to let her know if they spot it on farm.

"This is not something you want in your cane when you are harvesting," Emilie warned.

Navua sedge *(Cyperus aromaticus)* is a vigorous grass-like perennial which normally grows to about 30-70 cm high. A native of tropical Africa it was first found in Australia growing on Cairns footpaths in 1979. It has spread north to Bamaga, south to Townsville and west to the Atherton Tablelands.

Growers and agricultural resellers say it is now springing up in several parts of the Mackay district, particularly along the highway.

Navua sedge is a problem where the sugarcane crop is light with a poor canopy cover. It can spread easily by seeds and from an interconnected underground stem system. It can form dense stands that will choke a harvester.

The only registered herbicide for Navua sedge is Nufarm's Sempra, used only in pastures.

"However, Sempra is not very effective on well-established Navua sedge infestations, so it is important to identify it early and control it while still small."

Several organisations including the Department of Agriculture and Fisheries (DAF), Federation University and SRA are working hard to find effective strategies to control Navua sedge, but to date well established infestations are still difficult to control."

Emilie is also concerned that there are now confirmed cases in the Burdekin of Crowsfoot *(Eleusine indica)* which are resistant to haloxyfop, a Group A herbicide, sold as, for example, Verdict®520.

"These resistant populations have so far only been confirmed in long-term bean fallow rotations where haloxyfop has been heavily relied on," Emilie said.

"Once herbicide resistance is confirmed in a paddock, chemicals with alternative modes of action need to be used to control the survivors and especially to stop them at the seedlings stage.

"Pre-emergent herbicides are also an important tool to reduce the bulk number of germinating seeds, so there are fewer resistant weeds to control with alternative post-emergent strategies.

"In some cases, mechanical removal or control in fallow crops will be the best options, to widen the range of chemical modes of action available.

"If resistance is detected early, you can control the seed bank in two or three seasons by monitoring your paddock very carefully and ensuring there are no survivors," Emilie said.

"When a herbicide is not as effective as expected, poor spray timing is often the main issue. But if you think you have an emerging herbicide resistance issue, please contact me and we'll get the weed seeds tested and discuss your control options."

Emilie Filiols addresses Mackay Area Productivity Services and Plane Creek Productivity Services staff during a weed management workshop.

The Australian Cane Farms billboard provides Bruce Highway travellers a welcome to the Burdekin.

Silos visible from the highway ensure the farm is noticed by passers-by.

AUTOMATED IRRIGATION SAVING TIME AND MONEY

One of the Burdekin's large corporate growers has begun the process of automating their irrigation, with support from the Burdekin Irrigation Project.

Australian Cane Farms is counting the benefits in improved productivity and reduced costs and water use, while also achieving improved environmental outcomes.

Since 2006, Australian Cane Farms has grown from farming a couple of hundred hectares to more than 4000.

Their property at Horseshoe Lagoon, north of Brandon, is prominent on the Bruce Highway - its billboard signage welcomes passers-by to the Burdekin, while its towering silos are standout features among fields of sugarcane.

General Manager Farming Operations Ryan Matthews said the property was a natural choice as the starting point for the company's switch to automated irrigation.

"We want to be seen as an industry player to be working to the best of our ability to have a good environmental footprint, because there's a lot of pressure on this industry," he said.

"We want to make sure that when people drive up and down the Bruce Highway and they look at our farm before they cross the creek, they say, 'you know there's very minimal water running off into a natural waterway'."

Ryan said automating irrigation on the 320-hectare farm made good business sense.

Farm Hand Cornel Du Blessis –"Duppie" - programs the irrigation schedule in the office.

Australian Cane Farms General Manager Farming Operations Ryan Matthews is pleased with the benefits of automated irrigation.

"It's basically to try and utilise our farm hands so we're getting value for time and doing other jobs," Ryan said.

"Just running around our properties, turning on taps, turning pumps on, turning pumps off, is a time-consuming exercise," Ryan said.

"Each individual is looking after 400 hectares by themselves, so they spend a lot of time driving around. This is about simplifying that."

Not one for computers, Farm Hand Cornel Du Blessis – affectionately known as Duppie - admits he was daunted when introduced to the computerised technology. But his confidence has grown rapidly.

"Now I find it's a stroll in the park. It is so straightforward, and you rely on your equipment. It has been set up and it will switch on and switch off when it's supposed to," Duppie said.

"We're saving water, saving money and time – that's the big thing.

"You've got peace of mind that everything is going to happen the way it should. It's made my life so much easier, it's phenomenal. I love it."

Two months into using the automated system, Duppie is looking to adopt more of the automated features available.

"There are so many functions that I can use to make my life even better.

"For instance, we have an end-row sensor that you can put in the row and as soon as the water touches that it'll open the next set. I'm not there yet but I'll get there.

Ryan said the set-up process was simple, thanks to support received through the Burdekin Irrigation Project.

The project is supporting lower Burdekin sugarcane farmers to transition to more efficient irrigation systems and practices to help reduce on-farm irrigation expenses, run–off and deep drainage losses.

Farmers receive one-on-one support to improve systems, identify opportunities to save on energy and irrigation costs, and investigate potential water-use efficiencies.

"We found it quite easy. Initially you just put in your expression of interest, and send it back to SRA," Ryan said.

Participants can choose to work with one of three delivery partners - AgriTech Solutions, Burdekin Productivity Services or Farmacist.

"Once your application is ticked off, they touch base and work with you. They design the system based on how you want it to work, and what result you want to achieve.

"We're really time poor and it's been a simple process."

Like Duppie, Ryan is pleased with the results which enable the business to maximise irrigation, while reducing water use and losses from flooding or run-off.

"We can have the system change irrigation sets at midnight or two o'çlock in the morning. In the past we had timers on pumps, which turns off the pumps, but that's six hours of irrigation time we're losing and it adds complexity to Sunwater as well, in trying to manage their channel heights.

"Having our pumps run 24 hours a day and having irrigation sets turn themselves on and off automatically, makes it easy for Sunwater to maintain a channel height that delivers the flow rate that we desire.

"It also maximises our irrigation efficiency, so we don't lose six hours of pumping time. On this property we pick up three or four days in just not having the pump stopped. It also means I don't have to get one of my farmhands to wake up at midnight or two o'clock in the morning to change irrigation sets to get the same result."

Australian Government | Reef Trust | Great Barrier Reef Foundation

The Burdekin Irrigation Project is funded by the partnership between the Australian Government's Reef Trust and the Great Barrier Reef Foundation with collaboration between Sugar Research Australia, Farmacist, AgriTech Solutions, Burdekin Productivity Services, Burdekin Bowen Integrated Floodplain Management Advisory Committee, James Cook University, the Queensland Department of Agriculture and Fisheries and NQ Dry Tropics.

Victor Schwenke with Chuong Ngo and Lucy Gibbs at the Rocky Point Productivity Workshop in June.

THINKING ABOUT TESTING YOUR CANE FOR RSD? **HERE ARE SOME TIPS**

Victor Schwenke has been the Productivity Officer for Rocky Point growers since 1980. He talks of working part-time and soon retiring but when it is time for ratoon stunting disease (RSD) sampling in July through October he's still busy working all week. He schedules and samples plant sources for RSD on four or five farms at a time and delivers the samples himself directly to the SRA RSD lab at Indooroopilly for testing.

As a result, the sample quality is always first class.

SRA Disease Diagnostic Leader Dr Chuong Ngo and Pathology Senior Technician Lucy Gibbs, who operate the RSD lab, praised Victor for his care, at a workshop for Rocky Point growers in June.

Chuong and Lucy reported that sample numbers across the state received by the lab for testing have increased in recent years and that there has been an increase in RSD detections since a qPCR assay replaced the previous ELISA assay in 2019.

"Our test is now more sensitive and accurate compared to ELISA and as a result we are picking up more positives," Lucy said.

She showed growers that RSD lab test samples had jumped from 9,818 in 2020 to 12,561, in 2021 (including NSW).

Almost 10,000 of these (78%) were from productivity service groups who mainly focused on plant source inspections.

A further 2,743 or 22% of samples were from SRA plant breeding trials and propagation plots.

Demand from growers has been increasing as the message that RSD may be the reason for their poorly performing cane is extended. RSD surveys have also been undertaken in some districts to assist the industry to gain an understanding of how much RSD is out there.

"We are already half-way through 2022 and samples processed to June were 8,080, up from 6,701 for the same period in 2021. Of course, it may just be that the samples are coming in earlier this year," Lucy said.

Of the total samples tested in 2021, 8.5% were positive.

"That is a very low figure because the samples generally came from the cleanest cane there is," said Lucy.

The lab is now busiest from March to July.

The average turnaround time is five days, inclusive of when the samples are received for testing to returning the results.

"It doesn't take three days to run the qPCR test, but turnaround times depend on sample backlogs (samples sent in during our busiest months) and if the sample requires re-testing when sample quality is poor."

In Rocky Point, the smallest sugarcane district in Australia, Victor samples around 150 blocks a year. Of these, 18% were positive in 2021, down slightly from 2020 when 22.5% were recorded as positive.

Dr Chuong Ngo gives his presentation.

"This could be because RSD rates are dropping in the region or it could be because growers are taking more care with sterilising equipment and ensuring they have clean seed to plant," he said.

For those growers planning to sample their cane, Lucy and Chuong had this advice:

"Contact your local productivity service and advise when and how many blocks you would like tested. Let them know early and don't wait till the last moment. Some Productivity Services send out plant source request forms and these should be completed in good time to allow for scheduling of sample collection," Chuong said.

"Samples are routinely tested three times and every aspect of the process optimised to avoid human error, including the use of two robots.

"If there's an unexpected positive for an approved seed plot for example, we'll test that sample again. We'll discuss it with the productivity services manager and SRA Pathologist Rob Magarey to determine the best way forward."

Chuong warned growers that even with the best methods, no diagnostic test is perfect.

"Poor quality samples can lead to problems," he said.

"Also, we are just testing a raw sample. We don't do a DNA extraction of the sample.

"A positive means that the sample – and only that sample - is positive. If there has been some cross contamination during the field sampling process, that sample can also test positive. With the more sensitive test, it is important that those taking the samples take every precaution to ensure that the bacteria present in one sample do not contaminate the following one. "If the sample is negative it means we can't detect the bacterium in that sample. It doesn't mean the field from which the sample came is negative."

Chuong said that they tested a Rocky Point sample once and couldn't detect the bacteria, but Victor knew the field was positive because of a previous result.

"We investigated this more closely and found that the sample had a very low level of the RSD bacteria. This Rocky Point sample helped shape and improve our lab processes."

Chuong said that due to the recent improvements the lab was picking up at least 20% more positives these days which would have been missed in previous years.

"The important thing to remember is that RSD is not always uniformly distributed in a block. If you take just one sample from one block, you may not have sampled a diseased stalk – and the assay may provide a negative result but the crop is actually diseased. The more stalk samples you take the better chance you have of detecting the disease. Detection is almost impossible in blocks with really low levels of disease, because of the low number of stalks with RSD."

Lucy gave an example:

"Testing a block of cane is like testing a town for COVID. Testing only sixteen people from a town of 10,000 people to see if COVID is there, at the start of an outbreak, doesn't give authorities a high confidence in the result. Once COVID starts spreading (similar to RSD levels spreading and increasing in ratoon crops) the chance of detecting the disease increases. Perhaps authorities test the sewerage of the town. It comes back positive so you know COVID is in the town but you don't know which individuals."

The lab personnel emphasised that RSD testing is a quality control tool (telling you whether your management has been adequate), but not the main management strategy for keeping crops disease-free. Management relies on the following:

- planting seed cane and commercial crops into fallow ground, free from potentially diseased volunteers
- acquiring clean seed material or tissue culture for planting
- practising good farm hygiene (sanitation of the cutting surfaces of mechanical equipment) to prevent the spread of RSD from diseased to healthy crops.

Victor Schwenke said that thanks to the new lab testing technology he expected lower RSD positives over time as growers tested their cane and used the tools available to them to control it. He had attended the workshop to hear about the potential detection methods in the mills which he found very exciting.

SRA Pathologist Robert Magarey chats with CANEGROWERS Board Member Michelle Fischer (Rocky Point) (left) and Director of CANEGROWERS Rocky Point Suz-anna Burow-Pearce at the workshop.

HANDS-FREE FARMING IN AUSTRALIA: **LESSONS FOR THE SUGAR INDUSTRY**

The Digital Agrifood Summit 2022 held in Wagga Wagga in June examined the digital trends and technologies transforming Australian agriculture.

The key focuses of the summit were: hands-free farming; robotics and artificial intelligence; carbon and natural capital; and the circular economy.

The summit was an initiative of the Food Agility Cooperative Reserach Centre, Charles Sturt University and AgriPark. Food Agility is a commonwealth funded research body that invests in world leading research changing the way we produce, supply and consume food.

Chief Scientist Professor David Lamb is a physicist who has worked in precision agriculture for more than 25 years, and was one of the team behind the fully automated digital farm at Charles Sturt University in Wagga Wagga. Prof. Lamb kicked off the proceedings with an address which looked at progress and challenges for hands-free farming in Australia.

"We tend to conjure up images of drones at work while we sit on the veranda having a cold beverage, but robotic systems, autonomous systems, artificial intelligence systems and the data they bring to farmers are all a part of the mix in hands-free agriculture of the future," he said.

Professor Lamb said there was an estimated global growth rate for hands-free farming of 30 per cent compound annual growth year on year by 2030.

"What matters most is the 'why' it is happening: it's about solving problems and improving the experience of work – both its safety aspects and repetitive tasks, saving time and costs, and having good data to make good farming decisions.

"Robotics is now a part of every machinery maker's product development roadmap and Australia is already about 18th in the world in terms of the density of our population of robots in our production systems, including in manufacturing.

"However, telecommunications still remains a key challenge for achieving hands-free connectivity out in the paddock. Sleeves up, Australia!

"Fortunately, there are already novel paths forward including Australian wireless networking company, Zetifi's connectivity solutions which are achieving coverage across kilometres of farming land and paddocks.

"Analytics, machine learning and artificial intelligence (AI) are a key part of our road to hands-free farming. The global compound annual growth rate in AI software according to Statistica is forecast at 54 per cent year on year (2019-2025.)

"There are companies like Pairtree Intelligence which initially started out as an aggregator of data but is now working on customised solutions on the ground for the end user – the farm owner.

"American company, Loftus Labs is also merging analytics capability with customised dashboards to suit the farmer's business needs.

"Farmbot and Yield Technology Solutions are two other companies looking at how the user experience works, getting detailed data into a form that is client facing, and fits under the bonnet of a particular business system.

"Incidentally, this is also how we make these technologies exciting for young people who will be operating these technologies and these farms in the future.

"Why make some big clunky, remote controller when you can have it designed like a PlayStation gaming console or a VR experience?

"Then there are the retrofitting capabilities of a company like AME Group. If you want a robotics tractor you now don't have to buy one off the floor. You can take a reasonably contemporary tractor and retrofit a system on it. You then drive the tractor you already know through its operations while recording it, hit the play button and it will keep doing that set of operations.

"These sorts of things make a difference when it comes to the interface between the amazing opportunity of a product and working with the reality of our farming systems and the capability of our workforce."

SRA participants were impressed with the 'Cockroach' R150 robotic equipment from XAG Australia. In addition to its potential production systems applications could also offer Workplace Health and Safety benefits for some farm tasks.

SRA's Danielle Skocaj, Terry Granshaw and Phil Patane were among the participants who took part in the tour of the Global Digital Farm Demonstration Site as part of the Digital Agrifoods Summit in June.

While technology is moving in the fast lane, Professor Lamb referred to the challenge of the regulatory sphere as 'the slow lane'.

"My advice is to keep an eye on the trends from the regulatory side but be aware the law is still largely being thrashed out in the courts." he said.

Other challenges included whether farms and farmers were robotics ready and if social licence issues would be raised in future if plants and animals have only been handled by machines.

In a panel discussion, CEO of Robotics Plus Steve Saunders - a farmer for 35 years - said he could start to see the challenges in his own farming system around labour and safety years ago.

"The challenge is understanding the price point where the technology proves its economic sense. What is the value-add the technology can bring into the system? How will it impact the upstream and downstream supply chain?

"We have got more than 200 globally integrated machines around the world now but in parts of Australia it can take a full day for a service agent to go out to a machine and back. So it's the ease of maintenance, remote support, trust and safety, the staff capability, the training of staff, and the regulatory certifications that must all be worked out."

Dr Sue Keay is the Chair of Robotics Australia Group an incorporated not-for-profit organisation set up to act as the voice for robotics in Australia and the Robotics Technology Lead, Oz Minerals.

"We put together a robotics roadmap for Australia. Australia specialises in the development of field robots, or outdoor artificial intelligence which is applicable across a range of different sectors. However, when putting the roadmap together we identified sectors were operating in their own silos.

"In areas in Australia that are taking up robotics at pace, we need to find ways to break down the barriers for a much better flow of information and ideas from one sector like defence to sectors like mining and agriculture; that would be really advantageous."

Addressing the need for a skilled workforce for the digital farm, in the face of general labour shortages in agriculture, Professor Lamb commented:

"Yes, we do have a labour shortage but I don't think we've worked hard enough to bring the workforce back into regional areas. It's the way we market it, the way we engage with our trainers, our universities, our vocational education and training sector, to show our students, our future workers, that there is a future in the bush.

"When I think back to 2017, when the Accelerating Precision to Decision Agriculture report was written, there was a lot of opportunity and excitement around this Farming 4.0.

"I think that the companies that are now offering products or services have long since realised you just don't throw the stuff out there and people will buy it - they're taking the time to sit down with clients and understand the farming business to work out how to dovetail their product and solution into it, playing a more active role. That's where the opportunities are."

Turning to questions of robotics and the environment, General Manager Australian Farm Institute Katie McRobert said the Institute had worked on the issue of ag sustainability in the past 12-18 months.

"The premise initially had been that sustainability should be something farmers get a premium for as stewards of the land and water.

"But we have moved away from that conversation to one about farmers needing a ticket to play in future. Finance providers, banks and insurers want to know more about what's happening on a property to make it sustainable and to hit environmental, social and governance goals, in order to cover their risk.

"Autonomous farming and potentially robotics can play into that and provide the farm owner or manager with the data about what's being achieved and what needs to improve."

Dr Keay referred to the benefits of embracing new aspects of technology and redesigning processes from scratch.

"Until now, most equipment on farms is being made as big as possible so the farmer can cover as much ground as possible with only one person to work the area.

"But in the case of SwarmFarm Robotics, instead of having one large piece of equipment, there's a multiple number of small lighter pieces of equipment, which benefits not just the soil, but also costs and efficiencies. If one piece of equipment fails it can be swapped out without a standstill in operations."

COMMUNITY TRUST IN AUSTRALIAN RURAL INDUSTRIES – HOW ARE WE DOING?

When it comes to community trust and acceptance, rural industries are generally in good shape according to findings from the three-year Community Trust in Australia's Rural Industries Program, supported by Sugar Research Australia.

Social Scientist and Lead Researcher, Dr Kieren Moffat said Australians overwhelmingly valued what Australian rural industries do and the products that they make.

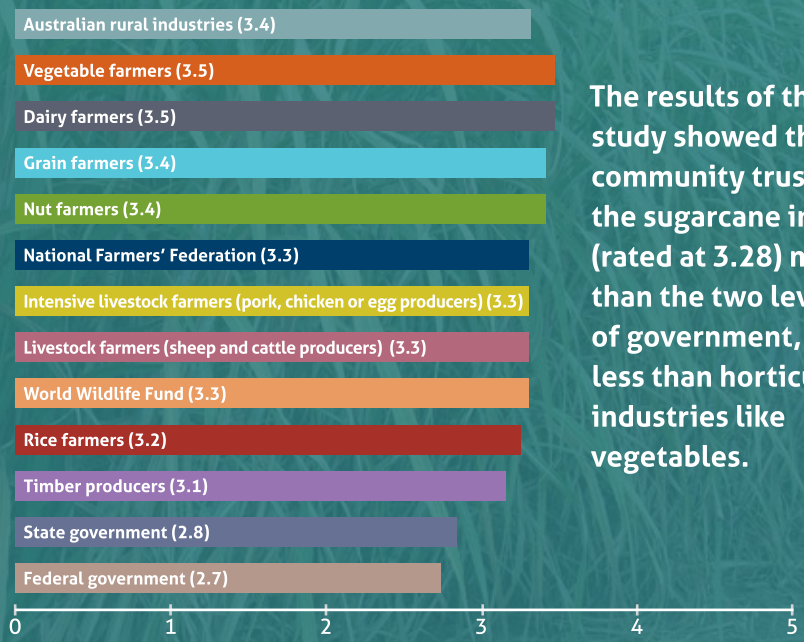
"That's not to say that the community isn't worried about some of the challenges associated with agricultural production and whether products such as sugar can fit into a healthy diet. But there is a really strong 85 per cent to nearly 90 per cent agreement that rural industries are important to our Australian way of life," Kieren said.

"That is a good starting point to remember when you see a negative conversation coming through the media - remember that the baselines of community acceptance are really high," he said.

"The industry can't be complacent about issues of concern, but farmers can have confidence that community trust is already high and there is goodwill that can be used in addressing more challenging issues."

Kieren presented an overview of results of the Community Trust and Rural Industries project to an industry group comprising different industry representative organisations including SRA, in May, including details of the Year 3 National Survey.

WHAT WAS RURAL INDUSTRIES' TRUST RATING OVERALL IN 2021?



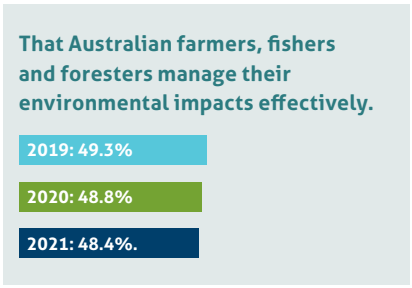
The results of the focal study showed that the community trusted the sugarcane industry (rated at 3.28) more than the two levels of government, but less than horticultural industries like vegetables.

What are the top trust issues?

Kieren showed that the top two drivers of trust in each of the three years of this research by a large margin were environmental responsibility and procedural fairness.

"Environmental responsibility is the sense that rural industries are acting responsibly; that they are managing their environmental impacts, such as their use of water, effectively and appropriately, and they are responsible stewards of the land and the sea," Kieren said.

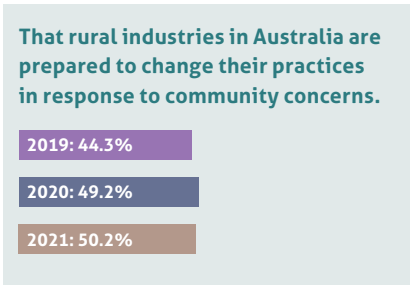
The three-year National Survey showed the responses from participants which are shown graphically below:



"These results show that trust and acceptance have remained at similar levels for the three years," Kieren said.

"They have not improved, but they have not dropped markedly, either."

Procedural fairness flows from this and has two components:



"In terms of listening to communities, sentiment hasn't moved much over the three years but has improved with respect to the extent community feel rural industries are willing to change their practices in response to community concerns – that's a real positive."

Why are community attitudes important?

Some issues, such as concerns about chemical use in farming, were raised by participants in the survey a number of times in different questions over the three years. Issues like these are seen to influence the community's overall trust and acceptance of rural industry.

The logic is that the more that the community is concerned about an issue, the less they trust rural industries overall, and the less they accept rural industries' right to operate.

"That could lead to action ranging from lobbying of government representatives to take more regulatory action, to demonstrations and negative publicity, to trespassing, to boycotting of products at the supermarket.

"The actions of one rural industry can flow into community perceptions of other industries. In addressing the impact of some important issues it is therefore important for industries to collaborate."

WHAT ARE OTHER ISSUES FOR THE SUGAR INDUSTRY?

The presentation included highlights of the sugar industry focus study which was undertaken at the end of 2020.

"Looking at the focus sugar industry study, the issue of managing environmental impacts effectively is as central as for rural industries overall," Kieren said.

"The extent to which community members feel that sugar has a place in a balanced diet is also important - the more that communities feel that to be true, the more they trust the sugar industry overall," he said.

"Interestingly, worker exploitation and work conditions came up as a specific and explicit issue in eroding community trust in the focal study. There is a growing belief in the community that exploitation of workers is a serious problem in Australian rural industries.

"The sugar industry has an opportunity to communicate the wide range of employment types available in the sugar industry to reduce uncertainty in a complex issue, particularly where issues are a carryover from other sectors."

The Community Trust in Rural Industries Program is a jointly funded initiative of AgriFutures Australia, Australian Eggs, Australian Pork Limited, Cotton Research and Development Corporation, Dairy Australia, Fisheries Research and Development Corporation, Sugar Research Australia, Grains Research and Development Corporation, LiveCorp, Meat and Livestock Australia and the NSW Department of primary in Industries. National Farmers' Federation is also a project partner and AgriFutures Australia is the managing agent.

With Molly O'Dea, (second from the left) are Proserpine Young Farmers members: Indi Lade, Justin Blair, George Cole, Sam Orr, Bessie Orr, Owen Lee and Darren Lee.

YOUNG FARMERS EXPLORE PRECISION AGRICULTURE SUGAR CANE TRIALS

Former SRA project officer, Molly O'Dea was pivotal in forming the Proserpine Young Farmers (PYF) group in 2019, supported by SRA and Sugar Services Proserpine (SSP).

Members of the group wanted to come together and create an environment where younger people could see and learn about new technologies and farming practices, not only from each other, but also others inside and outside of the industry.

At the Proserpine Young Farmers' Precision Agriculture workshop in June, Molly spoke about sugarcane precision agriculture (PA) trials begun by the group in 2020.

The trials were set up on PYF members, Sam and Bessie Orr's farm at Foxdale, which supplies 7500 tonnes of cane annually to Proserpine Mill. The Orrs purchased a new 40 ha block which, was set up on 1.5 metre row spacing. In the first year of the trial, the block was harvested with a yield monitor installed on the harvester. From this, a yield map was developed as a base for the first year of the trial.

After harvest, the block was reformed to 1.8 metre row spacing and the drainage laser levelled to enable a controlled traffic farming system to be adopted. This will reduce the area of compacted soil and create improved farming efficiencies.

The group engaged Vantage BMS LaserSat to undertake Trimble Soil Information System mapping on the PA trial block. The company came out and mapped the area and took soil tests.

"They provided numerous pages of pretty coloured maps," Molly said.

"We had to work out what we were going to do with the information."

Unfortunately, the Trimble service didn't go quite to plan. The surface soil test was taken from 0-40cm in depth while the deep soil test was 40-120 cm in depth.

However, soil recommendations in sugarcane are taken on a soil test from 0-20 cm.

"So, there were some big assumptions for the lime and gypsum recommendations from the start," Molly said.

"But we just had to work with what we had. That was a little bit disappointing, but that's how it is.

"John Hughes and Tony Crowley from Farmacist helped us out heaps so a big thank you to those guys.

"From the data, we decided as a starting point that we needed to put on some lime and gypsum," she said.

"Farmacist made up variable rate maps for us and we could just plug them straight into the spreader and off we went.

"The block was harvested again last year. We got the yield data to be able to compare results," Molly said.

"We will have another look after harvest this year as well. We were not expecting anything miraculous from applying lime and gypsum. It takes time to work because it is usually applied at the surface soil and can take several years to increase subsurface soil pH."

Soil variability across the paddock is not uncommon and the larger the variation between soil types, particularly in their pH levels, the more compelling is the case for a variable rate application.

To map the soil type variability, the paddock can be surveyed with an electrical conductivity (EC) and a soil sodicity soil mapper. These generate geo-referenced maps.

"We based our variable rate prescription for gypsum and lime on the EC map," Molly said.

"We applied a few different strips at varying rates – 0 rate applied, 2000 kg/hectare (recommended by SRA guidelines) and 4000 kg/hectare.

(Left to right) *PYF President Bessie Orr, with Molly O'Dea and SRA District Delivery Officer Stephanie Duncan.*

"Our tests also found a bit of calcium deficiency as well. We added lime to correct that. We used a variable rate across three strips.

"We discovered some acidity at the top of the block but there was not enough variation to have to use a variable rate, so we just applied lime across the whole area to correct pH.

"We also found some zinc deficiency in the soil in varying locations."

Molly took some tissue tests to discover what zinc levels showed up in the actual plant.

"While the soil tests showed areas with and without zinc deficiency, tissue tests from both areas produced results showing borderline deficiency. We plan to have a look at this more closely further down the track," Molly said.

"A few other things came up in the leaf analysis including sulphur deficiency. Molybdenum was also a problem based on SRA's number but there is pretty limited research around leaf testing on this so that's something else we will look at in the future.

"The results so far are not very clear and we will do more analysis after the next harvest.

"With new cane, fertiliser and new groundworks there was a higher cane yield everywhere in the paddock.

"There was a 2.1 tonnes per hectare higher yield on average where we put lime on. That's not a large difference but an improvement with the calcium.

"The difference between areas where lime was and wasn't applied is showing a smaller difference in yield, so not much is happening with the lime yet.

"With the gypsum there was actually a 28 tonne/ha increase where the gypsum was applied to where it wasn't applied.

"It might not just be because of sodicity because sulphur was pretty low as well. Clearly, there are a few factors at play.

"It is important to note that these numbers are preliminary and we'll have a better look and analyse all of the data properly once we've got another year's harvest results.

"When we get all the results, we'll post them on our Facebook page to keep you updated," Molly said.

If you are interested in following the trial which is expected to finish in October, follow Proserpine Young Farmers on Facebook.

TO JOIN PROSERPINE OR MACKAY YOUNG FARMER GROUPS PLEASE CONTACT:

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FORECASTING UNSEASONAL AND EXTREME WEATHER **IS NOW EASIER**

Cane growers now have access to agriculture specific weather and climate information to help them make critical business decisions.

A set of new tools to help farmers plan for extreme weather and climate events has been released by the Bureau of Meteorology's climate outlooks service. The five tools have been designed in response to farmers' growing need for information about unseasonal and extreme weather and climate events to help build their climate resilience and support better-informed decision making.

Feedback from farmers has been taken on board throughout the development of the tools during the five-year Forewarned is Forearmed project, a partnership between industry and research sectors, including SRA.

A highlight of the new tools is the location specific detail about extreme rainfall and temperatures available across Australia.

Users can drill down to their location to view the chance of unseasonal and extreme temperature and rainfall for either the weeks, months, or seasons ahead.

Using these tools growers are able to see the likelihood of extreme dry/wet and warm/cool periods, and three day-rainfall bursts.

More detail can be found in pop up charts for a farm location, anywhere in Australia.

The five extreme event forecast tools now available on the Bureau's website are:

- **Tools 1 and 2:** extreme climate maps and location-based bar charts (released on the Bureau's climate outlooks webpages in November 2021).
- **Tool 3:** a location-based forecast rainfall and temperature time series: weekly and monthly forecasts as a time series (called 'climagrams') for any grid point in Australia.
- **Tool 4:** graphs displaying the probability of a comprehensive range of rainfall amounts for the coming weeks to seasons, termed 'probability of exceedance'.
- **Tool 5:** rainfall probability maps displaying the likelihood of exceeding three-day rainfall totals, ranging from 15 mm to 75 mm in the weeks and fortnights ahead. These are described as 'burst potential' maps.

The recording of a webinar exploring Tools 3, 4 and 5 following their recent June release is available to view online at:

https://youtu.be/RL0JrRY61NU

The tools can be accessed on the Bureau's website:

www.bom.gov.au/climate/outlooks/

Australian Government
Department of Agriculture, Fisheries and Forestry

Queensland Government

This five-year project (2017 – 2022) is supported by funding from the Australian Government Department of Agriculture, Fisheries and Forestry as part of its Rural R&D for Profit program, in partnership with 14 project partners including SRA. The project is managed by Meat & Livestock Australia. SRA acknowledges co-funding from the Queensland Department of Agriculture and Fisheries.

SIMPLE TARIFF CHANGE **CUTS IRRIGATION COSTS**

SRA District Manager Central Dylan Wedel, is one of several SRA staff who run their own cane farms. He and his wife, Sarah, have owned a farm at Victoria Plains since 2016, supplying mainly Farleigh mill. Recently, Dylan made a change on the farm which has helped save the couple a lot of money on their irrigation.

The property is 100 per cent irrigated using a low-pressure boom on a hard hose while the crop is small, then changing over to a high-pressure gun. They also flood irrigate some paddocks. For years the couple worked seven days on/seven days off at the mines and were constrained by time and resources on their farm. They were always on the lookout for ways to try to keep costs down.

"One opportunity I've found to reduce irrigation costs has been to assess if I was on the best electricity tariff for my situation," Dylan said.

Dylan recently changed over one of his own farm's irrigation pumps to Tariff 34 to reduce the cost per megalitre. This is a load control tariff that may be interrupted by Ergon Energy for up to six hours per day to manage peak demand on the network (e.g. summer evenings).

In return, this tariff has a lower daily supply charge and lower usage rate. See table.

To change to this tariff Dylan engaged an electrician to make some minor upgrades to his meter box and install a 'contactor' to allow for remote switching by Ergon.

The electrician, Brendan Camilleri from Energy Base in Mackay, had not done this for a client before, however with the aid of the information and the detailed installation guide, available online, he was able to complete the job quickly.

Dylan typically uses 320 kWh/ML with his high-pressure gun, so moving to Tariff 34 means he is saving $22/ML in pumping costs.

"With the changeover costing about $1500 the irrigation will pay itself off after only 45 days of irrigation," Dylan said.

"Homes and farms are becoming more automated, and I've found several simple gadgets on the market that can notify you when the power is switched off by Ergon. There are also gadgets that can then restart your pump when power is restored.

"If growers in the Central district would like to discuss how they can get more bang for their irrigation buck, please ring me on 0490 029 387."

Read more online at www.ergon.com.au/loadcontroltariffs or scan the QR code below.

	TARIFF 34	TARIFF 20	SAVINGS BY MOVING TO TARIFF 34
Supply charge per day	$1.25	$1.35	$0.10
Usage per kWh	$0.21	$0.28	$0.07

SCAN QR CODE

SRA's District Manager Burdekin Terry Granshaw caught up with Townsville Enterprise Chief Executive Officer Claudie Brumme-Smith, Burdekin Shire Mayor Lyn McLaughlin and Senator Susan McDonald at Farming in Focus.

The event at the Ayr Showgrounds brought together primary producers from across the Burdekin to discuss innovation in agriculture.

Mayor Lyn McLaughlin said the region's traditional industry of sugar production and processing would continue to play a critical role into the future, with an important focus on innovation and value-creation.

"Our local growers continue to diversify their fallow land and are innovating in a range of areas," Cr McLaughlin said.

The event, coordinated by the Burdekin council and Townsville Enterprise, canvassed a range of innovations including biofutures and renewable energy.

Terry Granshaw presented on several projects focused on improving productivity and profitability for the industry, including the Burdekin Irrigation Project, precise robotic weed control, the cane harvest optimisation tool currently in development, and use of drones to improve decision making in plant breeding and variety development.

RESEARCH PROJECT INVESTMENTS

PROJECT IDENTIFIER	TITLE	CHIEF INVESTIGATOR	RESEARCH AGENCY	END DATE
Research Mission 1: Continuous improvement in farming and milling profitability				
2017/002	Implementing and validating genomic selection in SRA breeding programs to accelerate improvements in yield, commercial cane sugar, and other key traits	Ben Hayes	UQ	1/10/2023
2017/007	Investigations to mitigate the effects of juice degradation in factory evaporators on sugar recovery and quality, corrosion and effluent organic loading	Darryn Rackemann	QUT	1/05/2022
2018/005	Genetic analysis and marker delivery for sugarcane breeding	Karen Aitken	CSIRO	1/11/2022
2019/002	Validating high-throughput phenomics technologies for sugarcane clonal selection	Sijesh Natarajan	SRA	30/09/2022
2019/005	Strategies to minimise impacts of processing existing soft cane varieties, and industry cost/benefit analysis	Floren Plaza	QUT	1/05/2023
2019/007	Eliminating roll arcing	Geoff Kent	QUT	1/08/2022
2019/901	Smarter Irrigation for Profit Phase 2	Multiple	CRDC	30/06/2022
2020/003	Maximising cane recovery through the development of a harvesting decision-support tool	Phil Patane	SRA	1/06/2023
2020/202	Improving pan stage performance by on-line monitoring of C seed grainings using the ITECA Crystobserver	Ashley Curran	Sunshine Sugar/ QUT	1/11/2022
2021/002	Pre-commercial development, testing and validation of RSD LAMP assay for sugar mill roll-out	Jimmy Botella	UQ	30/08/2022
2021/201	Use of a purge sensor to improve performance and reduce the need for supervision of batch centrifugals	Robert Zahn	Bundaberg Sugar	30/07/2022
2021/202	At-line purity sensor to enhance the monitoring, control, and performance of pan stage	Bruce Tyson	WH Heck and Sons	30/07/2022
2021/203	On-line measurement of the physical properties of each cane consignment at the factory	John Edwards	Tully Sugar	30/07/2022
2021/204	Evaluate the operational performance and industry application for the final evaporator design at Victoria Mill	Jonathon Gilberd	Wilmar Sugar	30/07/2022
Research Mission 2: Position the industry to stay ahead of climate, environmental and biosecurity threats				
2017/809	Modern diagnostics for a safer Australian Sugar Industry	Chuong Ngo	SRA	1/02/2023
2018/010	Moth Borers - how are we going to manage them when they arrive?	Kevin Powell	SRA	3/01/2023
2020/002	Developing an integrated device for on-farm detection of sugarcane diseases	Muhammad Shiddiky	Griffith University	1/04/2023
2020/004	Beyond imidacloprid - chemical and biorational alternatives for managing canegrubs	Kevin Powell	SRA	1/03/2025
2020/007	Environmental DNA technologies and predictive modelling for rapid detection and identification of sugarcane priority pests	Andrew Weeks	Enviro DNA Pty Ltd	1/03/2024
2020/008	Transformational crop protection - Innovative RNAi biopesticides for management of sugarcane root feeding pests	Neena Mitter	UQ	1/06/2024
2021/002	Pre-commercial development, testing and validation of RSD LAMP assay for sugar mill roll-out.	Jimmy Botella	UQ	24/08/2022
2021/003	Scoping study of the requirements for the Development of CaneMAPPs	Ando Radanielson	USQ	1/04/2022
2021/401	Risk assessment for the newly discovered parasitic nematode *Pratylenchus parazeae* in the Australian sugarcane industry	Shamsul Bhiyan	SRA	1/05/2023
2021/402	Towards more sustainable pest control strategies through a metagenomic survey of viral entomopathogens in canegrubs populations	Kayvan Etebari	UQ	1/04/2023

PROJECT IDENTIFIER	TITLE	CHIEF INVESTIGATOR	RESEARCH AGENCY	END DATE
Research Mission 3: Capitalise on changing consumer preferences, and the growing bio and green economies to develop diversification opportunities				
2019/902	Biorefineries for profit - phase 2 (RR&D4P round 4)	Ian O'Hara	QUT	1/06/2022
2020/010	Sugarcane Industry Situational Analysis: Industry consultation and roadmap development	John Sheehy	Pottinger Co	13/05/2022
2020/011	Demonstration of safety, palatability, and efficacy of novel, sugarcane-derived feed ingredients in ruminants	Mark Harrison	QUT	30/08/2022
2020/013	Oil Canes Part 1: Technical readiness and regulatory assessment	Robert Henry and Frikkie Botha	UQ	30/08/2022
2020/014	Sugar industry diversification opportunities investigation	Michael Wallis	Procom Consultants P/L	1/05/2022
2021/004	Project BGreen	Greg Watson	Burdekin Renewable Fuels	31/10/2022
Research Mission 4: Position the Australian sugarcane industry as leaders in profitability, environmental sustainability and resource-use efficiency				
2016/807	Support of cane farmer trials of enhanced efficiency fertilisers in the catchments of the Great Barrier Reef.	Julian Connellan	SRA	30/06/2022
2019/803	Complete nutrient management planning for the Russell-Mulgrave and Lower Barron catchments	Cathy Mylrea	SRA	11/06/2022
2020/001	Environmental risk assessment and life cycle assessment of the raw sugar manufacturing	Stephen Wiedemann	Integrity Ag	1/03/2023
2020/017	A common approach to sector-level greenhouse gas accounting for Australian sugarcane	Kate Ricketts	CSIRO	30/07/2022
2020/802	Mackay Whitsunday Cane to Creek	Matt Schembri	SRA	31/10/2023
2020/803	On ground testing and modelling of the effectiveness of Enhanced Efficiency Fertilisers in the Wet Tropics catchments of the Great Barrier Reef	Julian Connellan	SRA	30/06/2022
2020/804	Reducing herbicide usage on sugarcane farms in reef catchment areas with precise robotic weed control	Mostafa Rahimi Azghadi	JCU	31/08/2022
2020/805	Increasing industry productivity and profitability through transformational, whole of systems sugarcane approaches that deliver water quality benefits	Cathy Mylrea	SRA	30/06/2024
2021/007	Investigating potential for sugar industry participation in green markets	John Rolfe	CQU	1/11/2022
2021/008	Develop a Sustainability Framework for Australian Sugarcane and Sustainability Report in collaboration with stakeholders	Ingrid Roth	Roth Rural	1/05/2024
2021/804	Mobilising the Murray	Cathy Mylrea	SRA	30/06/2023
2021/805	Soil specific management for sugarcane production in the Wet Tropics	Danielle Skocaj	SRA	30/04/2024
Research Mission 5: Support the development of an adaptable, professional, commercial and entrepreneurial industry and research community				
2018/015	Sugar milling R&D capability building program	Geoff Kent	QUT	1/05/2023
2018/101	New approaches to quantifying nitrogen fluxes in enhanced efficiency fertilisers in Australian sugarcane soils	Aiden Chin	UQ	1/06/2022
2018/102	Characterising nitrogen use efficiency in sugarcane	Anoma Ranagalage	UQ	1/06/2022
2019/006	Australian sugar industry training - development of factory training modules - phase 2	David Moller	QUT	1/05/2022
2019/102	Genetic solutions for determining fibre quality traits in sugarcane	Angela O'Keefe	CSIRO	30/06/2023
2019/806	Advancing techniques for diagnosis of yellow canopy syndrome	Kevin Powell	SRA	13/04/2023
2020/101	Engineering bacterial enzyme secretion for cellulose utilisation	Madeline Smith	QUT	1/02/2023
2021/101	Optimising mill mud and ash applications for soil improvement and carbon sequestration	Hannah Green	JCU	30/04/2025
2021/102	Systems biology for sustainable agriculture: evaluation of plant growth-promoting bacteria to produce high-performing biofertilisers	Ian Petersen	UQ	30/04/2025

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

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