Sugar Research Australia

Cane Matters

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(Cover page) Kelsey Hesp (pictured) and his family who operate Hesp Farms at Mulgrave west of Ayr are exploring precision technology to automate their lateral overhead irrigation system as part of the Lower Burdekin Smart Irrigation Project. Read more about the project on pages 18-21.

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

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Queensland Government

Australian Government
Department of Agriculture, Fisheries and Forestry

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

Celebrating future successful initiatives

The 2025 season has started off where 2024 finished. Weather events, tropical depressions, cyclones and flooding have presented a myriad of challenges. It should be noted and acknowledged just how resilient our industry is under adversity. I take this opportunity to thank our SRA staff who, despite their own personal situations, continued to push through and deliver during these times. You are very much appreciated.

Our staff and key industry collaborators are vital to driving the development, implementation and adoption of innovative technologies, techniques and varieties needed to drive profitability and productivity in the Australian sugar industry. All sector groups working cohesively towards commonly agreed goals is mission critical. I would like to acknowledge the increasing support of our collective stakeholders and look forward to building trust by implementing tangible and quantifiable benefits for the sugar industry this year.

The feedback from grower and miller surveys in late 2024 was clear and consistent. The SRA Board has subsequently acted accordingly and has directed SRA to focus on variety development and adoption in 2025.

SRA has several key initiatives planned for 2025 that show a real commitment to increasing stakeholder communication, engagement, and transparency.

The 10th Anniversary Fund call announcement recently saw the first set of projects being finalised, and contract negotiations are underway for approximately 20 more concepts. SRA will announce these in coming weeks. These projects ensure delivery of real benefits to growers and millers over the next few years.

The completion of our state-of-the-art Innovation, Research & Industry Services (IRIS) Laboratory facility in Acacia Ridge has already begun transforming SRA's ability to deliver high-quality research outcomes. The facility is now fully operational and has significantly improved precision, timeliness and agility in plant and soil analysis, disease diagnostics, and sugarcane performance testing. The results are impressive and add great value.

SRA is looking forward to hosting the Research and Development Forum (date to be confirmed) following its deferment due to Cyclone Alfred's unwanted visit. The forum provides another tangible opportunity for industry to have direct input into the research objectives for 2026. The forum is a crucial opportunity for industry and Governmental partners to actively contribute to shaping SRAs next 5-year strategic plan which is due in 2026.

I would like to extend my sincere thanks to everyone who positively contributes to SRA's work. We look forward to continuing this momentum and working cohesively to drive productivity, profitability and resilience for the sugar industry in Australia.

Mick Bartlett
Chief Executive Officer

SRA Head of Laboratory Services, Dr Heidi du Clou.

IRIS LABORATORIES: OPEN FOR INDUSTRY

SRA's Innovative Research & Industry Services (IRIS) Laboratories at Acacia Ridge, Brisbane, are now open and busy, marking a major milestone in sugarcane research and development.

The world-leading laboratories are an integrated one-stop shop for all laboratory work in the sugar industry, housing state-of-the-art technology that will drive future advances in plant breeding, genetics, biosecurity, and precision agriculture.

Head of Laboratory Services, Dr Heidi du Clou, said IRIS Laboratories were providing essential services to the industry on a daily basis – from the analysis of soil nutrients, studying the genetic traits of varieties, identifying pests and diseases, to analysing agricultural chemicals in plants and soils, determining components of runoff, and detecting the nutrient status of plants and mill by-products.

The facility also includes the RSD lab, running essential disease diagnostics, and a dedicated suite for tissue culture sample development, critical for accelerating plant breeding breakthroughs.

"It is not just the grower who benefits but also the miller," Dr du Clou said.

"SRA has developed calibrations for benchtop Near Infrared (NIR) instruments which are used in mill labs to measure multiple mill products in a fraction of the time compared with traditional methods.

"An online NIR instrument has also been calibrated to determine the losses of sugar to mill mud in near-time."

Dr du Clou invited industry stakeholders to tour the laboratories to see their unique capabilities.

ANNIVERSARY FUND PROJECTS TO DELIVER POSITIVE INDUSTRY OUTCOMES

The first eight of the research and development projects to be awarded under SRA's 10th Anniversary Research Fund call were announced earlier this year.

Additional projects which will be funded by the $32.6 million investment by SRA and Queensland's Department of Primary Industries (DPI) are currently being finalised. This transformational investment will work to secure the productive, profitable and sustainable future of the sugarcane industry.

These first eight projects, detailed, will target improved efficiency, competitiveness, sustainability and innovation for Australian sugarcane growers, milling companies and regional communities.

All eight projects are funded by SRA through the 10th Anniversary Fund.

Project 2024/014

Crop response to nutrient application following mill by-product application to optimise nutrient inputs and manage impacts on CCS

Chief Investigator: Julian Connellan, Sugar Research Australia (SRA)

Co-investigators: Dr Heidi du Clou, SRA, Mark Poggio, DPI

Collaborators: Department of Primary Industries, Wilmar Sugar Australia Limited, Tully Sugar Ltd, MSF Sugar Pty Ltd

Project Rationale

Annually, Australian sugar mills produce 1.5 million wet tonnes of mud and 200,000 wet tonnes of ash, as by-products of the milling process. These products provide a range of valuable nutrients and soil health benefits which farmers can utilise to their benefit.

Traditionally, mill by-products have been applied at rates of up to 200 wet tonnes/ha, however these large volumes result in significant haulage costs which make them less attractive to growers located further from mills.

New application methods developed over the past decade attempt to address these issues by banding onto the plant row at rates of 100 wet t/ha or less, however the current SIX EASY STEPS® guidelines require further refinement to optimise nutrient recommendations following their application.

Chief Investigator for the project, SRA Senior Agronomist, Julian Connellan, said "The project will provide growers with the information they need to maximise productivity and profitability, whilst reducing their environmental footprint when using these products."

Key Benefits

- Refine the SIX EASY STEPS® recommendations for modifications to nitrogen application rates where mill by-products are banded at rates less than 100 wet t/ha
- Maintain yield benefits associated with mill by-products without a CCS penalty
- Understand the long-term impacts of mill by-products applied at rates less than 100 wet t/ha on CCS
- Understand the economic implications of using mill by-products at rates less than 100 wet t/ha
- Validate Near Infrared (NIR) technology to assess moisture and nutrient content of mill by-products to provide real time assessment of available nutrients and their economic value.

Pictured far left: *Mill mud banded on the surface at a Wilmar farm in the Herbert. Wilmar is one of three mills that will collaborate with SRA on Project 2024/014.*

Pictured left: *SRA Senior Agronomist, Julian Connellan.*

Project 2024/010

Long-term soil health trials to assess farming system opportunities and impacts

Chief Investigator: Dr Barry Salter, Sugar Research Australia (SRA)

Co-investigators: Dr Danielle Skocaj and Julian Connellan (SRA), Assoc. Prof. Paul Nelson (JCU), Prof. Bernard Schroeder (UniSQ), Mark Poggio (QDPI) and Dr Peter Larsen (Wilmar))

Collaborators: University of Southern Queensland, Queensland Department of Primary Industries, James Cook University, Wilmar Sugar

Project Rationale

Establishment and continuation of long-term soil health trials, led by SRA Translation Research Manager, Dr Barry Salter, exploring a number of research questions, including assessing options and opportunities from managing trash.

The Australian sugarcane industry is currently facing a number of related issues associated with soil and crop residue management. These include: increasing soil carbon (C) as part of the Australian Government's plan to achieve a target of zero net emissions by 2050; increasing soil C and soil health to benefit productivity and resilience; utilising crop biomass including crop residues following harvest for the production of green products and diversification; producing biochar from crop residues and using this in soils to sequester C; and accessing soil C credit schemes developed for agriculture.

The project will assess farming systems and residue management practices through monitoring of soils over time, assessment of sugarcane productivity, economic analysis of practice changes and modelling using the Agricultural Production Systems Simulator (APSIM) to understand potential longer-term outcomes across a wide range of environments.

Dr Salter said a recent study found surprising results regarding long term trash retention.

"There has been little change to trash management in the past two decades and few new strategies for trash management have been assessed or adopted," Dr Salter said.

"Soil health remains a significant issue affecting industry productivity and resilience. Armed with new knowledge that trash has not increased soil C as expected, a lack of any new solutions will see this significant organic matter resource being underutilised.

"New approaches to managing this significant organic resource need to be investigated to see whether soils can be improved with altered trash management."

The project will establish three new long-term field experiments, located in the Central, Herbert and Tully regions with differing environments and soil types (organic C content and/or clay percentage). It will also continue a current long-term trial site at Mackay.

Key Benefits

- Understanding the impact of novel residue management practices on soil capital
- Understanding the impact of trash removal on industry sustainability
- Identifying new practices that improve long-term sugarcane soil capital
- Providing long-term trial sites as an industry resource to assess residue management practices
- Improving understanding of short-term changes in soil capital following implementation of residue treatments, leading to a greater understanding of potential long-term benefits
- Increasing knowledge of short-term economic impact of practice change.

SRA Principal Agronomist, Dr Danielle Skocaj, and SRA Translation Research Manager, Dr Barry Salter, will conduct long-term soil health trials as part of Project 2024/010.

Project 2024/012
Improving the technology readiness level of AI-based weed zonal and spot spraying for sugarcane

Chief Investigator: Emilie Fillols, Sugar Research Australia

Collaborators: James Cook University, InFarm Pty Ltd, PTx Trimble International Limited

Project Rationale

Vines and perennial grasses are the most troublesome weeds of the Australian sugarcane industry, responsible for losses of up to $84 million annually due to the weeds and their management.

The Australian sugar industry mainly relies on herbicides to control these weeds, as chemical control is the most cost-effective solution. But in many situations, weather conditions and limitations due to new regulations lead to weed escapes.

With the industry's proximity to the Great Barrier Reef, it is also essential to limit the use of herbicides harmful to aquatic species, such as pre-emergent herbicides which can persist in the environment.

To ensure a sustainable strategy to control these weeds in the future, this project will explore how Artificial Intelligence (AI) technology can enable both large-scale automated aerial weed mapping - for zonal spraying of patchy weeds - and ground-based automated spot-and-spray of problem weeds.

Key Benefits

- Development and early deployment of an app – SugarWeedMapper - that maps weeds from drone pictures and generates spray maps; and a feasibility study for a spot-and-spray ground system with a clear commercialisation pathway for sugarcane
- Aerial imagery database and new AI algorithms which will initially focus on six weed species including vines, perennial grasses and sicklepod (Shared IP: JCU, SRA and InFarm)
- Nine spray trials will cover approximately 24 hectares and used to demonstrate the app's effectiveness
- Initially focused on select farms (less than 1% of industry), the technology will improve weed control, reduce herbicide costs by up to 70% and increase profitability while reducing off-target impacts
- Currently, 5-10% (up to 35,000 ha) of sugarcane areas are treated for vines. Implementing zonal spraying for vines only could reduce this to 10,000 ha, saving up to 50,000L of herbicides annually, valued at $1.2M
- Growers will save significant time and money in their weed management through minimised yield losses and a reduction in the weed seed bank in the longer term while limiting the impact of herbicide usage on the environment

Chief Investigator of Project 2024/012, SRA Weed Scientist, Emilie Fillols.

Project 2024/015
Characterising the vector of sugarcane streak mosaic virus: a major biosecurity threat for Australian sugarcane

Chief Investigator: Dr Kevin Powell, Sugar Research Australia

Collaborators: Indonesian Sugar Research Institute, Khon Kaen University (Thailand), Wilmar Sugar (Myanmar) Limited, Ramu Research Services (PNG), University of Illinois (USA)

Project Rationale

The Australian sugarcane industry is facing an increasing threat from the potential incursion of exotic pathogens, vectored by insects which could enter by wind dispersal and human-assisted movement of plant material.

One of the major pathogen threats is Sugarcane Streak Mosaic virus (SCSMV), as explained by SRA Entomology Leader and Chief Investigator for this project, Dr Kevin Powell.

"Although not yet detected in Australia, SCSMV has caused up to 20% yield loss in major sugarcane growing regions of Southeast Asia," Dr Powell said. "The vector of transmission of this virus is not yet known."

"However, it is most likely to be an as yet unidentified insect vector. Identification of the insect vector is of paramount importance, as this knowledge will lead to more targeted surveillance and detection of the vector should an incursion occur."

Dr Powell said if the vector and the virus became established in Australia, post incursion management would be required. Through international collaborative research, focused on characterising the insect vector and developing potential management options, this project will improve preparedness of the Australian sugarcane industry for an incursion of this exotic disease.

Key Benefits

- Improved biosecurity preparedness to respond rapidly to an Australian incursion of SCSMV
- Characterisation of potential exotic vectors of SCSMV in PNG, Myanmar, Thailand and Indonesia and of endemic vectors of SCSMV in Australia
- Determination of provisional varietal susceptibility or resistance to SCSMV (Indonesia, Myanmar, Thailand)
- Revised Biosecurity Plans to incorporate revised SCSMV incursion management plans, including varietal selection and vector management
- Enhanced surveillance (for rapid detection); rapid chemical or biological control options (to potentially eradicate); and knowledge of potential germplasm with resistance properties to incorporate into a breeding program.
- Enhanced awareness of SCSMV.

SRA Entomology Leader, Dr Kevin Powell, (pictured third from left) will lead an international research collaboration to prepare the Australian sugarcane industry for a future potential incursion of Sugarcane Streak Mosaic virus.

SRA Breeding Technology Lead, Dr Sijesh Natarajan, (pictured below left) with SRA Remote Sensing Specialist, Johan Deutschenbaur.

Project 2024/017
Sugarcane Sucrose Estimation with Hyperspectral Imaging and Artificial Intelligence

Chief Investigator: Dr Sijesh Natarajan, Sugar Research Australia

Co-investigators: Dr Xianming Wei, Dr Felicity Atkin, Roy Parfitt - Sugar Research Australia

Project Rationale

The current method of estimating sugarcane stalk sucrose content, known as Commercial Cane Sugar (CCS) in SRA's breeding program uses near infra-red (NIR) in the lab. This is both time-consuming and costly. An attractive alternative lies in the unique spectral signatures (or reflectance at different wavelengths) generated by sugarcane canopies interacting with sunlight.

SRA Breeding Technology Lead, Dr Sijesh Natarajan, said these spectral characteristics in cane leaves presented an opportunity to investigate the factors influencing sucrose accumulation, and to predict stalk sucrose levels.

"This project proposes to use drone-based hyperspectral imaging and Artificial Intelligence (AI) models in the field, to predict CCS levels in the sugarcane stalks," Dr Natarajan explained.

"Sugarcane produces sugar through complex physiological processes, but it is primarily regulated by photosynthesis. By capturing chlorophyl content and other photosynthetic components in the leaves using hyperspectral sensors attached to drones, we will be able to test whether we can predict the sugar content, too."

The project will enhance the efficiency of the plant breeding program by replacing labour-intensive CCS estimation methods with precision, automation, and effectiveness.

Upon successful validation in the breeding program, it's also hoped to apply the technology to the entire industry, to assist growers and millers to schedule their harvest at peak sucrose levels.

Key Benefits

- Insights into the spectral signatures and physiological processes driving sucrose accumulation in sugarcane during ripening
- Ability to develop tailored sugarcane varieties with optimised sucrose content and maturity profiles enabling more strategic variety adoption and harvest planning
- Improved efficiency in variety development and accelerated genetic gains in sucrose yield
- Improved working conditions and safety outcomes for personnel involved in breeding operations
- Enable further research to develop solutions integrating AI models with field data for real-time sucrose estimation
- Enable growers and millers to plan harvests more strategically, leading to maximised sucrose productivity.

Project 2024/011
Progress towards variable rate N application within block - understanding crop N response

Chief Investigator: Dr Barry Salter, Sugar Research Australia (SRA)

Co-Investigators: Dr Danielle Skocaj and Dr Heidi du Clou (SRA), Prof. Andrew Robson (UNE), Robert Sluggett (Farmacist), Dr Eric Wang (JCU) and Prof. Bernard Schroeder (UniSQ).

Collaborators: University of New England, Farmacist, James Cook University, University of Southern Queensland

Project Rationale

Nitrogen (N) fertiliser inputs for most of the Australian sugarcane industry are regulated in order to minimise off-site environmental impacts. There is on-going pressure to improve N use efficiency from both an environmental and economic perspective.

Variable rate N application within a block is uncommon in the sugarcane industry but may allow further refinement and advancement of the industry's nutrient management practices. A key to implementing a variable rate N management program within a block is to better understand crop responsiveness to N inputs and how this varies spatially.

Simple solutions such as applying more N on high yielding zones and less N on low yielding zones may not always be the most appropriate approach. The project will use N rate strips (low, standard, high) that run through variable soil conditions within a block in order to better understand crop responsiveness.

Project Lead, SRA Manager Translation Research, Dr Barry Salter, said a combination of remote sensing, crop sampling, in-depth soil characterisation and machine learning tools would be used to explore key drivers of N response.

"Ultimately the project aims to increase understanding of crop response to N across variable block conditions so that a robust approach for implementing variable rate N application can be introduced to the industry," Dr Salter said.

Key Benefits

- Understanding relationships between soil traits and crop N responsiveness
- Methodology of implementing variable rate N management within block documented in the SIX EASY STEPS® Toolbox
- New knowledge on which variable rate N application within block could be implemented by industry.
- Better understanding of soil factors linked to crop responsiveness to N.
- Further validation of remote sensing technologies.

Project 2024/018
Are trends in silicon uptake a reason for concern?

Chief Investigator: Dr Danielle Skocaj, Sugar Research Australia

Co-Investigator: Prof. Bernard Schroeder (UniSQ)

Collaborators: University of Southern Queensland, CANEGROWERS Innisfail

Project Rationale

Silicon (Si) is recognised as a beneficial element for successful sugarcane growth.

Results of a recent industry-wide survey showed a noticeable increase in crops exhibiting Si-like deficiency symptoms. The study found that the Si content of third leaf tissue samples for more than 50% of crops sampled across the Far Northern region, and almost 80% of crops sampled from Tully, were below the established critical value.

These low leaf Si concentrations were also being observed in crops where soil assays indicated cane yield responsiveness to silica application was either unexpected or unlikely, meaning Si was not required.

Project 2024/018, to be led by SRA Principal Agronomist, Dr Danielle Skocaj, (pictured left) will investigate if trends in Si uptake are impacting crop performance, identify how various soil chemical properties may influence Si availability and if changes are required to soil and/or plant tissue assay critical values to ensure adequate Si nutrition.

Key Benefits

- Widespread awareness of updated silicon best management guidelines for sugarcane
- Greater scientific knowledge, including suitability of current Si soil assay critical values across a diverse range of sugarcane soils; the influence of different soil properties on Si soil assay critical values; and the impact of poor Si uptake on crop performance, productivity and profitability
- Incorporation of updated Si guidelines into whole-of-farm nutrient management plans
- Information on the impact of Si-like leaf deficiency symptoms on crop performance, productivity and profitability
- Validation of the Si management guidelines contained within SIX EASY STEPS® .

Tully harvesting contractor Ian Ghidella (pictured) is a big proponent of Harvest Mate having used it throughout the 2023 and 2024 seasons.

Project 2024/016
Harvest Mate Auto – Improving Economic Outcomes in Harvesting

Chief Investigator: Dylan Wedel, Sugar Research Australia (SRA)

Collaborator: Queensland Department Primary Industries

Project Rationale

Harvest Mate Auto project, led by SRA District Manager Central, Dylan Wedel, will build on previous investment into the original Harvest Mate web-based portal and app, by integrating live data from harvester monitoring systems and enabling automation of data entry to generate real time predictions of optimal harvesting practices.

"The project will also expand the capabilities of Harvest Mate by collecting data from harvest trials in burnt cane and from dual row harvesters," Mr Wedel explained.

"The Harvest Mate Auto concept will link the existing tool into live data from current harvester monitoring systems and a real-time display. Linking live feedback will allow the decision support tool to access significantly improved inputs and outputs, such as real time cane yield, actual fan speed and actual ground speed on-the-go for individual situations.

"It will allow the operator to adjust parameters whilst harvesting and improve confidence in the tool's predictions. This will increase the profit of harvesting for both the grower and harvesting sectors."

The project builds upon previous investment by SRA and the Department of Primary Industries in the harvesting decision support tool (the original manual version and Harvest Mate Manual). Both have key limitations including: requiring manual input of paddock and harvesting data; relies on estimates of paddock yields prior to harvest; and is only applicable for green cane harvesting with standard single row machines.

Key Benefits

- Harvest Mate Auto will be the first real-time harvesting decision support tool that considers both agronomic and economic outputs to predict optimal harvesting practices with algorithms derived from Australian contextualised data
- Will be applicable for green cane and burnt cane harvesting, whilst encompassing newer machines on the market (i.e. dual row harvesters)
- Will make Harvest Mate Auto useful in identifying optimal harvesting practices for all grower and harvesting stakeholders across the Australian sugarcane industry
- Will enable data automation and live feedback
- Will include results for burnt cane trials and dual row harvesting trials, including productivity evaluations for each trial
- Will include field days, workshops and forums prior to releasing Harvest Mate Auto.

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

Queensland Government

(Left) SRA Weed Scientist, Emilie Fillols, shows Tweed Valley sugarcane grower Robert Quirk how to identify a weed using Pl@ntNet.

Pl@ntNet - NEW APP FOR SUGARCANE GROWERS TO EASILY IDENTIFY WEEDS

SRA has collaborated with the developers of a global app to provide Australian sugarcane growers with a free tool to easily identify weeds and other invasive flora on-farm.

Pl@ntNet is a free app that uses automated recognition technology to identify plants, when images are uploaded onto the platform. Growers can simply take a photo of the weed they want to identify, upload it and Pl@ntNet will do the rest.

SRA Weed Scientist, Emilie Fillols, worked with the Pl@ntNet team to create a sugarcane-specific micro-project on the platform – titled 'Weeds of Sugarcane in Australia' – to allow Australian cane growers to easily identify weeds in their crops.

"Yield losses from weed competition, along with the cost of weed control on sugarcane farms is estimated to cost Australian cane growers more than $84 million nationally each year," Ms Fillols said.

"Identifying weeds is crucial to good weed management, which is why we have developed this online resource for growers to easily identify weeds on-the-spot, saving time and money, and assisting in improved weed control."

Downloaded by more than 12 million users world-wide, the app allows for 'micro-projects' to be added to the platform that relate to a specific industry, topic or location.

The app works by analysing images uploaded by the grower onto Pl@ntNet. The app then compares the images with a library bank of images of known, identifiable weeds stored in Pl@ntNet. Plants that most resemble the species will be displayed on the screen.

"It's important that if a grower sees a weed that they have never seen before, they are able to quickly identify it," Ms Fillols said.

"Thanks to Pl@ntNet, this can now be done easily, on-the-spot, and right in the palm of a grower's hand."

The App can be used on both iPhone and Android devices and can be downloaded free via the App Store or Google Play. It's also available as a web version.

Once growers are logged in, they should click the 'special flora' option, then scroll down and click on the 'micro-projects' tab, before choosing 'Weeds of Sugarcane in Australia'. This way there is a greater chance for the app to identify the correct matching species and display its Australian common name.

The Pl@ntnet micro-project was funded under SRA's Far North District Productivity Plan.

For more information on Pl@ntNet and how to use the app go to sugarresearch.com.au/growers/weeds/plantnet/. Or click the link below to watch the quick tutorial video.

www.youtube.com/watch?v=me5Mut26Fdk

SOLDIER FLY SURVEYS ACROSS AFFECTED **CANE GROWING REGIONS**

SRA staff have collected soldier fly larvae from all cane growing regions known to have the economic pest.

More than 800 were collected from sugarcane on 11 properties on the North Coast and in the Pioneer Valley, Mackay and Plane Creek areas earlier this year.

In January, SRA Entomology Leader, Dr Kevin Powell, and Entomology Research Technician, Dr Samuel Bawa, worked in Mackay collecting larvae with the assistance of District Manager Central, Dylan Wedel, and District Delivery Officers, Emma Burns and Jessie Borg.

The survey followed others conducted in South Johnstone and the Southern region in 2024. The aim is to identify the different species of sugarcane-feeding soldier flies and map their distribution.

Molecular testing will be used to look at the genetic diversity of populations to improve future management in affected regions.

The project recognises that in the past, most studies of soldier fly (*Inopus* species) have focused on potential control options for only one species – *I. rubriceps*. However, several more potentially new species of sugarcane-feeding soldier flies have been identified – and SRA's researchers want to find out if there may be more.

Reports of soldier fly damage in sugarcane are increasing. It only takes low numbers of soldier fly larvae to cause significant damage to sugarcane due to their ability to cause poor ratooning, that ultimately leads to poor growth and reduced yield.

Soldier flies are known to have a complex life cycle of up to two years, unpredictable timing of outbreaks, relatively uncharacterised sugarcane varietal choice, and patchy distribution – all of which make research activities and management options challenging.

In order to test potential control options effectively and rapidly under controlled conditions, populations of soldier fly species will need to be reared in the laboratory. Trials to maintain soldier flies on an artificial diet are already underway.

SRA District Manager Central, Dylan Wedel, has addressed a number of grower meetings in the district over recent months and has updated growers on the status of the project.

"It's incredible to see that the Entomology team have identified a promising new artificial diet during their recent trial work for use on soldier flies," Mr Wedel said.

"If successful, this is a major step towards the next stage of research activities, which would include lab screening of control options, if funding is approved," he said.

A poster summarising recent research findings on soldier fly will be presented at this year's Australian Society of Sugarcane Technologists' conference in Brisbane, by Dr Kevin Powell.

SRA Project 2022/004: Soldier fly diagnostics, distribution and development of an artificial diet is funded by Sugar Research Australia and the Department of Primary Industries.

Queensland Government

Soldier fly larvae (pictured inset) were collected from 11 properties on the North Coast and in the Pioneer Valley, Mackay and Plane Creek areas earlier this year and will be used by SRA's entomology team to test potential new control options for the pest.

SRA Entomologist, Dr Emtia Chandrima, (pictured far right) working on SRA funded Project 2022/004, investigating Soldier fly diagnostics, distribution and development of an artificial diet to identify control options for the economic pest.

Soldier fly crop damage (pictured right).

GREYBACK CANE BEETLE DAMAGE IN THE BURDEKIN

An increase in Greyback cane beetle populations in the Burdekin observed since late last year prompted a visit to the district by SRA entomology experts to view the activity first-hand.

SRA District Manager Burdekin, Terry Granshaw, had reported increased sightings of cane beetles in the region as far back as October. However, the first major flight observations of the Greyback cane beetles only occurred after a significant rain event in November.

"This year we have seen the beetles strip the trees of foliage in a matter of days and the number of cane beetles is higher than previous years," Mr Granshaw said.

"One grower told us that he hasn't seen them swarming like this since he was a young child. We are used to seeing one or two beetles chewing on the cane leaves, but this year they are in clusters."

SRA Lead Entomologist, Dr Kevin Powell, and Entomology Research Scientist, Dr Samuel Bawa, visited the district in early December and used the opportunity to collect cane beetle samples to use in laboratory trials, being conducted at SRA's Meringa Station.

The Central District has also experienced high populations of cane beetles over the past several years.

Research targeting control options

Two SRA-funded research projects are currently investigating new options for Greyback control. One is focusing on the cane grub and pupal stages of the pest, while the other is concentrating on the adult life-stage.

Dr Powell said the beetles, collected during the visit, would be used by the entomology team to breed, and produce grubs for a forthcoming laboratory trial on alternatives to imidacloprid (Project 2020/004).

"These canegrubs will be treated with different novel chemical and biological insecticide products to evaluate their efficacy compared to imidacloprid," Dr Powell explained.

"Once final laboratory trials have been completed, it's hoped the project will progress to field trials later this year (subject to funding), to provide the data required by the Australian Pesticides and Veterinary Medicines Authority (APVMA), to register a new product, for commercial use."

While in the Burdekin, Dr Powell and Dr Bawa also visited a replicated, randomised trial site that is being used to investigate the efficacy of granular and liquid imidacloprid, applied on the same day, to control cane grubs. This trial is part of the Burdekin District Productivity Plan.

The sampling method for the trial will be optimised, and the impact that these products have had on canegrub control, will be assessed in March-April 2025. The trial itself is only looking at whether the liquid product can mitigate grub damage when applied early in plant cane, in the absence of the granular product in future years.

Mr Granshaw said many growers in the district had been asking about using clothianidin, as an alternative to imidacloprid.

"Both clothianidin and imidacloprid are part of the Neonicotinoid insecticide group, which is currently under review by the APVMA," he said.

"When applying clothianidin to plant cane, it needs to be applied between October and December as per label, like the majority of liquid imidacloprid products.

"However, this timeline doesn't work in the Burdekin due to the size of the plant cane crop at this stage. So, an alternative product or a new application method would need to be developed."

Mr Granshaw, accompanied Dr Powell and Dr Bawa on their visit to the district and noted that cane beetles were collected from sandpaper fig, strangler fig, ornamental fig and jackfruit trees.

"There seems to be, most likely a plant volatile, that attracts the adult beetle to these trees, especially fig trees," he said.

Dr Bawa also took the opportunity to take volatile samples in some of the cane varieties on farm where the beetles were abundant (pictured below). Dr Bawa is conducting a new research approach (Project 2024/402) to identify what plant volatile attracts the beetle to its hosts. Read more about this project in the Summer 2024-25 edition of *Cane Matters*.

Severe greyback cane beetle damage in a cane crop in the Burdekin.

Project 2020-004 - Beyond Imidacloprid – Chemical and Biorational Alternatives for Managing Canegrubs is funded by Sugar Research Australia (SRA) and the Department of Primary Industries.

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

WHAT SHOULD I DO ABOUT STANDOVER AND LATE CUT RATOONS?

With the recent crushing season extending into December and January in many regions, there is a proportion of standover cane, and ratoons that have been harvested late. These crops will be impacted by the onset of the wet season leading to deterioration of standover crops and poor growth of young ratoons, combined with an inability to perform management tasks like fertilising and the application of herbicides due to a lack of trafficability. Dr Barry Salter, SRA Translation Research Manager, has provided the following recommendations for growers to manage standover crops.

Management of standover:

Nutrient management

- Previous experiences indicate there is little to no benefit in applying additional fertiliser to standover cane.

Pest control

- When standover blocks are near rat harbourage areas, a larger headland between the harbourage and the crop is advantageous.
- Any ratooning crops on the farm that have weed cover will increase the reproductive potential of ground rats and allow climbing rats to colonise the crop earlier than usual.
- Manage your incrop weeds wherever possible to minimise rat colonisation and breeding across the farm.
- Any crops at out-of-hand stage across the farm with weed cover will extend the breeding season for ground rats while it is also less likely for a baiting strategy to be effective due to an increase in their preferred food source.
- If possible, maintain headlands with regular slashing to keep grass as short as possible through to the next harvest.
- Spray the edges of all crops, particularly standover and perimeter bait rat harbourage areas and the adjacent standover crop.

Weed control

- Control weeds along standover block boundaries, headlands, drains and adjacent land (i.e. grassed habitats, sheds) to reduce pest harbourage areas and minimise in-crop habitat.

Harvesting

- The best time to harvest standover cane is early in the crushing season as this is when the CCS will be closest to mill average.
- Previous experiences indicate the mixing of standover cane with one-year-old cane can improve the CCS level.
- Consider burning standover crops prior to harvest as this may help remove most of the dead material.
- Burn blocks at a time when a good 'hot' burn can be achieved and harvest as soon as possible.

An extended 2024 harvest season has led to a proportion of late cut ratoon crops (an example in the Central District below left) and standover cane (below right).

Management of late harvested ratoons:

Management of ratoon crops harvested very late in the season has not been the focus of research and development activities in the recent past. Due to this there is limited validated advice or guidelines for these crops. Some potential options to consider have been outlined below:

Assess the crop's development following the wet season in early April to determine its potential to continue growing and produce a viable crop for harvest in late 2025.

Healthy crop:

Green well developed crop canopy, adequate stalk population (7 - 12 stalks/m^2), cane stalk/ internodes visible at base of crop.

Has the crop been fertilised?

YES

Manage this crop for potential harvest in the 2025 harvest season.

NO

Consider applying a low rate of fertiliser (NKS). Manage this crop for potential harvest in the 2025 harvest season.

Weak crop:

Pale leaves and canopy, low stalk population, stunted growth with no cane stalk/internodes visible at base of crop.

Is the crop suitable for ratooning e.g. not gappy or pest damaged?

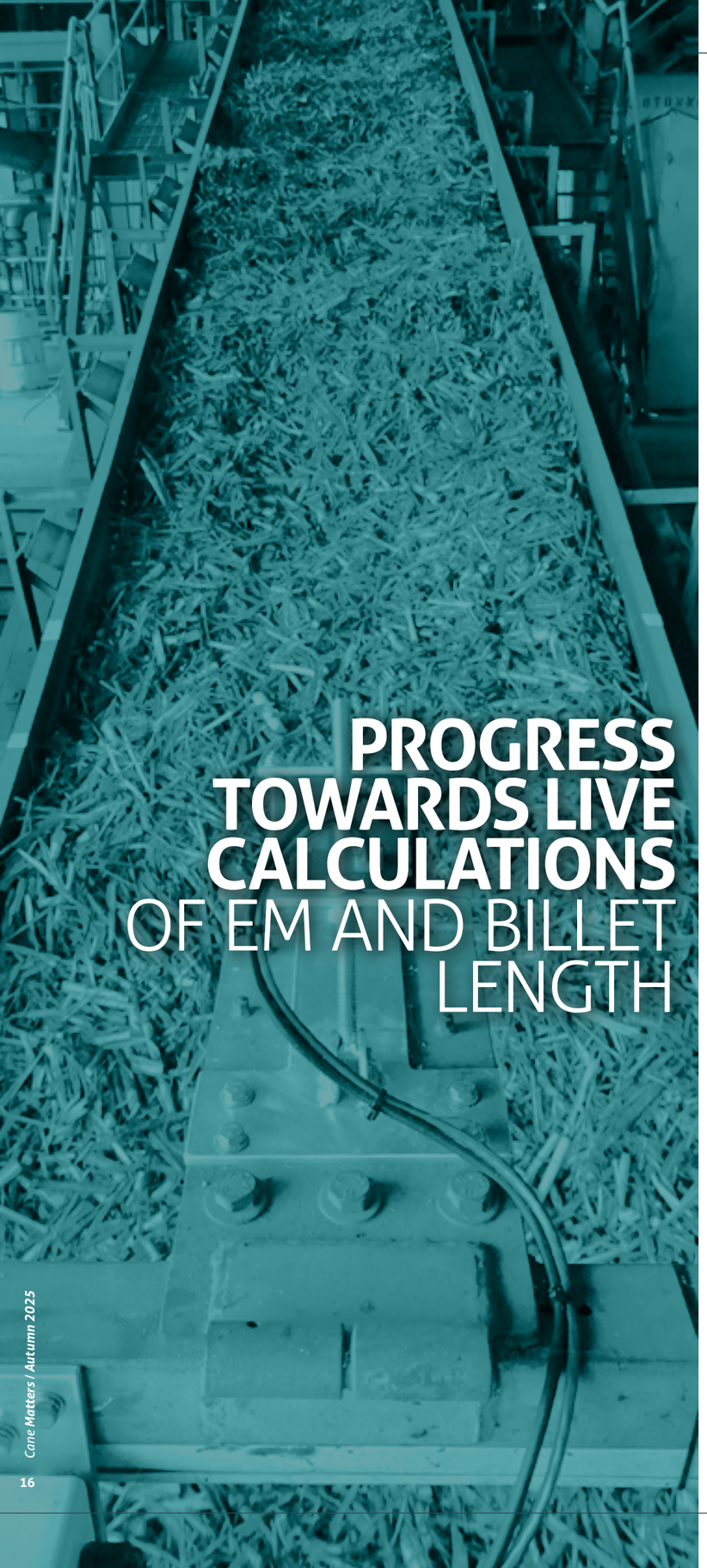
Note: If fertiliser was applied following harvest, it is likely that little nitrogen would be remaining following the wet season.

YES

Slash/cut the crop, fertilise as per SIX EASY STEPS® ratoon crop guidelines (NKS). Manage this crop for harvest in the 2026 season i.e. 14+ months ratoon crop.

NO

Immediately spray out the ratooning cane and consider short season break crop e.g. Sunn hemp, plant cane in spring 2025.



PROGRESS TOWARDS LIVE CALCULATIONS OF EM AND BILLET LENGTH

The technology will provide milling companies with accurate, real-time estimates as the cane enters the factory to help manage cane quality more effectively.

This will reduce profitability losses for millers, growers, and harvesting contractors.

A Research Project at Tully and Macknade Mills is using technology to analyse the cane supply as it enters the mill to determine the percentage of extraneous matter (EM) and the lengths of billets.

Using its laboratory, Tully Mill has analysed EM for many seasons prior to the project's implementation and had the infrastructure already in place to be involved.

An SRA Small Milling Research Project was conducted at Tully Mill in 2021 where cane supply images and Tully's laboratory results were used to develop machine learning models to predict EM and billet length.

In 2023, SRA and the Department of Primary Industries invested in a follow-on project *(2022/12 Use of Machine learning to determine the extraneous matter and billet length in cane consignments)*.

This project commenced with further data collection at Tully in the 2023 season and the process was replicated at Macknade in the 2024 season.

QUT Researcher, Associate Professor Simon Denman, has led the development of the machine learning models.

"A specialised camera and lighting were installed above the conveyor bringing cane into the mill, taking images every five seconds. From these we can estimate the cane properties," Mr Denman said.

At Tully, images collected during the 2021-2023 seasons were compared with mill laboratory results. From these images, machine learning models were developed to estimate extraneous matter and billet length for every cane bin supplied to the factory.

Tully Cane Supply & Transport Manager, Dale Thomas's part in the project was to compare the collected data for about 80 samples with what he saw in the photos with his own eyes and with the mill lab's EM results.

Chief Investigator and QUT Researcher, Geoff Kent, worked with Mr Denman and Mr Thomas, and Tully Mill's IT Department to determine how the collected data would be integrated with the mill's existing computer platform. Changes to the existing software allowed for the capture, storage and transfer of the data being gathered.

"We hit a big milestone in August 2024 when we deployed a model at Tully estimating cane properties live for the first time," Associate Professor Denman said.

Reports of EM and billet size data were fed into the mill's computer system in October.

Further data transfer from Tully Mill to QUT was completed in December last year after the 2024 season finished. In total, 4.7 terabytes of image data were collected from 31 July to 11 December. Equivalent data was also collected at Macknade for the first time.

Accompanying lab data, tip log, and data from other cameras such as the mill's own camera over the cane conveyor have also been transferred to verify accuracy.

Results are currently being reviewed by the project team to determine if the models are providing the correct real time measurement of cane quality. These will be made available to growers once researchers are confident the system is accurate.

The information will also be used to improve the existing machine learning models for use live during the 2025 season at both Tully and Macknade. Isis Mill will also be included for the first time.

The period reviewed after the data was fed into the mill's computer system was characterised by quite high extraneous matter. This result contrasted with the 2021 to 2023 seasons from which the models were developed.

Consequently, the models did not perform as well as expected in estimating the magnitude of the EM. However, the models are designed to be easily updated, and it is expected substantial improvement will occur when the 2024 season data is introduced into the model's training data set.

"When considering the well documented impact of EM on both millers and farmers, this was an easy project to be involved with," said Brendan Rich, Production Manager at Tully.

Project 2022/012: use of machine learning to determine the extraneous matter and billet length in cane consignments is on track to finish in February 2027.

Collaborators: Tully Sugar Limited, Wilmar Sugar Australia Limited, and Isis Central Sugar Mill Company Limited.

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

Queensland Government

SMART IRRIGATION PROJECT **PAYING DIVIDENDS IN THE BURDEKIN**

Over the past five years, sugar cane growers in the Burdekin have invested significant time, money and faith into transitioning to scalable, sustainable and technologically-advanced practices in irrigation management.

The Lower Burdekin Smart Irrigation Project (LBSIP) has been an important building block in these advancements.

Offering incentive funding and extension support to growers to trial and adopt new and innovative irrigation practice change, the project began in March 2023 and will end in June 2025.

The project has assisted farmers in moving towards optimised and automated irrigation practices. To validate the change, record keeping and water monitoring has taken place on all demonstration sites and some project sites.

Complementing the Burdekin Irrigation Project (BIP) 2021-2024, the LBSIP has provided tailored, property-specific support to growers to adopt cutting-edge automated technology, saving time; reducing water usage and energy costs; whilst decreasing run-off and deep drainage losses.

"The project has assisted growers to save water, save energy, maintain yield, improve their lifestyles, and the spin-offs from that is improved water quality and benefits to the reef," NQ Dry Tropics Sustainable Agriculture Program Manager, Rob Hunt explained.

The project has been an opportunity for testing systems and techniques that haven't been fully trialled in the Burdekin before, to address real day-to-day challenges growers are grappling with on the ground.

"By reducing water volumes from end of paddock using smart irrigation scheduling tools and technology, growers reduced nutrient, pesticide and sediment losses to the environment," SRA District Manager, Terry Granshaw explained.

"Largely, it's about matching irrigation to crop water use. It's easy to install automation, but you need to make sure you're automating efficient practices, Mr Granshaw said"

The LBSIP is assisting with the installation of automation across more than 850 ha of cane production area. Different irrigation systems and practices have been tested with the enabling technology.

Automation helps achieve more frequent and precise set changes needed to match water volumes with crop requirements, reducing deep drainage and run off losses.

The project is a collaborative initiative delivered by Sugar Research Australia (SRA), AgriTech Solutions and the Burdekin Bowen Irrigated Floodplain Management Advisory Committee (BBIFMAC) and co-ordinated by regional natural resource management organisation NQ Dry Tropics.

APPLYING NEW TECH, TO EXISTING SYSTEMS, FOR GREATER EFFICIENCY

The Hesp farming family is aiming for a Burdekin innovation first as part of the LBSIP project, automating their lateral overhead irrigation system, using precision technology never explored in sugarcane in the district before.

For many years, Hesp Farms at Mulgrave west of Ayr, have been leaders in innovative practice change.

Their family enterprise, is operated by Chris and Sonya Hesp, and their three children, Damon, Kelsey and Sarah.

The family use a combination of furrow and overhead irrigation. Their lateral-move irrigator was purchased in 2005. It's an efficient method of watering – albeit with some operational challenges - however the family want to improve the efficiency of the system via precision technology.

"We've taken on a bit more ground in the last year, so we're just trying to cover a bit more things with less people," youngest son Kelsey explained.

The Lateral move irrigator is a 12-span machine which covers a swath of 600 metres and walks a distance of 2300 metres. It is a centre feed ditch type machine that delivers 180 litres/sec of water to spinner type sprinklers. The centre cart is diesel powered which drives a 150mm pump and a 40 kva generator. The engine's fuel use is almost 20 litres per megalitre of pumped water. The machine can apply 12mm of water over the 130ha cane in a 24-hour period

"Previously we had a pretty low level of control remotely with the lateral. You'd have to make sure every time you started it, there's a stop (concrete block), so you didn't walk it out the end," Kelsey said.

"More recently we invested in a Lyndsay FieldNET GPS controlled system, which was a positive move. Like all technology and innovation this only opens your mind up to further opportunities that could be available.

"So, we're hoping that with this new system, we'll be able to set permanent stops and take things a lot further along the line and marry things up a lot more."

AgriTech Solutions is a delivery partner in the LBSIP project and Operations and Farmer Engagement Manager, Cherrie Stockham, has been working closely with the Hesp family to integrate the automation into the system.

"Lateral irrigation is much more economical with water usage, but it uses a very different application rate to furrow (irrigation). It's seen as a more efficient method of irrigation, but also without bringing this (20yr old) unit into this era of technology, with the precision, these guys (Hesp Farms) can't get as much out of it. Or they're limited in the capability of what it can do," Mrs Stockham said.

Mrs Stockham has been offering valuable, localised support to the Hesp's in their overall progression to automated irrigation across their farming enterprise. Together they are working towards upgrades to the system to best suit their farming operations, including prescription mapping and additional automated feedback options such as oil pressure and water temperature. The current system only has feedback for RPM and volts.

"With the lateral, we've been working to try and bring everything across to the same platform using Farm in One, integrated with IrrigWeb. Just so that the entire system is streamlined. I don't like using lots of different platforms," Kelsey said.

"But I don't think we would have gone down this path if we didn't have someone like Cherrie to work with to be honest."

The Hesp's lateral has an individual span width of 48m, operating across six, 22ha paddocks, with three paddocks either side of a centre storage channel. The channel is where the lateral unit pumps the water from, the channel height is maintained by the automation system letting water into the suction area from the main (Sunwater) water source, at the top end of the paddock, and a recycle pit at the bottom end of the paddock.

As well as incorporating an application map into the automated system, Hesp Farms would also like to be able to set variable flow rates and detect when the lateral walks out of alignment.

"The application map will be fantastic, because if the irrigator stops pumping, but keeps walking you will know where this actually occurred. The belief is it will help control both over and under watering of the block which is the single biggest issue with any OHLP system (because it can cause rutting). The other bonus is the peace of mind knowing that the system will stop at the end of the paddock. Alerting all of us to what is happening with the machine 24/7 is invaluable." Kelsey said.

The new program will have the stops built into the system, instead of being programmed manually. Another improvement to its functionality is having an off-line mode.

"Currently, if you go to the bottom of that farm, you don't get internet, so you can't control it (the lateral). So, you've got to come all the way back up here. The new system will be radio controlled, so we won't have that problem," Kelsey said.

Kelsey, a trained agronomist, said improving the system's performance rate, including sending automatic alerts for mechanical issues (fail safes), would not only benefit the crops under it, but save time and maintenance.

"Just as an example, we had some beans planted, the suction got too low and choked some of the nozzles around the cart. So, we then had to clean them all out, which took time, and then restart the irrigation set again."

He said as well as allowing greater efficiency and precision to their irrigation practices, it was helping to improve whole-of-farm management and improve record keeping.

"Just like with fertilising, spraying and harvesting, we're all trying to create the best efficiencies that we can, and irrigation is no different. And it's not only showing that the economics are adding up, but the crop itself is showing the benefits, we're not waterlogging it, we're not stressing it. It's as good as gold!"

The centre storage channel and pump that feeds water into Hesp Farm's overhead lateral irrigator.

Pictured: AgriTech Solutions Operations and Farmer Engagement Manager, Cherrie Stockham, (centre) has been working with Kelsey Hesp (right) and the Hesp family to integrate automation into the family's overhead lateral irrigator. Pictured with SRA District Manager, Burdekin, Terry Granshaw.

Continued Page 20...

SMART IRRIGATION PROJECT
PAYING DIVIDENDS IN THE BURDEKIN CONTINUED

BBIFMAC Manager, Arwen Rickert, (pictured right) with a San Dimas flume positioned in a tail drain at the bottom end of Paul Villis's demonstration farm.

The San Dimas Flume directs water from one or more furrows through a controlled velocity device with a height logger. This allows the volume of water flowing through the furrows to be accurately calculated over time.

As part of grower Paul Villis's demonstration site he grew two legume crops where the nitrogen fixing crops (pictured far right) were monitored for conversion of organic (N) into inorganic (N) over time.

AUTOMATED IRRIGATION ADAPTED TO OTHER CROPS

A demonstration site in two legume crops is showing how automated irrigation practice change can easily be adapted to crops other than sugarcane.

Paul Villis, who has been farming cane in the Burdekin for 20 years, has hosted the LBSIP trial site. Water quality has been monitored for two legume crops – in replicated trials – followed by a sugarcane plant crop.

His irrigation automation system includes valves, pumps, weather stations, advance sensors and end of row sensors, all connected to a platform called Farm In One – a user-friendly interface designed to help farmers interact with the technology and easily keep records.

Burdekin Bowen Irrigated Floodplain Management Advisory Committee (BBIFMAC) Manager, Arwen Rickert, and her team conducted the comprehensive water monitoring throughout the trial.

Two treatments have been tested in the field. Two irrigation sets with higher flows and less duration versus Mr Villis's standard irrigation practices, replicated twice.

"We've got quite an interesting data set that has come out of this trial, because we have followed those different crops, over multiple cycles, and have been able to monitor them for quite some time," Ms Rickert said.

"We looked at the pollutants that may be leaving the farm in the form of nutrients and pesticides in each (legume and cane) crop, but also the volume of runoff. Because obviously the runoff that is coming off the farm and into the downstream environment is the vector to removing those pollutants out of the paddock.

"Obviously, the bean crops are nitrogen fixing, and they introduce a lot of organic nitrogen into the system, so we were quite interested in seeing the conversion of organic (N) into inorganic (N) over time - when that took place and how long it took."

"For the first bean crop, we trialled two different irrigation treatments in replicated trials, and we installed water quality monitoring equipment in eight different locations across the block to give us more robust data."

Climatic conditions – including severe rain events in the Burdekin - created challenges throughout the trial, but also allowed for more practical analysis.

"The good thing about following a trial through several seasons is that you get such different climatic conditions each season," Ms Rickert said.

"What you want to know when assessing data is; Is it a reflection of the different crop? Is it a reflection of different irrigation practices?; Or is it a reflection of a different season or weather event?

"And we are finding that the seasonal variations, have a huge impact on the water quality and obviously the irrigation practices as well."

SRA District Manager Burdekin, Terry Granshaw, said harvest data would be taken from the plant cane in the demonstration site to provide yield and commercial cane sugar (CCS) outcomes from the crop.

"We'll send a separate ticket to the mill to get individual tonnes and CCS for each individual treatment, then we can go back and assess not only how much water we applied, but how much electricity we used, the crop yield, and we can give economic value back to Paul," Mr Granshaw said.

"And then hopefully we can translate that information back to industry, so that it helps and supports other growers to make decisions of their own."

Despite the challenges of running a demonstration site, Mr Villis was happy to be involved in the trial, which has assisted in reducing water use and energy costs in his fallow crops.

"The project has been an awesome collaboration between SRA, BBIFMAC and AgriTech [Solutions]. They have all worked so well together throughout this project and it's certainly enabled us here to fast-track getting our automated irrigation fully completed, particularly in this block," Mr Villis said.

"It's so hard with sugarcane because it's such a long crop. This data we started collecting in September 2023, and that's a long time. But with the automation equipment talking to the platform and storing the records of every irrigation event and linking it all to IrrigWeb, that made record keeping a breeze and so easy."

Mr Villis said he now has all his cane farming land operating under full automatic irrigation systems. He said the practice change had immeasurable benefits both in saving time and money.

"There is just so many more things that you can do, that you can't do with manual irrigation," he said.

"Like, after a rain event, the bottom end is always wet around here, it always stays wetter than the top end, always, so you set it up to do four hours and just keep changing from set to set to give the top end a quick flush.

"Manually, I can't do that, because it would be a full time job".

"Just recently, I was irrigating (remotely) from Colorado (USA). It works that well," Burdekin cane grower Paul Villis said.

Pictured (L-R) SRA District Manager Burdekin, Terry Granshaw, Burdekin Bowen Irrigated Floodplain Management Advisory Committee (BBIFMAC) Manager Arwen Rickert and Burdekin cane grower Paul Villis at the trial site hosted by Mr Villis as part of the Lower Burdekin Smart Irrigation Project.

The XXXX Lower Burdekin Smart Irrigation Project (LBSIP) was funded through a partnership between the Great Barrier Reef Foundation and Lion Corporate. It was delivered in collaboration with the Burdekin Irrigation Project (BIP) as a complementary addition to the Lower Burdekin Water Quality Program.

SCIENCE AND SOPHISTICATION BEHIND SRA'S EFFORTS TO PRODUCE NEW SUGARCANE VARIETIES FOR COMMERCIAL RELEASE - PART 2

In our Summer 24/25 edition of ***Cane Matters*** we published Part 1 of 'Magic at Meringa' – the first of a two-part series, shining the spotlight on SRA's efforts to release new varieties to industry each year, for commercial use.

While Part 1 largely focussed on the crossing process to create new genotypes for testing in SRA's selection programs, here we present the second and final part in this series. We start by delving into the different trial phases of SRA's Variety Development program, and how elite clones eventually progress through to commercial release.

THE SELECTION PROGRAM **WHERE THE MAGIC IS REALISED**

The selection program – assessing families in PATs

Once seedlings produced through SRA's crossing program reach three or four months of age, they are strong enough to transplant to the field in family plots as part of the first stage of the selection program.

These are called Progeny Assessment Trials (PATs). This is where all sugarcane genotypes start their 12-year journey towards possible commercial release.

Pictured above: 25,000 seedlings go into the ground in a PAT at Meringa in September 2024. Approximately 100,000 seedlings are planted each year across the SRA Variety Development Program.

Keeping it in the family

The PATs are grown in the North, Burdekin and Central regions, as each region has different incidences of pests and diseases, as well as climatic conditions, including rainfall.

As sugarcane seedlings are germinated from true sugarcane seed, this means each plant (or seedling) is a genetically unique individual, and families are replicated in PATs, but individuals aren't.

Assessing individual seedlings at this stage is inefficient, so seedlings are assessed by their family performance instead. Each 'family' plot assessed includes seedlings which are full-siblings (like brothers and sisters), produced from the same cross (female by male cross combination), allowing between and within family selection during the PAT stage.

The PATs are grown for 12 months in the plant crop and harvested at maturity to assess each family's commercial potential for cane yield (tonnes cane per hectare - TCH), sugar content (Commercial Cane Sugar - CCS) and fibre content (% fibre). At the same time each family is assessed visually for undesirable traits, including suckering, lodging, and flowering propensity, presence of diseases including smut and leaf diseases, and tiller height and number.

More specifically, TCH is assessed for each sugarcane family in PATs on a plot-mean basis. The cane from each plot is weighed at harvest using a commercial cane harvester and an SRA in-field weigh unit. At the same time, a sub-sample of sugarcane stalks is hand-cut from each plot and processed through SRA's SpectraCane using near-infrared spectroscopy (NIR) technology to assess CCS and fibre content.

The PATs are then ratooned for selection the following year. The best performing families are identified based on the analysed plant crop data (family selection). Individuals from within these top families are then visually assessed for ratooning ability, vigour, stalk number and diameter, canopy structure and health, flowering, suckering and lodging propensity, and side-shooting at first ratoon (1R) harvest. Only the best-looking individuals are selected to progress to the next selection stage (within-family selection).

SRA Plant Breeding Technician, Variety Development, Ryan Smith (pictured right) visually assessing clones and entering ratings and comments directly into SRA's plant breeding database SPIDNet on his mobile device during a CAT harvest in Meringa last year. While, SRA Variety Development, Field Operations Leader Far North, Ken Clarke (pictured far right) cuts CCS samples from experimental clones from the CAT harvest at the same site.

Time to shine - Trial stage 2 – CAT assessment

The top seedlings from the PATs are planted in the next stage of the breeding process, known as Clonal Assessment Trials (CAT). This is also known as the first clonal stage, as this is the first time an individual is planted and assessed in a uniform plot consisting of just one clone.

Approximately 10,000 clones make it to CAT stage and are planted across the same sites as the PATs – North, Burdekin and Central.

It is at this stage a name is assigned to clones. Each unique clone name indicates the region and year of its first planting to the field as a seedling.

Like the PATs, each clone is assessed in CATs for TCH, CCS, fibre content and visual appearance in the plant crop. Initial selections are made based on this plant crop data to select which clones are sampled again for CCS and fibre content in the first ratoon (1R) year (all clones are assessed for TCH in 1R), and which clones are sent for their first smut and Pachymetra screening.

Any smut or Pachymetra susceptible clones or clones with poor CAT performance are discarded and only the top clones progress to the final stage of selection.

Continued Page 24...

Pictured above: Whole stalk CCS samples cut from a family plot are fibrated for assessment by SRA's SpectraCane™ unit. Each sample is barcoded to trace the sample (and its data) from its trial plot to the lab and finally captured and stored instantly in SRA's plant breeding database, SPIDNet.

Pictured above left and above right: Fibrated sample from each plot (pictured above left) being scanned using Near Infrared (NIR) to predict sugar content (CCS) and fibre content (% fibre). Once scanned by SpectraCane™ fibre from every tenth CCS sample is kept for validation purposes, while the rest is disposed of (pictured above right).

Pictured above left and above right: Juice from every tenth sample is then extracted using a hydraulic press (above left). Juice samples are processed through the wet-lab to measure Brix and Pol (above right). The Brix, Pol and fibre content from these 1 in 10 samples are then used to validate the NIR data to ensure accurate CCS data is collected and used.

Final countdown – Trial stage 3 – FAT chance

The final trial stage in the breeding program is the Final Assessment Trials (FATs). FATs are undertaken across all six sugarcane growing regions of Australia – North, Herbert, Burdekin, Central, South and New South Wales.

From the CATs, only 500-800 clones progress through to the final stage. Within each region, approximately 150 new clones are planted across three or four FATs on commercial farms grown under Best Management Practices. These represent each region's main production areas and growing conditions.

More intensive testing is undertaken at the FAT stage. Each clone is assessed for TCH, CCS, fibre content, visual appearance, and its ratooning ability up to second ratoon (2R). Clones are also retested for smut and Pachymetra. Elite clones are identified based on their initial performance in FATs and disease ratings. They are then established in a repeated series of FATs to assess clones under different growing years, and screened for further diseases including leaf scald, Fiji leaf gall, mosaic and red rot. Their millability is also assessed by testing their fibre and sugar quality.

At the same time, the most promising clones are being prepared for possible future release by starting the 'bulking up process'.

And the winner is! Progressing a variety to commercial release

From the FATs, a select number of elite clones are submitted each year to Regional Variety Committees (RVCs) for consideration for commercial release.

There are six RVCs in Australia, each committee comprising of grower and miller voting members. The committees are also supported by non-voting growers (particularly those that host SRA trials), technical staff from milling companies, private agronomists, productivity services organisations and SRA staff. Each release decision requires a unanimous vote.

At annual RVC meetings, each committee is presented with detailed data from new candidates compared to the relevant commercial varieties of that region. The commercial merit of candidate varieties is considered against the local production constraints and challenges, as well as the strengths and weaknesses of the current variety mix.

Yield and CCS across crop classes and trial locations is a key focus.

The weighting of TCH and CCS reflects the whole of industry relative economic value which is region-specific and based on the local drivers of cost and revenue.

Other characteristics that affect the agronomic fit of varieties are also considered including lodging, flowering, suckering, side-shooting, germination behaviour and early vigour. Disease ratings are also key.

Once a new variety is approved for commercial release, it is added to the Approved variety list for the region. The use of an Approved variety is seen as meeting one aspect of every grower's General Biosecurity Obligation under the *Queensland Biosecurity Act (2014)*. Cane supply agreements also commonly reference delivery of only Approved varieties.

Variety Guides

All new varieties approved by Regional Variety Committees (RVCs) for commercial release are added to SRA's Regional Variety Guides when they are updated each year.

The Variety Guides contain detailed information on each variety that has been approved for each Region.

Regional guides are designed to help growers across the industry with their agronomic considerations when selecting new varieties to plant and trial on their farms.

The guides are updated annually, with information that comes from the best available data of regional variety performance and disease ratings.

2025-26 Variety Guides are currently being compiled. Previous year's guides can be found on the SRA website via the link below.

sugarresearch.com.au/growers/varieties/

SRA Northern Variety Officer Andrew Rigby (pictured below far left) inspects a Final Assessment Trial (FAT) on a grower co-operator's farm in far north Queensland in late 2024. At every trial in every selection stage, visual observations are recorded for each clone at harvest for traits including suckering, lodging, flowering, presence of diseases and tiller number. At the same time, six to eight randomly selected sound stalks are cut and labelled (pictured below middle) for processing at the juice lab to assess CCS and fibre content. Each clone is also harvested using a commercial harvester and weighed using SRA's infield weighing bins (pictured below far right) to assess its yield as tonnes cane per hectare (TCH).

DISEASE SCREENING AT WOODFORD

A vital component of SRA's breeding program is the disease screening work undertaken at SRA's Woodford (north-west of Brisbane) and Tully (far north Queensland) Stations.

Depending on which stage of selection a clone is in, each clone from all selection programs is screened each year for the major diseases of sugarcane - smut, leaf scald, red rot, mosaic, and Fiji leaf gall in Woodford, and Pachymetra root rot in Tully.

"Without the Woodford and Tully facilities we would have no idea of the population resistance of our sugarcane parents, our experimental clones or any of our commercial varieties to the industry's major diseases, so it's a very important component of our breeding program," Dr Atkin said.

The information obtained at Woodford and Tully on each variety's disease resistance is presented in SRA's annual Variety Guides and is used to determine which clones are promoted to FATs, meeting minimum disease standards. This information is also used by Regional Variety Committees when assessing varieties for commercial release.

SMARTER FARMING ON THE CASSOWARY COAST

KEY BENEFITS for GROWERS:

- Specialist advice from SRA agronomists and subject matter experts
- District-level results that identify widespread issues
- Case study examples for data-driven decision making

Historically, water quality projects involving the sugarcane industry have focused on broadscale reduction of pesticides and nitrogen (N) fertiliser applications, designed to protect the Great Barrier Reef.

However, a recently completed, three-year initiative involving SRA in Queensland's Far North, demonstrated that reducing industry's N footprint, does not have to come at the cost of industry sustainability.

The Cassowary Coast Reef Smart Farming (CCRSF) project was unique in its approach – delivering productivity improvements for sugarcane growers, while optimising nitrogen use efficiency on farm.

Led by CANEGROWERS Innisfail, with local coordination from Tully CANEGROWERS, Sugar Research Australia (SRA) was a key partner in the project, delivering on-ground support to growers in the Tully Mill area to identify productivity constraints on their farms, and ways to address them, whilst achieving environmental co-benefits.

Key to the project's success was its grower-centred approach that considered constraints at both an enterprise and district-specific level.

Project Leader and CANEGROWERS Innisfail Manager, Debra Telford, said this was the first time in 15 years, that she had seen a water quality project without the emphasis being on blanket nitrogen rate reductions.

"The (CCRSF) project was focused on helping growers improve their nitrogen use efficiency, which involved putting them and their enterprises centre stage and taking a whole-of-farm approach," she said.

SRA agronomists Nancy Rincon and Erin Headon, led SRA's extension activities across the Tully region as part of the project.

This included investigating district-level constraints via a survey of soil and leaf nutrient assays, which was conducted in response to agronomic priorities identified through the Tully and South Johnstone Local Expert Analysis (LEA) process.

The extensive survey saw the collection of nearly 200 paired soil and leaf samples across both regions.

A key finding from this survey identified that a large percentage of leaf samples were below the target value for silicon, despite relatively few soil samples requiring silicon application according to the SIX EASY STEPS® guidelines.

Further research is underway (in partnership with the University of Southern Queensland and CANEGROWERS Innisfail) to investigate if there is reason for concern and if adjustments may be required for managing silicon.

Ms Rincon and Ms Headon also worked one-on-one with growers to investigate productivity constraints unique to their farming operations, and drawing on the expert advice of SRA's agronomy, weed and entomology teams, to address these challenges.

From April 2023 to December 2024, SRA's work in the project involved 500 one-on-one interactions with growers, 30 individual participating growers and six demonstration sites.

Constraints included weeds, drainage, soil nutrition, pests and diseases.

"Growers benefitted from tailored agronomic advice, with access to comprehensive whole-of-farm planning and a diagnostic testing package that included soil, leaf and Pachymetra assays," Ms Rincon said.

"Grower uptake of the package was positive, with nearly 200 samples taken during the life of the project.

"This project was very much focused on constraints and raising awareness about using data to identify constraints."

For example, constraint analysis often began by sharing with growers maps of mill data showing historical block performance in terms of yield, sugar yield and CCS.

SRA researchers also presented a number of workshops, providing growers with practical skills to identify and address constraints.

Continued Page 28...

Tully District cane grower, Gavin Camilleri, hosted a demonstration site as part of the CCRSF project.

Pictured below: SRA Senior Agronomist, Nancy Rincon, and SRA Environmental Sustainability Scientist, Simon Clarke, conduct a stalk count at one of the CCRSF project demonstration sites.

SMARTER FARMING ON THE CASSOWARY COAST CONTINUED

SRA Weed Scientist, Emilie Fillols, (*pictured below left*) provided expert guidance on weed management using pre-emergent herbicides, while Entomology Leader, Dr Kevin Powell, shared an update on alternatives to imidacloprid for canegrub control.

SRA Principal Agronomist, Dr Danielle Skocaj, (*Pictured below right*) led sessions on taking leaf samples and interpreting soil tests to better understand soil and crop nutritional requirements. This was reinforced by a series of project fact sheets on soil sampling, the importance of correct sampling position, and choosing a lab for soil analysis.

"The project was one of the most rewarding we have been involved in; but it was also challenging, because each farm is different, and each grower has different issues. It was about working with each grower and finding out what those challenges were, and using data to drive decision making," Ms Rincon said.

"For example, Emilie held a workshop and was explaining the best control measures for cane grubs. During the workshop, Emilie identified an opportunity for growers to improve their chemical application for the product to work more effectively.

"She was able to explain to the group the most effective chemical use, and provide handout sheets. After the workshop some growers changed their management practices and improved their grub control."

Demonstration site

Tully District cane grower, Gavin Camilleri, (*pictured on page 26*) wanted to know how much nitrogen was available to his plant cane crop following a legume fallow.

In 2023, he volunteered to host a demonstration site as part of the CCRSF project, on a two hectare block at El Arish to guide decisions about adjusting his plant cane nitrogen fertiliser rate appropriately.

"We bought the farm from my father about six years ago. He never grew beans (as a cover crop) because that farm has always been prone to flooding and he was worried about the beans dying. But, I started trying beans down there and we got a good crop," Mr Camilleri said.

Mr Camilleri worked with Ms Rincon and Ms Headon to better understand how much nitrogen was available by measuring soil mineral nitrogen at key points over the growing season, from which he gained insight into whether additional N fertiliser was needed at top dressing.

"We experienced a huge rainfall event, but the nitrogen tests the following year showed there was plenty of nitrogen left in the paddock, so I didn't top dress. So yes, we reduced our nitrogen application," he said.

To check if nitrogen uptake had been affected, third leaf samples were collected from the plant cane crop in January 2024.

"Despite a wetter-than-average season and rainfall associated with Cyclone Jasper, third leaf nitrogen concentrations were above the critical value. Gavin's decision to forgo N at top dressing did not restrict crop N uptake," Ms Headon explained.

"Monitoring changes in soil mineral N over time can provide valuable information about potential N supply following a legume cover crop. Nitrogen available to the plant cane crop varies with legume species and biomass, in-season rainfall, and tillage, so it is important to check what is happening on your farm each season."

For more information on adjusting plant cane nitrogen rates following a legume fallow, refer to the SIX EASY STEPS® Toolbox guidance.

The Cassowary Coast Reef Smart Funding project was funded by the partnership between the Australian Government's Reef Trust and the Great Barrier Reef Foundation.

SRA Agronomist, Hector Fleury, is pictured (left) in the field and (right) at the Bundaberg Agtech Showcase where he gave a presentation on the BMAP project.

BURNETT MARY AGRONOMY PROJECT FORGES AHEAD

SRA's Burnett Mary Agronomy Project (BMAP) project which began in May last year has exceeded its participation target, with 26 cane growers across 78 farms now signed up.

SRA Agronomist, Hector Fleury, spoke about the impressive progress of the BMAP program at the recent Agtech Showcase in Bundaberg.

"We are delighted to have 26 growers involved – six in the Isis cane growing region and 20 in the Maryborough region – a total of 5450 ha of cane farms to work with," Mr Fleury said.

For the majority of growers, nutrient management planning is the aim of the one-on-one engagement, however, for a small number, constraint analysis is also on the schedule for the coming year.

Standard guidelines for constraint analysis in sugarcane have been developed by SRA and are followed in the project. These reduce subjective appraisals by integrating observations, farmer input, diagnostic testing, and environmental data.

"The aim is to benchmark the farm's productivity today and where it is in a year's time based on farm practice change, that is, measuring the improvement occurring through the grower's engagement with agronomists, using the results of soil tests, adopting improved nutrient management practice, and having the tools and data to become SmartCane BMP accredited.

"The project will also improve knowledge of the whole region - where the soils may have high or low pH and the levels of nutrients and micro-nutrients," Mr Fleury said.

Mr Fleury uses a farm map, normalised difference vegetation index (NDVI) and soil and leaf sampling for laboratory analysis to pinpoint soil pH, soil health and levels of minerals and other nutrients.

"Soil and leaf samples are de-identified so that the location is only known to the researcher.

"Our recommendations for yield improvement are based on the SIX EASY STEPS® soil-specific nutrient management guidelines for the Bundaberg/Isis/Maryborough regions."

Mr Fleury says he was concerned when he began the project that it would be tough getting growers to soil test.

"But I was wrong. The number of soil tests done in this region is really high.

"Out of the 78 farms we didn't identify a single grower who applies more nitrogen or phosphorus on the farm than their soil test recommendations and SIX EASY STEPS' guidelines allow."

Mr Fleury has met with all participating growers individually on their farms and discussed overcoming identified productivity constraints.

The project has another year to run and a lot of soil tests to do. About 100 soil tests have already been completed with 400 still to be collected in the two years of the project, together with leaf samples and analysis.

Another service under the BMAP is to help growers, in conjunction with the Maryborough Cane Productivity Services and Isis Productivity Services, to accumulate the necessary data, records and knowledge to become accredited under the industry's Best Management Practices program, Smartcane BMP.

For more information about the BMAP project, email hfleury@sugarresearch.com.au

The project is part of the $4.38 million Sugarcane Practice Change Program funded through the Queensland Government's Queensland Reef Water Quality Program.

SRA Burdekin District Delivery Officer, Rebecca Sullivan, is pictured at work biomass sampling. The crop is sampled at three, six and nine months in order to assess P uptake and growth.

PHOSPHOROUS REQUIREMENTS IN ALKALINE SOILS

A milestone report for the project *Understanding phosphorus requirements for sugarcane crops growing in alkaline soils* (SRA Project 2022/011) was recently submitted.

The project is being conducted by SRA in collaboration with Burdekin Productivity Services (BPS).

The Burdekin was chosen for the project because of the prevalence of alkaline soils in the region. However, the research findings will be relevant to alkaline soils elsewhere.

"Phosphorus requirements for sugarcane crops growing in alkaline soils are poorly understood," Manager Translation Research Dr Barry Salter said. "This project will address this research gap using a combination of pot and field experiments, soil and crop sampling and novel soil testing methods.

"The aim is to find out which soil tests provide the best prediction of plant available phosphorous (P) in alkaline soils.

"It will also assess the relationship between soil P and plant P and the effects this has on sugarcane growth.

"The findings will support the development of improved phosphorous fertiliser guidelines within the SIX EASY STEPS® nutrient management program.

"It's early days yet with the milestone report containing results of soil and plant analyses from three field trial sites and harvest data from a first ratoon crop."

In the past six months, project activities have included:

- harvesting the first ratoon crop in a trial that received four P fertiliser rates (0, 20, 40 and 60 kg P/ha) at planting and again in the first ratoon crop
- conducting soil sampling following harvest
- re-establishing P rate treatments in the 2nd ratoon crop
- temporal biomass sampling at three and six months after planting/harvest in three field trials
- analysis of soil and plant tissue data
- collection of soils with differing P status and properties which will be included in a pot experiment due to commence this year.

As part of the project, a hybrid workshop was delivered to 27 growers and advisors last year to raise awareness of the factors which can impact phosphorous nutrition.

The project is due to finish in December 2027. Chief Investigator is SRA Principal Agronomist, Dr Danielle Skocaj.

PROJECT SEEKS TO IMPROVE MILL ASH MANAGEMENT

Sugar mills in normal operations produce a large amount of boiler fly ash, which is the solid residue left after combustion of the bagasse used to fire the boilers.

Without proper management, boiler fly ash could cause air pollution or water contamination.

"Sugar mills have environmental obligations for boiler emissions and water contamination," Wilmar Production Technologist, Jonathon Gilberd said. "A well-functioning boiler fly ash system is important to meeting these obligations.

"This project wanted to investigate the performance of these systems across the industry and what processing technologies are currently being used within the industry."

According to Mr Gilberd, the ultimate goal of the project is to:

- Understand how to design ash systems to reduce stoppages and slow-downs (for example, due to the need to clean fans) and reductions in crushing rates due to boiler problems caused by poor quality ash water;
- Provide design information that would lead to improvements in the efficiency of ash processing systems leading to reduced emissions and environmental concerns.

"The project team conducted a review of all types of ash systems currently used in the industry,"Mr Gilberd said.

"Site visits were made to most factories to collect ash water samples and discuss systems with mill staff.

"Ash water samples were analysed at QUT by Senior Research Fellow, Anthony Mann, and Research Engineer, Hakan Bakir, to determine important ash water quality parameters.

"As emissions regulation has tightened in the past few decades, the prevalence of wet flue gas scrubbers has increased which in turn has increased the number of wet ash processing systems being utilised to provide water for these wet scrubbers. Wet ash systems existed in 19 of the 22 sugar mills operating during the 2023 crushing season."

The researchers found:

- A wide range of concentrations of total (suspended and dissolved) solids in the ash slurry, with an average value of 1.76%
- A smaller range of concentrations of total solids in the water supplied to wet scrubbers with an average value of 0.84%
- The ash system collection efficiency based on the average concentrations of total solids (including dissolved solids) was low at less than 46%.

Elements in a boiler fly ash management system typically include: (left) an ash clarifier, seen from the top, and (right) an underflow belt filter, pictured with QUT Senior Research Fellow and Senior Engineer, Anthony Mann.

KEY BENEFITS:

- A manual for bagasse fly ash systems is being developed
- Improve the design and performance of ash systems, reduce maintenance costs and guide engineering mill staff.

THE CHALLENGE: DISSOLVED SOLIDS

High concentrations of dissolved solids were found in the ash water across the industry. These are made up of soluble parts of bagasse ash and incompletely burnt bagasse; and of components of boiler flue gas and ash system 'makeup' water (from creeks and other sources).

Screens, clarifiers and filters which are common in wet ash systems are designed to remove suspended solids however are less effective on dissolved solids.

Dissolved solids can currently only be removed from the ash system when some of the ash water is expelled from the system, ideally by delivering it to effluent ponds.

"The issue is that dissolved solids can precipitate on internal boiler surfaces such as wet scrubber internal components and induced draft fan impellers," Mr Gilberd said.

"These contribute to boiler operational problems such as the reduced scrubbing effectiveness of wet scrubbers or balancing and vibrational issues with induced draft fans.

"More investigation is needed into the components of the dissolved solids in wet ash systems and their contributions to the amount and rate of build-up on machinery and how to best mitigate it," he explained.

The project team are producing a manual for bagasse fly ash systems to improve their design and performance, reduce boiler and ash system maintenance costs and to guide the next generation of engineering mill staff in managing existing systems. It will be distributed within the milling sector.

PACHYMETRA SURVEYS IN THE HERBERT

As part of a joint productivity project in the Herbert, Sugar Research Australia (SRA) and Herbert Cane Productivity Services Limited (HCPSL) have begun conducting surveys to assess the presence and severity of *Pachymetra* root rot in the district.

The surveys are part of the 'Targeting balanced nutrition and productivity constraints in the Herbert' project and follows similar sampling undertaken by HCPSL in 2014-15 (Holzberger et al. 2016).

From November 2024 to January 2025, a total of 90 samples were collected across targeted productivity zones to assess spore levels and associations with soil type, pH, and varietal choice.

Additional *Pachymetra* sampling is scheduled for 2026 and will continue to target key blocks and extend into other soil types. The *Pachymetra* spore counts were conducted at the Soil Assays Lab, based at Tully, in Far North Queensland. Growers wanting a pachymetra soil assay to understand the spore counts of their blocks should contact the lab by emailing assaylabtully@sugarresearch.com.au.

Results from the individual surveys will be communicated to Herbert growers once they become available.

SRA Leader Field Pathology, Dr Seona Casonato, will review the results across the district to better understand *Pachymetra* distribution and the factors that may contribute to spore counts.

'Targeting balanced nutrition and productivity constraints in the Herbert' is delivered by Sugar Research Australia in collaboration with Herbert Cane Productivity Services Limited and is part of the $4.38 million Sugarcane Practice Change Program funded through the Queensland Government's Queensland Reef Water Quality Program.

Queensland Government

DISTRICT PRODUCTIVITY PLANS - CURRENT ACTIVITIES

INITIATIVE	COLLABORATORS	PROPOSED OUTCOME	STATUS – March 2025
Far North District Manager: Gavin Rodman E: grodman@sugarresearch.com.au M: 0476 807 355			
Mulgrave CCS Improvement Project	CANEGROWERS Cairns Region, MSF Sugar and Mulgrave growers.	Improve CCS through monitoring and measuring crop indicators. Development of new datasets. Identification of management strategies. Identify the impact of current practices on CCS, including those impacting upon extraneous matter.	The Mulgrave CCS Improvement Project has recently shared with the industry in the Mulgrave and Babinda areas initial insights on potential CCS impacts. These include crop age at harvest, increasing ash percentages, timing of planting and harvest scheduling, use of growth regulators/ripeners, topping practices, row profile and crop presentation, and Pachymetra root rot. The project has developed a suckering estimation tool and also produced templates to support appropriate row profiles. The planting practices survey is ongoing, with hill-up measurements, stooling assessments and shoot counts continuing throughout the growing season. Activities on the Tableland are underway to support the investigations in Mulgrave, to gain an understanding of trends across the region. The Pachymetra survey on the Tableland has commenced and will supplement the row profile survey completed in early-2024.
Development of maturity calibration for MicroNIR	Far Northern growers.	Develop a calibration for the MicroNIR unit to support rapid infield maturity measurements.	A preliminary calibration has been developed for sugarcane maturity. Calibration and validation activities will continue through the early months of 2025.
Emerging and troublesome weeds	Nurfarm, Federation University, DPI, Far Northern growers.	Identify control strategies for emerging or troublesome weeds.	PlantNet weed ID for Australian Sugarcane launched. Balsam pear trials completed with pre-emergent results published in Cane Matters Spring 2024, pages 18-19 and post-emergent results published in Cane Matters Summer 2023/24, pages 30-31. Second itch grass pre-emergent pot trial underway, with results to be shared in coming months if consistent. Fourth navua sedge field trial to be established in March. This trial will seek to start in fallow and continue throughout the crop cycle. New weeds of focus are likely to emerge through district planning process over coming months.
North District Manager: Jess Portch E: jportch@sugarresearch.com.au M: 0459 109 085			
Variety observation plot and CCS maturity profiling	SRA Plant Breeding.	Variety demonstration plot and CCS maturity profiling.	CCS curve data was collected at four-week intervals during the 2024 crush. There were four sites chosen for the Herbert district and two sites for the South Johnstone district.
Targeting balanced nutrition and productivity constraints in the Herbert	Herbert Cane Productivity Services Limited, Department of Environment, Science and Innovation (Queensland Reef Water Quality Program).	Targeted whole of farm management plans, workshops, training and meetings with one-on-one extension activities.	• Supported six growers in obtaining/maintaining BMP accreditation. • Commenced soil testing and soil amendment recommendations. • Collected 90 pachymetra samples from varying soil types across the major Herbert productivity zones. Sample results and recommendations determined for 75 growers. • Six Easy Steps workshop scheduled for February.
Crop response to nutrient application following mill by-product application to optimise nutrient inputs and manage impacts on CCS (2024014)	Wilmar Sugar Australia, Reinaudo Farming Company.	Refinement of the SIX EASY STEPS recommendations for modifications to nitrogen application rates where mill by-products are banded at rates less than 100 wet/ha available in 2028.	This project will commence on the 1st of April, the two existing sites located in the Orient subdistrict of the Herbert will continue (from previous project) and new sites are to be established in Tully, Innisfail and Gordonvale.
Local Expert Analysis (LEA) Tully	Tully Cane Productivity Services Ltd (TCPSL), Tully CANEGROWERS, COFCO Tully Sugar Limited, Department of Environment, Science and Innovation (Queensland Reef Water Quality Program).	Improved profitability through balanced crop nutrition, targeted use of mill by-products, automated mill alerts for poor yielding crops, better disease management, improved use of NIR to indicate crop status.	Current projects including a project led by TCPSL (funded by the Office of the Great Barrier Reef) are providing tailored advice on achieving balanced nutrition, identifying and managing some of the most significant productivity constraints identified. On 45 farms the process of constraint identification has commenced and 16 farm plans have been delivered. Work is under way to review and update the current LEA.

INITIATIVE	COLLABORATORS	PROPOSED OUTCOME	STATUS – March 2025
Burdekin District Manager Terry Granshaw E: tgranshaw@sugarresearch.com.au M: 0457 650 181			
Lower Burdekin Smart Irrigation Project (LBSIP) XXXX & BIP	Agritech Solutions, Burdekin Bowen Integrated Floodplain Management Advisory Committee (BBIFMAC), Department of Primary Industries, North Queensland Dry Tropics and growers.	Reduce energy costs, improve water costs and irrigation efficiencies. Measure water quality benefits. Modernisation of farming systems e.g. smart farming technology. Improve productivity/ profitability which has a direct effect on environmental outcomes.	XXXX demonstration sites have now had multiple irrigation events completed. Surge irrigation is now being trialed on both sites. Advance sensors and tensiometers have been removed on both sites due to cane lodging. Flume has been moved to the tail drain to capture irrigation and rainfall events. Ex BIP demonstration sites continue to be monitored as part of the district plan. Heavy rainfall over the last two months has meant limited irrigation events have occurred.
Burdekin phosphorus response trial (SRA project 2022/011)	Wilmar, Burdekin Productivity Services and field experimental site grower hosts.	Improved understanding of phosphorus requirements for sugarcane crops growing in alkaline soils.	6 monthly biomass sampling has been completed on both year 1 sites. BRIA and Delta year 1 sites both lodged shortly after bio massing occurred. Year 2 site is due to have the 6-month biomass sampling event at the end of March. Pot trial soil were contaminated during record floods in February. Recollection of soil samples has commenced since the floods.
Imidacloprid trials	Burdekin Productivity Services and field experimental site grower hosts.	Investigate liquid vs granular imidacloprid in early plant cane crop.	Grub digs are planned for end of March, early April. Weather depending.
Central District Manager Dylan Wedel E: dwedel@sugarresearch.com.au M: 0490 029 387			
Increasing variety adoption	Productivity services companies and growers.	Increase adoption of new varieties by making additional information available to growers to make variety management decisions.	During productivity board shed meetings earlier in the year, variety selection for challenging soils was a common concern raised by growers. To bridge this information gap, four demonstration sites have been established on these soil types across the district (3x heavy cracking clay, 1x sodic). The plant source for these demonstration sites has been planted out, with the demonstration sites to be commercially billet planted in 2025 and for annual commercial harvest/ individual rake data to be collected from 2026 onwards. The demonstration sites will host two promising varieties and a released standard for comparison. The information collected from these demonstration plots will complement what is already being collected from observation plots managed by productivity services companies. To increase early CCS across the district, SRA will support growers to assess if paddocks would benefit from crop ripeners. Previous trials have demonstrated an increase in CCS of 0.8-0.9 units. A simple non-destructive test will also be trialed this year to determine crop maturity, this will allow for more paddocks to be tested in a timely manner when there is higher demand.
Increasing irrigation utilisation	Productivity services companies and growers, CANEGROWERS Mackay, Greater Whitsunday AgTech Hub.	Increase utilisation of irrigation to increase profitability and productivity.	IrriSAT is a free irrigation scheduling tool that provides paddock specific recommendations based on weekly satellite data. The program is being rolled out to growers during workshops and individually across the district. Any growers who are interested in learning more about IrriSAT or would like to attend their nearest workshop are encouraged to register their interest. The Greater Whitsunday Alliance is supporting the development of multiple irrigation demonstration sites across the district. These 9 demonstration sites are being installed with field walks to be held in in the coming months.
Supporting the adoption of fallow crops	Productivity services companies and growers.	Increase adoption of fallow crops to increase cashflow and improve subsequent cane productivity.	The precision planter is currently available for growers to trial growing a fallow crop. It has been used to establish ~40ha of soybeans this season, in cultivated beds and through the trash blanket. It has also been used to establish ~10ha of other fallow crops. Previously, growers have been supported in establishing successful soybean crops that were taken through to a profitable grain harvest, averaging around $1000/ha in profit.
Southern District Manager Lisa Devereaux E: ldevereaux@sugarresearch.com.au M: 0456 590 497			
Bundaberg/Wide Bay	Isis Productivity Ltd and CANEGROWERS Maryborough.	Nutrient Management plans and identification of productivity constraints.	Soldier Fly project (2022/004) continues. Further Soldier fly sampling is underway. Next steps are identification of the species and development of an artificial diet bioassay for selected economically damaging species. Burnett Mary Agronomy Project (2023/802) has progressed to Milestone 4 in the Maryborough and Isis region. Project engagement is well received , with field work led by the new SRA Southern Agronomist. Monthly Steering Committee Meetings have been established. Twenty six growers signed up for either new NMP budgets or Constraint Analysis Assessment.
Rocky Point Pest and Disease Management Surveys	CANEGROWERS Rocky Point.	To deliver district-based activities that improve productivity, profitability and sustainability outcomes for the Rocky Point district.	Rocky Point is focused on RSD management and is testing the successful installation of a sterilisation unit on a harvester.
NSW multi-year productivity program	NSW Agricultural Services NSW Sunshine Sugar.	Improved profitability and productivity through various projects including the development of an economic model for farmers to determine whether to harvest one or two year cane.	Economic modelling and grower engagement on the benefits and drivers for growing one year old cane in the Harwood and Broadwater areas progressing to trial.
SIX EASY STEPS® Online Sugarcane Nutrient Management Program	Department of Environment and Science, CANEGROWERS.	Enable all Australian sugarcane growers to access nutrient management training that will improve the efficiency and productivity of their farms if applied.	The program has recorded more than 300 registrations since it was launched in 2023. Participants who finish the program receive a certificate of completion.

RESEARCH PROJECT INVESTMENTS

PROJECT IDENTIFIER	TITLE	CHIEF INVESTIGATOR	RESEARCH AGENCY	END DATE
Research Mission 1: Profitable and Productive				
2022/012	Use of machine learning to determine the extraneous matter and billet length in cane consignments	Geoff Kent	Queensland University of Technology	1/02/2027
2022/014	Australian Sugar Industry – Development of factory training modules – Phase 3	Geoff Kent	Sugar Research Institute	1/03/2028
2023/201	Bagasse fly ash system performance benchmarking	Jonathon Gilberd	Wilmar Sugar Australia Limited	4/09/2024
2023/203	Billet Quality Assessment	Barton Wixted	Grifith University	30/05/2025
2024/201	Hybrid pH control strategies to reduce sucrose losses and control corrosion in sugar factory evaporators	Aaron Baker	Sunshine Sugar	1/07/2025
2024/202	Demonstrate the use of a microwave dry substance transducer for controlling high grade boilings	Bryan Lavarack	Mackay Sugar Limited	1/07/2025
2024/203	Greenhouse gas emissions from sugar factory boilers	Line Jenssen	Wilmar Sugar Australia Limited	30/06/2025
2024/204	Thermo-digester for Rapid Conversion of Mill Mud to Green Fertiliser	Stephen Xu	Charles Darwin University	1/07/2025
2024/003	ARC Research Hub for Engineering Plants to Replace Fossil Carbon	Nathalie Piperidis	Sugar Research Australia	12/08/2029
2024/016	Harvest Mate Auto – Improving Economic Outcomes	Dylan Wedel	Sugar Research Australia	1/05/2029
2024/017	Sugarcane Sucrose Estimation with Hyperspectral Imaging and Artificial Intelligence	Sijesh Natarajan	Sugar Research Australia	1/09/2029
2024/301	Combining drone-captured phenotypes and genomic prediction to optimise clonal selection in sugarcane (PD1)	Sijesh Natarajan	Sugar Research Australia	12/08/2029
2024/302	Applying genomics tools for novel nematode resistance in sugarcane (HDR9)	Christopher Tom	Sugar Research Australia	12/08/2029
2024/303	Genomic prediction of specific combining ability in sugarcane (HDR20)	Andrew Rigby	Sugar Research Australia	12/08/2029
Research Mission 2: Resilient and Enduring				
2018/010	Moth borers - how are we going to manage them when they arrive?	Kevin Powell	Sugar Research Australia	1/06/2025
2020/004	Beyond Imidacloprid - Chemical and Biorational Alternatives for Managing Canegrubs	Kevin Powell	Sugar Research Australia	1/06/2025
2020/008	Transformational crop protection – Innovative RNAi biopesticides for management of sugarcane root feeding pests	Neena Mitter	The University of Queensland	12/05/2025
2022/001	Managing major diseases in sugarcane cropping systems using carbon nanodots	Qin Li	Griffith University	1/05/2025
2022/002	Updating the Sugarcane Industry Biosecurity Plan	Stuart Kearns	Plant Health Australia	1/06/2027
2022/004	Soldier fly diagnostics, distribution, and development of an artificial diet	Kevin Powell	Sugar Research Australia	1/06/2025
2022/005	Assess weed impact/distribution for prioritisation	Emilie Fillols	Sugar Research Australia	10/06/2025
2022/006	Development of a resistance screening method for chlorotic streak	Chuong Ngo	Sugar Research Australia	1/06/2026
2022/007	Delivery of a pest and disease diagnostic step change for the sugarcane industry (RSD - NIR)	Seona Casonato and Steve Staunton	Sugar Research Australia	1/12/2025
2022/016	Viruses to aid biological control of major root-feeding pests of sugarcane	Michael Furlong and Kayvan Etebari	The University of Queensland	1/08/2027
2024/001	ARC Industrial Transformation Training Centre – Centre for Plant Biosecurity.	Stephen Mudge	Australian National University	30/06/2029
2024/007	Carbon nanodots - Woodford component	Shamsul Bhuiyan	Sugar Research Australia	1/06/2025
2024/012	Improving the technology readiness level of AI-based weed zonal and spot spraying for sugarcane	Emilie Fillols	Sugar Research Australia	1/12/2027
2024/015	Characterising the vector of sugarcane streak mosaic virus: a major biosecurity threat for Australian sugarcane	Kevin Powell	Sugar Research Australia	1/12/2027
2024/401	Proactive Preparedness for Incursion of Leafhopper Vectors of White Leaf Disease – A Major Biosecurity Threat	Kevin Powell	Sugar Research Australia	8/08/2025
2024/402	The Sweet Smell of Success: Sustainable Canegrub Management using Host Plant Volatiles	Samuel Bawa	Sugar Research Australia	19/12/2025

PROJECT IDENTIFIER	TITLE	CHIEF INVESTIGATOR	RESEARCH AGENCY	END DATE
Research Mission 3: Diversified and Adaptable				
2022/018	Building industry engagement capability for a diversified and adaptable Australian sugarcane industry	Madeline Smith	Queensland University of Technology	30/06/2024
Research Mission 4: Sustainable and Efficient				
2020/804	Reducing herbicide usage on sugarcane farms in reef catchment areas with precise robotic weed control	Emilie Fillols	Sugar Research Australia	30/06/2024
2021/008	Develop a sustainability framework for Australian sugar and sustainability report in collaboration with stakeholders	Ingrid Roth	Roth Rural Pty Ltd	1/11/2025
2021/805	Soil specific management for sugarcane production in the Wet Tropics	Danielle Skocaj	Sugar Research Australia	13/06/2024
2022/010	Industry-wide leaf and soil survey to detect hidden macro and micronutrient constraints	Barry Salter	Sugar Research Australia	30/06/2024
2022/011	Understanding phosphorous requirements for sugarcane crops growing in alkaline soils	Danielle Skocaj	Sugar Research Australia	13/12/2027
2022/801	XXXX Lower Burdekin Smart Irrigation Project	Simon Clarke	Sugar Research Australia	1/05/2025
2023/801	Targeting balanced nutrition and productivity constraints in the Herbert	Simon Clarke	Sugar Research Australia	30/06/2026
2024/010	Long-term soil health trials to assess farming system opportunities and impacts	Barry Salter	Sugar Research Australia	1/01/2029
2024/011	Progress towards variable rate N application within block - understanding crop N response	Barry Salter	Sugar Research Australia	31/01/2029
2024/014	Crop response to nutrient application following mill by-product application to optimise nutrient inputs and manage impacts on CCS	Julian Connellan	Sugar Research Australia	31/10/2028
2024/018	Are trends in silicon uptake a reason for concern?	Danielle Skocaj	Sugar Research Australia	30/11/2028
2024/804	Fine-tuning nutrient and constraints management in the Tully mill area	Peter Sutherland	Tully Cane Productivity Services Limited	30/06/2026
2024/803	Tully & Murray fine-scale water quality monitoring project	Alicia Buckle	Terrain NRM	01/09/2026
Research Mission 5: Resourced and Skilled				
2018/015	Sugar Milling R & D Capability Building Program	Geoff Kent	Queensland University of Technology	31/03/2027
2019/102	PhD Scholarship - Genetic solutions for determining fibre quality traits in sugarcane	Angela O'Keeffe	The University of Queensland	31/03/2024
2021/101	PhD Scholarship - Optimising mill mud and ash applications for soil improvement and carbon sequestration	Hannah Green	James Cook University	01/02/2026
2021/102	PhD Scholarship - Systems biology for sustainable agriculture: evaluation of plant growth-promoting bacteria to produce high-performing biofertilisers	Ian Petersen	The University of Queensland	30/04/2025
2021/401	Research Award - Risk assessment for the newly discovered parasitic nematode *Pratylenchus parazeae* in the Australian sugarcane industry	Shamsul Bhuiyan	Sugar Research Australia	1/04/2024
2022/101	PhD Scholarship - A novel biosensor device for on-farm sugarcane disease diagnosis	Simon Strachan	Griffith University	29/02/2024
2022/401	Research Award - Harnessing the SynBio potential of Australia's stingless bees, the first step	Natasha Hungerford	The University of Queensland	31/03/2025
2022/402	Research Award - Genomic prediction of ratoon yield robustness	Eric Dinglasan	The University of Queensland	14/05/2024
2023/101	Development of an automated system to perform localised in-crop replanting of sugarcane gaps	Bruen Smith	University of Southern Queensland	19/03/2027
2023/103	PhD Scholarship – An economic and agronomic assessment of Nitrogen Use Efficiency and the factors influencing it	Kristopher Woodrow-Smith	The University of Queensland	31/12/2025
2023/801	DES 1231311 Sugarcane practice change program - Herbert	Simone Clarke	Sugar Research Australia	31/08/2026
2023/802	DES 1231311 Sugarcane practice change program - Southern	Lisa Devereaux	Sugar Research Australia	31/08/2026

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

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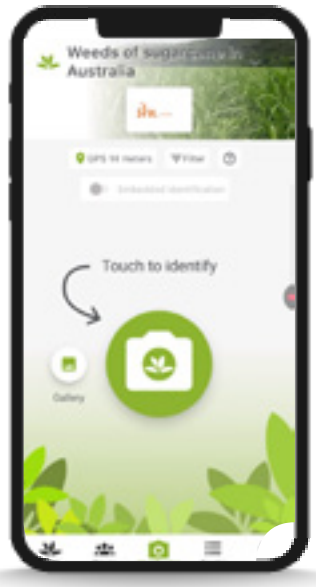

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The *Weeds of Sugarcane in Australia micro-project* was a collaboration between SRA and Pl@ntNet, and was funded from the SRA Far North District Productivity Plan.

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