



Sugar Research  
Australia

# CanecoNNECTION

**Autumn 2019**

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## Welcome to the Autumn 2019 edition of *CaneCONNECTION*

**Our first port of call in this magazine checks in with the harvesting Rural R&D for Profit project, talking with Mackay grower Phil Deguara about in-field demonstration trials from the 2018 season. You can read about changes the Deguaras have made to their machine and its operating parameters to get the most from the crop for the whole value chain on pages four and five.**

We also have a look at the SCHLOT Live project, which is working toward a practical tool for the people inside the cab of the harvester. This new tool is designed to bring real-time harvest loss information into the cab and is a significant step forward from 'SCHLOT classic'.

In this edition, we also continue our regular dive into sugarcane soil health. We talk about the costly problem of nematodes and some of the research strategies being used to tackle them for the industry. We also hear from a range of growers who have implemented improved farming system practices on their farms, including what it took to change and what benefits it is delivering to their business.

In this edition we also highlight some of the latest findings and work from the yellow canopy syndrome research program, which has made notable progress from recent trials and experiments.

Enhanced efficiency fertilisers (EEF) continue to be a hot topic for the industry, and many of you will have heard of the EEF60 project that SRA is running in conjunction with CANEGROWERS. In this edition, we look at another EEF project led by Dr Kirsten Verburg with CSIRO in conjunction with Herbert Cane Productivity Services Limited.

Our thoughts go out to all in the industry who have been impacted by severe weather this year – ranging from drought in the South and NSW to severe flooding in parts of the north. Here's hoping for some much kinder weather for everyone as 2019 rolls on.

**Brad Pfeffer**

*Executive Manager, Communications*

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*(Cover page) Young brothers Thomas and Eli Walsh checking over this year's soybean fallow. Read more on page 12.*

*Design: Catherine Jorissen, SRA.*

*Caneconnection is a registered trademark.*



95

The number of in-field trials undertaken by SRA over the last two seasons to help the industry optimise harvest efficiency.

Page 4



273,360

The number of virtual treatment years created as part of 'virtual trials' to analyse enhanced efficiency fertilisers.

Page 22

# By the numbers

1000km

The travelling distance that a harvester has reduced its yearly mileage through a shift to 1.9 metre dual rows.

Page 16



\$80M

The estimated cost of nematodes to the Australian sugar industry each year.

Page 14



6

The number of years that Glen Cole has been growing cane at Casino, NSW.

Page 18



## Thorough hygiene drives good biosecurity outcomes

**SRA has prepared a short online video with tips and reminders for cleaning down your harvester.**

The video runs through the importance of proper hygiene for moving harvesters both within a district and between biosecurity zones. In the video, we talk with Luke Giddy (SRA Burdekin), and Marian Davis from Burdekin Productivity Services about some of the basics of cleaning and the process for obtaining a plant health assurance certificate for moving a harvester.

In order to move machinery across sugarcane biosecurity zone boundaries, machinery requires a plant health assurance certificate (PHAC) available through your local productivity service or Biosecurity Queensland.

The PHAC states that the machinery was free of visible plant material and soil, when inspected, and will accompany the machine during transport.

Movement within sugarcane biosecurity zones does not require a PHAC, but requires the 'General Biosecurity Obligation (GBO)' to be managed. The requirement of the Act requires you to take all reasonable steps to prevent or minimise biosecurity risks.

- To see the video visit the media section of [www.sugarresearch.com.au](http://www.sugarresearch.com.au).
- The biosecurity section of the SRA website also has useful information on your general biosecurity obligation and information sheets on machinery hygiene. ■



(Above) Marian Davis and Leigh Chapple from BPS and Luke Giddy from SRA with some tips on cleaning down your harvester.



# Trials and practice change help find the sweet spot

## HARVEST OPTIMISATION TRIALS HAVE HELPED GIVE THE DEGUARA FAMILY IMPORTANT INFORMATION TO SET HARVEST PARAMETERS AND DRIVE EFFICIENCY FOR THEIR CENTRAL REGION FARMING BUSINESS.

**When the Deguara family from North Eton started cutting cane in 2017, they began with a blank slate.**

They had just bought a Case 8800 for their own cane, which totals in the range of 22,000 to 25,000 tonnes each year. Having already seen some of the information on harvest optimisation, their first step was with a copy of the SRA Harvesting Best Practice manual and they then decided to take part in field trials with SRA.

This led to several modifications and adjustment to their operating parameters.

"For our first year, we were dealing with a machine that we didn't have experience with, so we found the trial really useful in giving us an idea on our losses and how our practices stack up," explained Phil Deguara, who runs the property with his father John and brother Murray. "We wanted to know how our practices compare to best practice, and more generally to the area as well."

Modifications included the installation of after-market chopper drums and optimising the roller train.

"We see that these changes have helped with our billet quality. Cutting our own cane, we also wanted to use the same machine for cutting, so that also prompted these changes. For less than 25,000 tonnes per year, we saw no use having two harvesters."

The Deguaras took part in trials in 2017 and 2018. There have now been 95 trials similar to this one across the industry over the last two seasons, where the team uses two methods to measure harvest losses: mass balance trials; and the in-field sucrose loss measurement system.

Each trial runs over a day across about 500 tonnes, with one of the main objectives being to assess the standard practice of the machine compared to recommended practice. The trial also includes a control treatment of low loss

and an aggressive treatment, to provide a more complete picture.

For the Deguara family, having already learnt information from 2017 and then making improvements to their machine, their standard practice was fairly similar to the best practice recommendation for the 2018 trial.

Their normal practice is for groundspeed at 4km/hour, primary fan speed at 750RPM, with the secondary fan on, topper on, and elevator pour rate of about 68 tonnes per hour. The HBP recommendation was the same, but with the primary fan back to 700RPM.

The 2018 trial indicated that the Deguaras have minimised sugar loss to about 280kg per hectare by operating at their standard practice, with about 7.7 tonnes of trash per hectare (PRS of 14.8 percent). By comparison, the industry is losing 690kg sugar per hectare at current practice (based on statistical means for 2017 trials).



Billet quality was good. The trial indicated they had 74 percent sound billets, 17 percent damaged, and 9 percent mutilated.

Phil Deguara said that he felt they were now close to the sweet spot with harvesting, but added that they needed to continue to improve with estimating yield.

“We have it pretty good, but the estimate is the first thing you need when you go into a block, so that we can make the right decisions on ground speed and fan speed.”

Overall, he said that the less that was left in the paddock, the better it is for everyone.

“Across the industry, we also need to weigh up the economics and the time

and all the other factors that come into play. At the end of the day, the idea is to get as much sugar out the end as we can – that’s what we get paid on.”

He added that learning more about harvest optimisation, and seeing the cane from the cab of the harvester, had lessons right across the farm.

He said this visual view would continue to inform existing information through yield maps, EM maps, and help with variable rate application of inputs.

“It helps to ground truth those maps and really helps us understand the farm better.” ■

**This project is funded by SRA and the Australian Government Department of Agriculture and Water Resources as part of the Rural R&D for Profit program.**

**For more information on harvest best practice or to receive a hard copy of the harvesting best practice manual, contact Carol Norris on E [cnorris@sugarresearch.com.au](mailto:cnorris@sugarresearch.com.au) T 07 4963 6824.**

**“Learning more about harvest optimisation, and seeing the cane from the cab of the harvester, had lessons right across the farm.”**

**PHIL DEGUARA**



**Australian Government**

*(Over page) Phil Deguara and family have implemented a range of changes to help optimise harvesting efficiency. (Above) Garry Landers from SRA talking through trial results from 2018.*



# Real-time feedback to guide harvest efficiency in the cab

## A NEW TOOL IS IN DEVELOPMENT TO PUT INFORMATION ON HARVESTING PARAMETERS AND CANE LOSS INTO THE HARVESTER CAB, HELPING TO DRIVE HARVESTING EFFICIENCY.

**One of the many challenges with finding the sweet spot with harvest optimisation is getting an accurate estimate of the crop.**

In addition to yield, there are also a range of other factors that impact cane recovery – the variety, how it is standing, the time of day, and the weather.

All of these come in to play as operators seek to find the optimum spot for harvest recovery. The research arm of the industry is assisting with this challenge on a number of fronts, including by working with local groups with in-field trials that give everyone a better understanding of conditions and operating parameters.

At the same time, there has also been work on a new development that is

getting closer to commercial use, via a product that will be called SCHLOT Live.

This work is led by Norris ECT in collaboration with Agtrix and is funded by SRA and the Australian Government Department of Agriculture and Water Resources as part of the Rural R&D for Profit program.

SCHLOT (Sugarcane Harvest Logistics Optimisation Tool) Live uses sensors and a database of previous trial results to present this information to an in-cab monitor to give real-time feedback on yield and harvest losses.

Previous work by Norris ECT has seen them develop the predecessor to SCHLOT Live, which is an online version called SCHLOT (or 'SCHLOT classic').

This new version, through the Rural R&D for Profit program, takes that work to

another level for the industry by putting the information inside the cab and giving operators real-time feedback.

During the 2018 season, the Norris ECT team has been testing the system in harvesters at Rocky Point and the Herbert, and made refinements to the user interface.

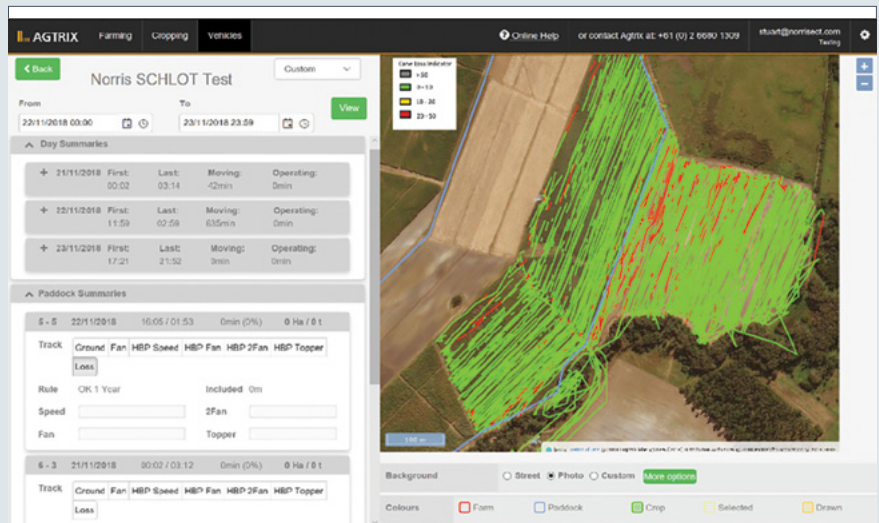
Stuart Norris from Norris ECT said they were developing a system where operators could change crop characteristics on the go.

“The operator will also be able to calibrate the system for primary and secondary extractor performance parameters in the cab, and also allow the display to show cane loss through both extractors either individually or collectively. This can be displayed as cane loss per hectare or per hour, and can also link back to the online

This work is funded by SRA and the Australian Government Department of Agriculture and Water Resources as part of the Rural R&D for Profit program.

For more information contact Stuart Norris on E [stuart@norrisect.com](mailto:stuart@norrisect.com)

For a video of SCHLOT Live in action, visit [sugarresearch.com.au](http://sugarresearch.com.au)



SCHLOT program to help find that sweet spot around cane loss versus bin weights, extraneous matter, and other factors," he said.

"Operators, or researchers, will also be able to log performance and harvester operating parameters over a period and download a data file onto a USB stick to analyse later.

"It is not an absolutely definitive tool, but we see that it provides useful information for harvesters, millers and transporters to be able to optimise their business."

The system also has an online interface, incorporated into Agtrix's Agdat system, which uses the cane loss values passed to the Agtrix logger to store high frequency historical cane loss data alongside the other data already managed by Agtrix.

The Agdat system allows users to view historical cane loss performance by date and time or by paddock. Cane loss is categorised as green, amber or red with a harvester track showing the categories of cane loss.

Feedback from operators using SCHLOT Live during trials has been very positive, with both groups making changes to the way they operate since the systems have been installed.

"The system has already had an impact and has changed the way my operator drives the harvester with the varying conditions due to the instant feedback," Rocky Point farmer, Josh Keith, said.

The system is still being fine-tuned, and more information on commercial release of SCHLOT Live will be available later this year. Please keep an eye on *CaneConnection* or the SRA e-newsletter for more information. ■



## Australian Government

(Over page) Stuart Norris, Chris Norris and Cam Whiting, Norris ECT, in the field testing SCHLOT Live at Rocky Point last year. (Above top) This online display allows the user to see, in addition to other Agdat data, the proportion of the field in which cane loss was in the green range, and to identify regions of the field that may have higher or lower cane loss than others. (Above middle) In-cab interface main page. (Above bottom) In-cab interface settings page.

Growers should consult their local productivity advisor around the use of mill by-products and what further nutrients may be required for their crop. The SRA Australian Sugarcane Nutrition Manual also has information on indicative amounts of nutrients in mill by-products, and this publication is available free for growers by calling 07 3331 3308.



# Looking at how mill by-products stack up

TRIALS AT HARWOOD IN NSW HAVE LOOKED AT COMPOST AND MILL BY-PRODUCTS AND EXAMINED FACTORS SUCH AS YIELD AND NEMATODE POPULATIONS.

**Alan Munro has been a long-term user of mill mud at his farm at Woodford Island in the southern stretches of the Australian cane industry.**

He sees that it has been one component of his farming system that is contributing to better soil health and improving the efficiency of his nutrient management.

Having seen the potential from mill mud sourced from the nearby Harwood sugar mill, he also wanted to learn how mill by-products compare to compost and also to a straight urea regime, as well as their impact on soil health and nematode populations.

With this in mind, he recently worked with Sunshine Sugar and then with Dr Graham Stirling (Biological Crop Protection) in trials that looked at a range of mud/ash, compost and urea treatments.

The work began as an initiative of Sunshine Sugar in 2012 to determine yield responses to banded mill mud or banded compost. At the time, Sunshine Sugar was starting to trial compost manufacturing.

Subsequent work was undertaken through a now-concluded project funded by SRA, called *Regenerating a soil food web capable of improving soil health and reducing losses from soil-borne pests and pathogens*, which was led by Dr Stirling. This trial was done in conjunction with Dr Anthony Young, Rick Beattie from Sunshine Sugar, and soil scientist Bob Aitken.

Results were published in a paper at the Australian Society of Sugarcane Technologists (ASSCT) conference in 2018, and while the study was a short term trial (one harvest), the researchers said that it made some important findings in relation to the increases in soil organic carbon and the potential to reduce some parasitic nematode populations.

"Amending the soil with organic matter had major effects on plant crop yields in this trial, as the highest rates of mud/ash and compost increased yield... relative to the no urea control," they wrote in their paper.

"The two lowest rates of compost or mud/ash did not increase cane or sugar yield relative to the control (no urea) treatment. However, higher rates of

both the amendments significantly increased yield and there was a clear trend for increasing cane yield as the amendment rate increased."

At the higher rates of compost (66t/ha) and mud/ash (90t/ha), the top urea rate (230kg N/ha) performed slightly better.

Rick Beattie from Sunshine Sugar said that a valuable part of the trial was that they were able to determine top-up nitrogen rates to use with different rates of banded mill mud.

The researchers also noted that the long-term impacts, while not assessed in this trial, were important to consider.

"Soil organic matter has a profound effect on soil physical, chemical and biological properties and the decline in soil carbon levels that has occurred in sugarcane soils over the last 100–140 years is a major reason they are now in relatively poor condition. Many cane growers are now trying to improve the health of their soils by adding amendments such as mill mud and compost and the data obtained in this study demonstrates that





such practices can improve organic matter levels in the soil.”

The experiment also suggested that there was a positive impact on soil biology.

The two highest rates of mud/ash and compost had the lowest populations of root-lesion nematode, a pest that commonly reduces the yield of plant crops by 10–20 percent.

Alan Munro said that one of the key messages for him was the importance of considering the economics, given that the standard urea rate produced slightly higher yield.

“But there is also evidence that organic inputs are improving the soil and helping with a positive impact on nematode populations. So the messages for me were that there is more to learn over the long term; that there is nothing wrong with growing cane with straight urea; and for us we had to go in at 50t/ha with the mill mud or compost to get a response.”

There are several projects and activities currently underway looking more closely

at mill by-products and their relationship with soil health.

These projects are part of the broader Soil Health Program occurring at SRA, with information on these projects and their findings available under a new ‘soil health’ section of the SRA website.

Current work underway in the Burdekin and Herbert has reinforced the importance of carbon inputs – such as mill mud or crop residue – for soil biology improvement.

Soil biology is key to productive healthy soils and soil microbes are responsible for converting complex organic compounds such as crop residues, mill mud and soil organic matter into nutrients that are available to the crop.

Alan farms on 1.8 metre rows and also uses minimum till strategies for his cane and soybeans, after work across the NSW region to investigate improved farming systems.

“The economics of the whole system with the beans and reduced tillage have

stacked up. We are able to sell our beans to a buyer in Casino, generate cash, reduce our tillage, and we reduce our nitrogen applications for the following cane crop.” ■



*(Above left) Alan Munro checks over beans in mid-January, hanging on through a long dry spell. (Above right) Alan with cane that will be cut as two-year old later this year.*



# Local data gives the full picture on water quality

GROWERS IN THE PROSERPINE REGION ARE EXAMINING THE RELATIONSHIP BETWEEN FARMING PRACTICES AND WATER QUALITY.

**"I've worked hard over the years to be environmentally friendly and try to improve practices more than I have to."**

**GARY SIMPSON**



**Proserpine grower Gary Simpson is keen to continue learning about farming practices and water quality.**

In recent years, he has made a number of changes and improvements to his farm, including reducing the use of residual herbicides, starting to use products such as dunder and mill-mud, and being strategic and careful with grub control.

He has also been involved locally in the push for Smartcane BMP adoption through his role as the Deputy Chairman of the local CANEGROWERS until 2016.

With that experience, but also eager to learn more about his farming practices and water quality, he is part of a project that is looking at water quality in Myrtle Creek.

Funded by the Department of Environment and Science and delivered by SRA in partnership with Sugar Services Proserpine, the project works with several growers across the catchment to look at how specific farming practices influence water quality, and then share these lessons across the region.

"I've worked hard over the years to be environmentally friendly and try to improve practices more than I have to," explained Gary.

"This project is a chance to see what that means for water coming off the farm, and also talk to the other growers about what is happening on their place."

Gary said with his experience and willingness to learn more about his farming practices and water quality,

the project was a perfect fit and that he looked forward to assessing the water quality in Myrtle Creek.

The Myrtle Creek sub-catchment feeds into the Proserpine River and covers significant cane country around Proserpine.

Gary is a keen angler and loves putting the boat in at the nearby Whitsunday islands.

"It is a beautiful part of the world and we want to look after it. If we are doing anything wrong, we want to know about it, and I am sure we would change our practices immediately," he said.

"This project will give us results that we can learn from."

On Gary's 230 hectares, monitoring stations have been looking at two different farming practices: surface applications of both dunder and of mill mud. Sites across the Myrtle Creek catchment are also assessing other farm practices in relation to chemicals and nutrients.

The project is led on the ground by SRA Adoption Officer, Natalie Baker, who said the project is focussed on getting the facts.

The project began late last year, with some significant rainfall events in December 2018 and early 2019 generating plenty of water samples to be analysed. These will form part of a range of discussions and activities for the growers involved and across the district.

"We are already getting strong interest from growers outside of the monitoring sites," Natalie said.

"We even have one grower collecting his own water quality samples and he is very keen to see from a catchment scale what – if any – herbicides or nitrogen is in the water.

"He's very close to achieving Smartcane BMP accreditation, so he's finding it helpful to learn more about his run-off."

Through the project, growers will be engaged in a range of groups to discuss ideas and learn from each other. There will also be on-farm demonstrations of innovative practices to continue to compare water quality impacts in relation to conventional practice compared to innovative practice.

"The project has a strong focus on getting growers more involved and getting the facts around all our different treatments and water quality," she said. ■

**To learn more about the project contact Natalie Baker on  
M 0439 619 082 or  
E nbaker@sugarresearch.com.au**

*(Over page) Proserpine grower Gary Simpson said the project is an opportunity to learn more about farm practices and water quality. (Top left) Water quality monitoring equipment in the field as part of the project. (Top right) Gary Simpson and SRA Adoption Officer Natalie Baker with monitoring equipment installed at Gary's property as part of the project.*



# Innovation and sustainability delivers long-term farming success

THE WALSH FAMILY AT WOODBURN IN NORTHERN NSW ARE PASSIONATE ABOUT SUGARCANE FARMING AND DOING EVERYTHING THEY CAN TO MAKE THEIR FARM PROFITABLE AND SUSTAINABLE FOR THE LONG TERM.

BY BRAD PFEFFER



**With more than 100 years of cane growing history, the Walsh family has seen plenty of changes and innovations to the industry.**

Farming at Woodburn in the Broadwater mill area, Tom is fourth generation at the family property and son Marty is fifth generation. They farm about 440 hectares of cane over several farms in the area, with the original property dating back to the start of cane growing in the region.

Both are keen to continue to improve the property for the next generation after them.

They have gone to 1.8 metre dual row, with three rows of soybeans following the same footprint at the end of the crop cycle.

All their equipment is on GPS and they have also moved to disc opener planters for both cane and beans.

These changes are all helping to minimise time in the tractor, reduce soil disturbance and provide a controlled traffic path that can assist when it gets wet during the harvest. They also have some machinery in partnership with other local growers to help with less-regular work such as the bean harvest.

"We are happy with the dual-row 1.8 metre and have been that way for more than 15 years now," Marty said. "With single row there can be a massive inter-row to cover in, but the dual row covers in very quickly."

Beans are an important part of the mix, and a handy cash crop, but they have learnt through experience never to bank on them until they are in the truck.

"We had an excellent crop in 2017 of about 60 hectares but we only harvested about eight hectares with two big floods that year," Tom said. "The first flood knocked them around and then the second flood put water completely over the top and we lost virtually all our beans. Probably 80 percent of the beans in the region were lost that year – so while they are a good crop, they're also quite risky."

They have moved more towards the beans to both improve soil health and to give themselves plenty of time for getting the next crop of cane in.

"If we were ploughing out cane in June or July, and then trying to plant in September the turnaround was too hard. So now we will plant beans in December and take the beans off around April or May, and then the block is there nicely prepared for September planting."

They said the 2018 cane harvest was slightly below average, and impacted from two floods in 2017.

"Some of our farms had half a metre of water over them, and while the cane survived it all, it did some lasting damage," Tom said. "We had cane that looked like it would cut 150 tonnes/hectare and ended up more in that 110-120t/ha range. We

still managed to cut about 23,000t all together, with good sugar."

Their main varieties are Q208<sup>Φ</sup>, Q240<sup>Φ</sup>, Q232<sup>Φ</sup> and Q244<sup>Φ</sup> and they said that Q244<sup>Φ</sup> is their leading variety for sugar content. They had paddocks average over 15 CCS last year which they described as "pretty amazing".

This year – like most of NSW – was looking very dry early in the summer and they were in need of rain at the time of writing. "We hope to get back to cutting heavier cane and have often averaged 170-180t/ha, so we're hoping to get back to that."

They cut almost all two-year old cane and see it as a safe bet to manage their reasonably high frost risk. They will grow one-year to balance different paddocks from time to time but also find that a cold and frosty winter will see the crop not perform as well the following year.

The Walsh's said they love farming, and are especially passionate about the cane industry. They are hopeful that the next generation will be keen to be farmers too, with Marty's kids Thomas (5), Eli (3) and Emmy (1) already showing a keen interest. ■

*(Over page) Emmy Walsh in the paddock earlier this year. (Above) Marty and Tom Walsh with the next generation – Thomas, Eli and Emmy. (Cover page) Young brothers Thomas and Eli checking over this year's soybean fallow.*



# Helping nematode challenge through varieties

WORK IS UNDERWAY TO BETTER UNDERSTAND HOW DIFFERENT VARIETIES RESPOND TO THE COSTLY PROBLEM OF NEMATODES.

**Plant parasitic nematodes (PPN) have been estimated to cost the Australian cane industry at least \$80 million per year, and could cause yield loss of 10 percent in plant cane and 7 percent in ratoons.**

One of the biggest culprits for restricting cane production is root-knot nematode, especially in sandy soil. This nematode attacks the growing root tips by developing galls that shorten the roots, which reduces the capacity of the plant to uptake water and nutrients.

Nematodes are also very difficult to control.

Extensive research over decades has refined management strategies that can help growers minimise the effects of nematodes, especially regarding improved soil health (see breakout box). Unlike some other sugarcane diseases, there is no varietal resistance to root-knot nematodes.

In addition to refining management strategies, SRA researchers Dr George Piperidis, Mr Roy Parfitt, Dr Fengduo Hu and Dr Shamsul Bhuiyan have looked at the nematode challenge from a different angle. They have examined sugarcane introgression clones, which are produced by hybridising wild relatives of sugarcane and commercial varieties, and assessed how these clones respond to nematode pressure, and if there are opportunities to assist with the problem through plant breeding.

Previous research overseas, and now for the first time in Australia, has confirmed the potential for wild relatives of sugarcane to offer resistance to nematodes says Dr Piperidis, Principal Scientist, SRA.

Breeders use introgression breeding techniques to bring in the good traits from the 'tougher' wild relatives into commercial varieties. In this case, the

trait is resistance to the costly industry problem of plant parasitic nematodes.

However, in order to harness and understand this potential, the industry requires a screening technique for nematode resistance.

According to Dr Shamsul Bhuiyan, Principal Researcher, Disease Management, a screening technique is important for providing useful information on nematode resistance with new and existing varieties. It also needs to be efficient and affordable for the industry.

The research started at SRA Woodford with glasshouse screening to assess introgression clones for nematode resistance. It then moved to verify the glasshouse results with field experiments.

The field trials ran for three seasons at Wallville with the help of Isis Productivity Limited and they showed introgression clones substantially reduced nematode in plant and ratoon crops (see graph).

"The results suggested that introgression clones are a novel source of nematode resistance and the glasshouse-screening trials can predict the field resistance of clones for root knot nematode," Dr Bhuiyan said.

"We also saw that the introgression clones are a valuable source of resistance to other important diseases of sugarcane such as smut and Pachymetra root rot."

This offers the potential to have a tool that will allow the industry to better understand the nematode resistance of new varieties that may make their way through the system as a result of introgression breeding.

He said the work also made interesting observations about existing varieties, some of which may have nematode resistance, although more work was needed to verify the results and to identify others that may offer resistance.

Better understanding of varietal response to nematodes offers potential for another management option for sugarcane growers.

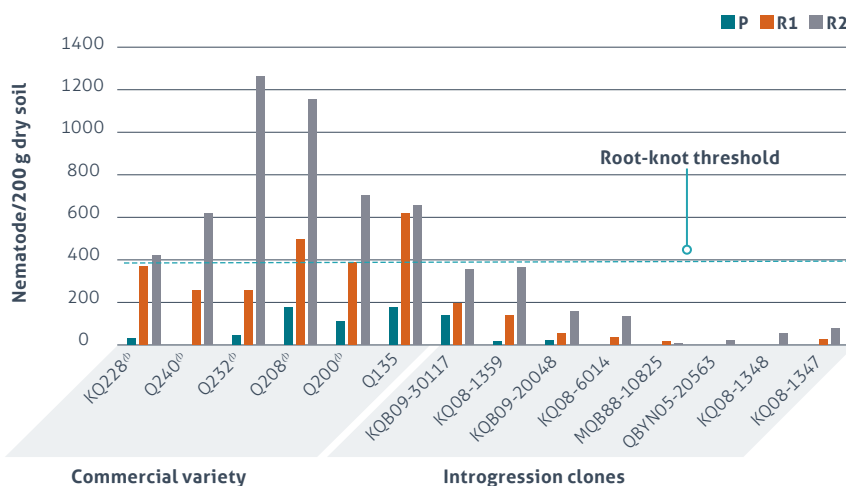
This is especially important given the speed at which nematode numbers can increase, as they have a life-cycle of four to five weeks in warm conditions. ■

**This research will be presented at the Australian Society of Sugarcane Technologists (ASCT) conference in Toowoomba in May.**

(Over page) Sugarcane roots affected by root-knot nematodes.

**NEMATODE MANAGEMENT**

- Monitor crops: a soil test which can confirm the species of nematode present can be arranged through your local productivity services group. Nematode counts are conducted at the SRA Tully assay laboratory.
- Avoid plough-out/replant where possible.
- Harvest plough-out blocks early to give a maximum break before planting legume crops.
- Include a legume rotation in your crop cycle. Soybean and peanut crops can reduce PPN numbers by 80-90 per cent.
- Ensure fallow crops are kept free of weeds and volunteer cane.
- Green cane trash blanket (GCTB). High populations of root lesion and root-knot nematodes re-establish if a trash cover is not maintained. GCTB provides a better environment for beneficial organisms such as free living nematodes and predators of PPN.
- Minimum tillage systems which preserve the trash blanket between crops to help minimise populations of PPNs. Tillage operations kill beneficial nematodes, allowing PPNs to quickly re-establish.
- A number of chemicals are registered for nematode control in sugarcane. These nematicides also kill natural nematode enemies, and only reduce nematode populations for a short period of time.





# Wider rows improve efficiency at Bloomsbury

WIDER ROW SPACINGS HAVE LOWERED LABOUR AND WEAR-AND-TEAR COSTS FOR GARY CONSIDINE AT BLOOMSBURY, AND HE IS HAPPY WITH THE RESULTS.



### Driving from Proserpine to Brisbane in a car is enough to make anyone tired.

But the thought of doing it in a harvester is a whole new level of weariness, according to Gary Considine, and it is something that he hopes he never has to learn about.

However, since widening his row widths from 1.6 metres to 1.9 metres (dual), he reckons that his harvester now travels about 1000km less each year, or roughly the same distance as the drive from his farm at Bloomsbury down to Brisbane.

The harvester is co-owned with two other growers – Tony Jeppesen and Scott Simpson – and they have also changed their row spacing. Between the three growers, and also with some contract work, their harvester cuts about 100,000 tonnes each year, across over 1000 hectares.

“We’ve saved about 17 percent of our row length, which equates to a lot of fuel, and a lot of savings on wear and tear on expensive components like tracks,” Gary said.

Gary changed his spacing about 15 years ago and said that although it came with some considerable investment, it has delivered good results.

Compaction is kept well away from the plants and harvesting in wet conditions is much easier.

He admits that row spacing is just one part of the puzzle with cane production, but added that his yields averaged about 95 tonnes per hectare even through some recent dry years, and a big factor driving the yield has been the wide rows.

Then there is the same savings on fuel and time in the paddock with other machinery operations, making it a cheaper crop to grow.

To make the transition, one of the more expensive changes was widening his high-rise sprayer by putting hydraulic rams in the wheels, which was necessary for getting around the farm and being able to safely cross a narrow bridge.

Fifteen years on, any new equipment is set up on 1.9 metres from the start and all tractors, trucks and the harvester are set up for 1.9m. “We based the 1.9m all around the harvester,” he said.

His usual program at the end of the crop cycle is to spray out the cane, disc it in March and plant soybeans (although some years, like 2018, the dry weather beats him).

Then it is disced, worked with a bed renovator and mound former that is four rows wide, which helps to reduce time in the paddock. Pre-emergent is usually used at planting, and knock-downs such as 2,4-D used early in the season to control vines as needed.

He said he liked the dual row because it helps with weed control and “stools out better” when compared to wide single-row, but added that after Cyclone Debbie (2017) they had to plant in single row because they couldn’t clean the plants to get the billets to feed properly through the double disc openers.

His main varieties are Q208<sup>ph</sup> and Q183<sup>ph</sup>, along with some Q242<sup>ph</sup> and Q240<sup>ph</sup>.

He has supplementary irrigation applied though water winches, furrow, and one centre pivot. ■

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*(Over page) Gary Considine’s sprayer, modified with hydraulic rams for the wheels to fit his 1.9 metre (dual) row and still be able to cross a narrow bridge.*

*(Below) Gary Considine checks over this year’s crop in January 2019.*





# Cane gamble pays off at Casino

**A PUSH TO GROW MORE CANE AROUND CASINO IS EXTENDING THE WESTERN REACH OF THE BROADWATER MILL AREA, DELIVERING GOOD RESULTS FOR THE GROWERS, AND HELPING IMPROVE CANE SUPPLY.**

**BY BRAD PFEFFER**



**When Glen Cole planted his first block of cane in 2013, it immediately had almost two weeks of wet weather on it.**

As he dug the drains to get the water off, and then when the cane took months to start growing properly, he was wondering if he'd made the right decision.

Six years later, and that crop of Q208<sup>ϕ</sup> has hardly looked back and sugarcane is a major feature of Glen's farming enterprise near Casino in northern NSW.

His major focus had been on soybeans, some cereal and silage, and cattle, but as problems set in with charcoal root rot with the soybeans (caused by the fungus *Macrophomina phaseolina*), he knew he needed to break the monoculture.

After finally deciding on cane – but only about two weeks before planting – that crop and the others that followed have done well and it was a good decision to go into cane, Glen explained. "It's been pretty good so far. The best we've done for year-old is about 145 tonnes per hectare in a block of Q208<sup>ϕ</sup>," he said.

The region around Casino is making an important contribution to cane supply for the Broadwater mill area, and offsetting some of the losses to the industry further east from other land uses. Casino is only about 50km from the Broadwater mill, and it has been in the last seven years or so that several farmers have made the move from double cropping soybeans and cereals to sugarcane.

Glen said the local conditions were comparable to regions closer to the coast. He said annual rainfall is lower, but the frost risk is also less than some of the eastern regions.

It has advantages as well. As relatively new country, yields are generally strong, and the previous soybean regime has helped him keep the paddocks clean of weeds, especially grasses. Like everywhere, weeds are still a constant battle and he keeps on top of them with a high-rise spray coup dual sprayer.

"We haven't ploughed any cane out yet, so I know that down the track it will get harder to maintain productivity, but I'll continue talking to people and working to keep the yield up."

After jumping in to cane, Glen said there was plenty of help along the way from people happy to provide advice. "As long as you are willing to ask, most people will help you out. And of course Rick Beattie from the Ag Services has been a great help to us," he said.

The Coles farm about 300 hectares, with about 120 hectares of cane. They still grow soybeans and some cereals and silage, and run cattle.

His varieties include Q208<sup>ϕ</sup>, Q155, Q232<sup>ϕ</sup>, Q240<sup>ϕ</sup> and Q254<sup>ϕ</sup>, with Q208<sup>ϕ</sup> and Q240<sup>ϕ</sup> being his preferred options.

They do all their own work with the exception of harvesting although, like

most regions, finding labour is an ongoing challenge.

He said 2017 was a good year, with about 12,000 tonne harvested, which included both two-year and one-year cane, and good sugar for the first three rounds.

Glen grows his cane on 1.8 metre rows and is also trying different nutrient options such as chicken manure. In recent years he has put about five tonne/ha of the manure from a nearby chicken farm on the bean crop before the cane, and then direct drilling cane into the bed.

"For the last two years we haven't worked the bed after we've taken the beans off."

With the help of the Ag Services, Glen gets an analysis of the manure and also works back from the soybeans to calculate nutrient rates. He also puts lime on the blocks before the bean crop.

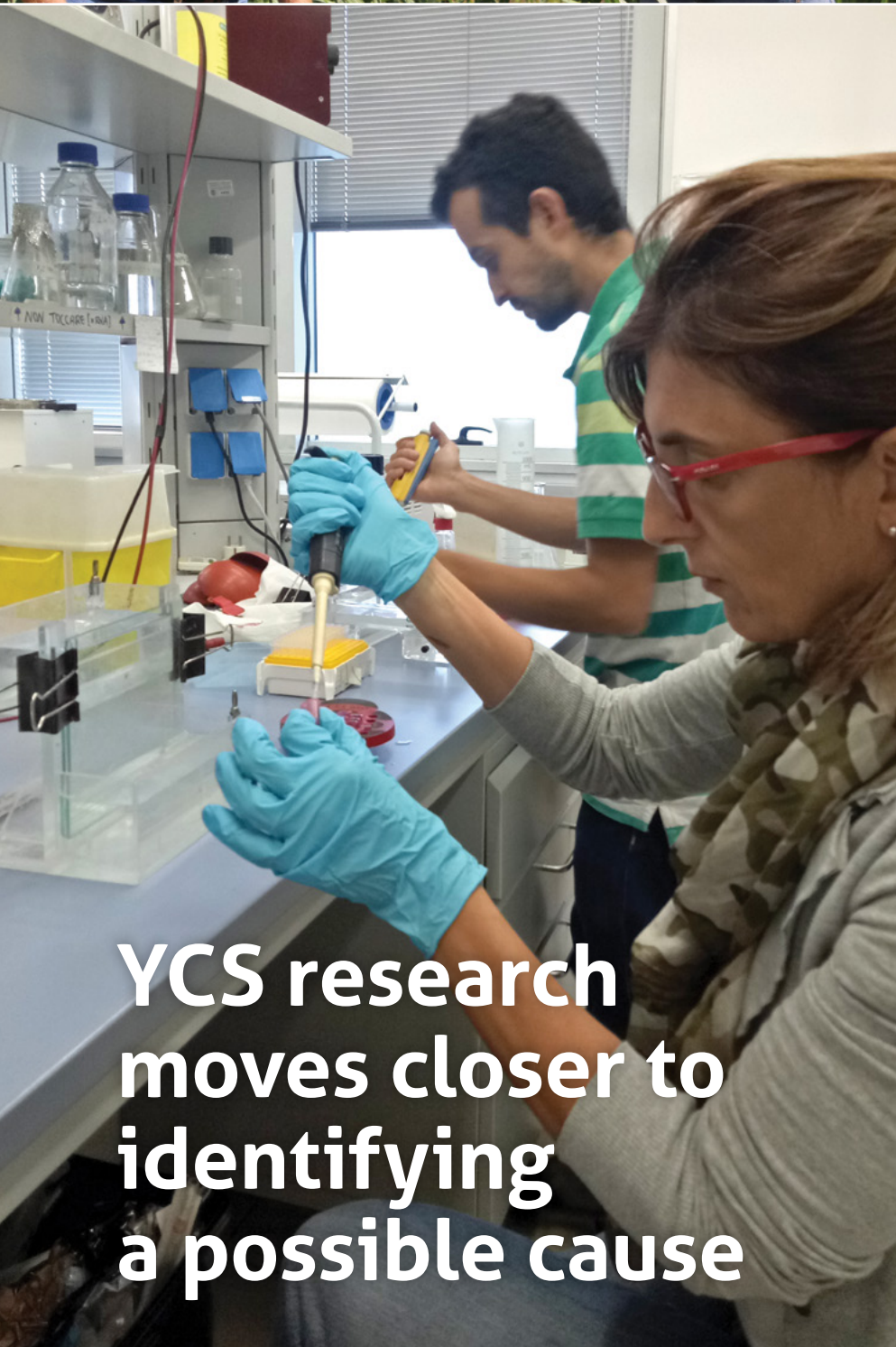
"The pH isn't too bad – usually between five and six – but the cane is in the ground for five or six years, so we are trying to have things as good as we can from the start."

At the time CaneConnection visited in January, dry weather was starting to put the brakes on a lot of the cane. ■

*(Over page bottom) Still in its first crop cycle, this new country around Casino is producing solid yields for Glen Cole. (Over page top) Glen Cole with cane that will be harvested as a two-year crop. (Above) Casino farmer Glen Cole checks over the crop during dry conditions in January 2019.*



**RESEARCHERS ARE CONTINUING TO UNEARTH USEFUL INFORMATION ON THE MYSTERIOUS YELLOW CANOPY SYNDROME, MOVING THE INDUSTRY CLOSER TO A BETTER UNDERSTANDING OF THE PROBLEM AND MANAGEMENT SOLUTIONS.**



**YCS research moves closer to identifying a possible cause**

**Yellow canopy syndrome (YCS) was first observed in Far North Queensland in 2012, and since then it has been confirmed in all growing regions from Bundaberg to Far North Queensland.**

The syndrome has appeared in blocks and regions in unpredictable patterns and its impacts can, at times, be severe.

Given its significance to the industry, the syndrome has been the focus of a major research investment by SRA, via projects led by SRA and University of Queensland, with support from Western Sydney University and CSIRO.

This integrated research program is narrowing in on important discoveries associated with YCS, including the assessment of a small number of possible causes and potential management options.

Across last year, and continuing this year, insects are an important focus via field trials in multiple regions, insect exclusion tests, and chemical treatment trials.

Experimental work does not support a single cause for YCS. It is still unknown if – or in what way – an insect could be linked to YCS, but from work so far the researchers have been able to prevent YCS symptom development and the yield losses associated with YCS by controlling insects.

In their search, they have also identified several different types of insects that the industry is generally not familiar with. It is not yet known if any of these insects are associated with YCS.

These entomological studies could lead to opportunities for management options.

However, for a management solution to be useful, this also requires a good understanding of whether a field is going to develop YCS well before it turns yellow so that any treatment has time to

be effective. Like most crop problems, treating the issue once you can see it usually means it is too late.

With this in mind, SRA Researcher Mr Gerard Scalia and his team at SRA's Indooroopilly laboratory have developed a prototype in-field test for diagnosing YCS. It is hoped that this test will be a useful tool for researchers and productivity services organisations to better understand YCS, and understand if a paddock has YCS *before* it turns yellow.

They are currently working to ensure the prototype test is effective and user-friendly and then determine how it could complement a management strategy for YCS.

"Early detection is one of the holy grails of our research," explained Mr Scalia. "It could help industry with potential cost savings, and would be vital to making an assessment on potential control options, once they are understood.

"At the moment, the key advice for YCS management is to continue to follow best practice farming to reduce stress on the crop which in turn should minimise the incidence and severity of YCS."

This prototype diagnostic is possible thanks to years of research that has improved the understanding of the internal workings of the sugarcane plant. Gerard and his team now have key knowledge on the internal systems of sugarcane, and the disruption to metabolic and gene expression changes that occur when export of sucrose from the leaf to the stalk is compromised, triggering the development of YCS.

Even with the diagnostic test and some new information on insects, there are other possibilities being explored.

Recently, SRA Researcher Dr Priya Joyce has consulted with world-leading laboratories in Europe on phytoplasma

**"Early detection is one of the holy grails of our research," explained Mr Scalia. "It could help industry with potential cost savings, and would be vital to making an assessment on potential control options, once they are understood."**

detection and analysis. Phytoplasmas are a type of bacteria that affect plants and can be spread by insects.

Through this work, Dr Joyce will apply this knowledge for the current YCS season to understand if phytoplasmas are part of the YCS question.

At the same time, SRA is also continuing to investigate variety responses to YCS. We already believe from grower observations that there is a range of variety responses to YCS, but there is a need to validate and understand these observations. SRA Researchers Dr Jaya Basnayake and Mr Sijesh Natarajan are using drones equipped with hyperspectral cameras to look more closely at YCS response for more than 30 different varieties.

This could lead to information on different varieties' yield response to YCS, and the severity of impact for different varieties.

All of this research has drawn on Australian and international expertise on topics including entomology, pathology, agronomy, plant genomics, and many others. The research teams

have continued to consult with other industries and leading global research institutions to ensure that their research is using the best available science and understanding, and that we are learning the lessons from other industries.

SRA Executive Manager, Strategic Initiatives, Dr Frikkie Botha, said that through SRA investment, the industry was moving closer to understanding the true impact of YCS, as well as identifying the cause and developing management strategies.

"SRA is uniquely placed to deliver these outcomes, with continued collaboration with leading research institutions. We have a strong team with expertise in pest management including insect vectors, as well as molecular biology and agronomy," Dr Botha said.

"We thank the industry for their patience as we persevere with this significant challenge, and look forward to refining our information for the industry as we progress this research." ■

## KEY POINTS

- We are working toward a useful control for YCS
- This control has the potential to be supported by a diagnostic test that is in development
- We are investigating a number of likely biological entities together with physiological disruptions as potential causes of YCS
- We have a much better understanding of the yield impact of YCS

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

*(Over page top) Ms Orna Tippett is based in the Burdekin and is working on YCS field trials, taking over locally from Mr Davey Olsen, who is pursuing his research career overseas. Dr Andrew Ward is now managing this project. (Over page bottom) SRA has recently learnt important information on phytoplasma detection and analysis from researchers at the University of Bologna, including Samanta Paltrineiri (pictured, front).*



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# Answering the key questions on enhanced efficiency fertilisers

**RESEARCH IS UNDERWAY TO HELP PROVIDE SHARPER INFORMATION FOR CANE GROWERS ON WHEN AND WHERE ENHANCED EFFICIENCY FERTILISERS COULD PROVIDE A BENEFIT TO PRODUCTIVITY AND SUSTAINABILITY.**

**There has been a strong interest in recent years in finding the best fit for enhanced efficiency fertilisers (EEFs) for the Australian sugarcane industry.**

However, with several different EEF products on the market, along with considering the weather patterns and farming conditions, the decision on when and where to use an EEF product can be confusing. Growers still often have the question: will the EEF provide a benefit for me?

These products cost more than conventional fertiliser, which heightens the need for growers to understand the best fit for these products.

Research is underway to provide the industry with sharper information to help them make decisions, examining an array of scenarios.

Through a project called EEF60, SRA and CANEGROWERS are working on 60 field trials over three years (creating 180 trial-years of data) from sites from Childers to Mossman.

Separate to this, but in parallel, CSIRO Researcher Dr Kirsten Verburg and her research team from CSIRO, HCPSSL and JCU are working on a project that is using an innovative method to examine a broad range of scenarios for EEFs.

The project has created thousands of virtual trials using an agricultural simulator called APSIM. This tool allowed the research team to mimic field trials across diverse conditions, allowing them to better understand the huge variability facing these products, and therefore gain a better understanding of scenarios that affect EEF efficiency.

"We have seen in the past some experiments with EEFs in the field not obtaining statistically significant differences between treatments," Dr Verburg said. "A combination of soil, rainfall pattern, crop growth and stage all influence whether the EEF provides a benefit.

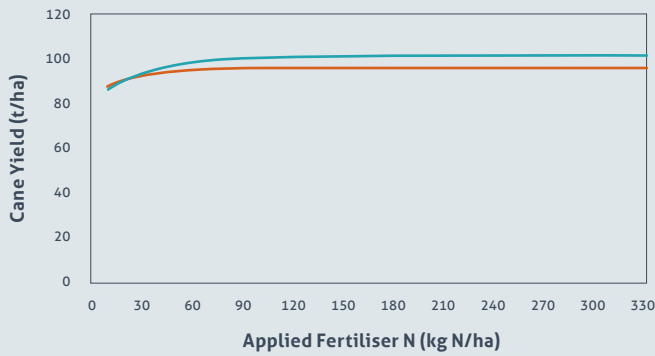
"With the range of products available and different farming and weather situations, it is understandable that it can be confusing for growers to work out which product to use and when."

Through the virtual trials, they simulated 273,360 different treatments, looking at parameters such as soil type, harvest date, fertiliser date, fertiliser type, irrigation, and a range of weather patterns.

"In field trials, you get results based on what is happening that year with the weather, and the other factors at the trial site. With virtual trials you can sample a range of conditions, and while we rely on the model's representation of reality, it helps build a lot of verification around what is happening," she explained.

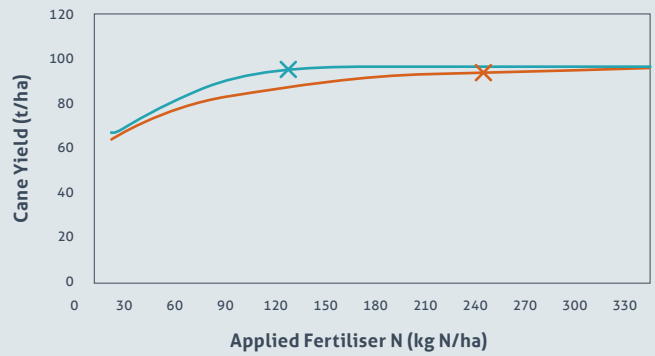
Based on the simulations, the research team identified four main categories of seasonal/situational responses to EEFs – some of which provided a benefit for yield and nitrogen loss, and others where there was none.

### Type A



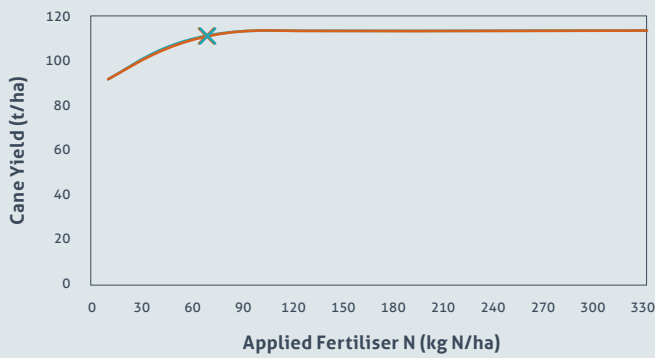
EEF protects some N in an early season large N loss event that loses most fertiliser N resulting in a yield benefit.

### Type B



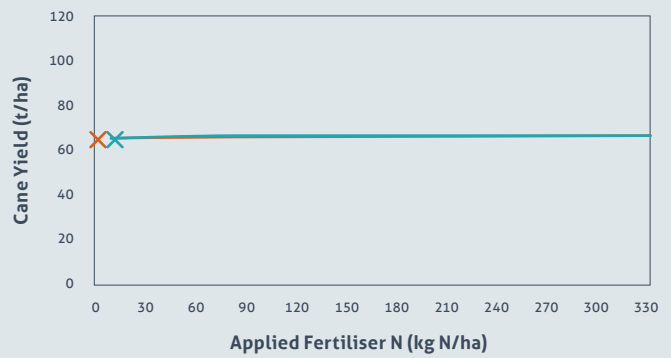
EEF reduces N loss; the 'saved' N results in a reduction in optimum N, allowing N rate to be reduced.

### Type C1



No benefit from EEF due to lack of N loss during the early season period before crop uptake when EEF protects the N.

### Type C2



No benefit from EEF due to lack of N response caused by other stresses (e.g. waterlogging); crop not able to respond to the 'saved' N.

The research team broadly categorised four different situations.

Type A responses represent years where there is a massive rainfall event that causes almost all fertiliser nitrogen to be lost, except for the amount still protected by the EEF. This results in additional yield (see graphs). These years were relatively rare.

Type B responses are years where the EEF reduces the nitrogen loss allowing a lower rate of the EEF to achieve the optimum yield. These are typically the type of years where EEFs are considered ideal.

The other types of situations (C1 and C2) saw no yield response for the EEF. In C1, this could be due to little N being lost from the conventional urea at a time when the EEF is protecting its nitrogen (N).

In C2, this could be situations where the soil can supply all the N required by the crop, such as with plant crops after legumes. Other factors that reduce yield – regardless of the fertiliser type and rate – such as waterlogging could also cause this effect.

This project has worked in the Herbert as a pilot region for testing the potential for developing a decision support tool around the use of EEFs, working closely with Herbert Cane Productivity Services Limited (HCPSL) and Manager Lawrence Di Bella. It is building on the work of HCPSL's existing decision support tree.

The next steps are to refine this information further for growers and to integrate it with climate forecasting information. The aim is to use information on soil type, the seasonal conditions, and crop start date to understand the likelihood of different scenarios occurring. Having this understanding of what may occur could be useful in deciding what product to use.

Dr Verburg said it was important to note that modelling does not replace the need for in-field experiments, but in this case it helped to build the understanding around the many possible outcomes of EEF use.

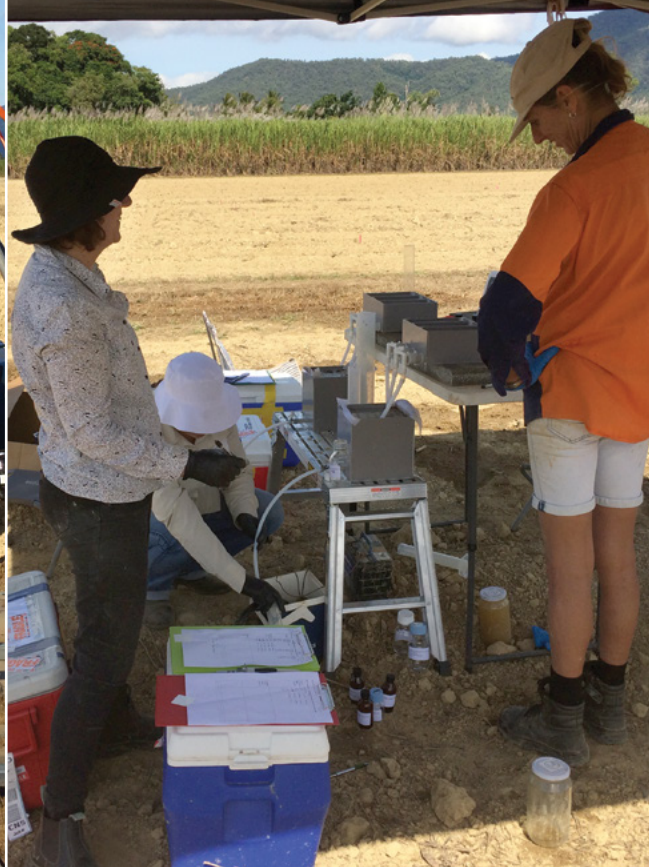
"Models are built on experiments, and experiments are also important to verify results from modelling," she said.

She said there was potential to combine the results from the virtual trials with the results from the EEF60 project, and this could enhance the industry's understanding of these products. ■

*(Over page) With a range of enhanced efficiency fertiliser products on the market, and a myriad of farming and weather possibilities that can occur each season, research is underway to provide growers with information on where and when these products could provide a benefit. – Photo by Lawrence Di Bella. (Above) Virtual yield N response curves for urea (orange) and EEF (blue), with the x indicating the agronomic optimum.*



# Can “biochar” help meet water quality targets?



## TRIALS HAVE BEEN UNDERWAY TO ASSESS WHETHER A BIOCHAR FILTER CAN HELP REDUCE HERBICIDE LOADS IN RUN-OFF WATER.

**Mitigating water quality impacts from farming remains a priority for the cane industry. Much effort is being directed into modifying agronomic practices to minimise the surface movement of nitrogen and pesticides from farm land into waterways and eventually the Great Barrier Reef lagoon. For herbicides, much of the focus is around reducing the amount of pre-emergent herbicides applied.**

But what if a simple filtering system could remove herbicides from run-off water?

A proof-of-concept biochar filter trial by CSIRO shows promising results to decrease herbicide load in surface run-off. Recently, CSIRO joined forces with SRA’s weed agronomy team to test the sorbent filter material at SRA’s Meringa Research Station. The work is part of the SRA-funded project *Keeping our chemicals in their place – in the field*.

As a proof-of-concept, the trials were small scale using rainfall simulation to create herbicide-loaded run-off. The contaminated run-off was then filtered through the proprietary biochar medium, with herbicide concentrations measured before and after the filtering process.

This initial trial looked at how well the sorbent material decreased the concentrations of five herbicides: hexazinone, diuron, imazapic, metribuzin and atrazine, as the run-off passed through the sorbent bed.

Promisingly, the filter was able to remove approximately 70 percent of the diuron load and 50 percent of the atrazine, metribuzin and hexazinone load, from the first run-off event. The filter was less successful in capturing imazapic, due to the fact that, as an acidic herbicide, it has a negative charge which is the same charge as the sorbent material, and thus was not captured.

Filtration of a second run-off event achieved a further 50 percent reduction of the diuron load, and a 20 percent reduction in the loads of metribuzin, atrazine and hexazinone.

The filter also successfully decreased the amount of sediment in the runoff by approximately 80 percent and 40 percent for the first and second run-off events, respectively.

These promising results will hopefully be followed by further work to test additional herbicides, developing a system to encase the biochar medium and upscale to a paddock and farm level.

The current project funding only allows for the initial proof-of-concept trial, and taking this research to the next stage is dependent on additional funding.

Coupled with improved in-field management, technology such as this has the potential to accelerate the achievement of Great Barrier Reef water quality targets.

“This strategy for improving water quality may be able to be incorporated into other research activity in the Burdekin and Wet Tropics. However, further studies would be required to take this initial work to the next stage,” said Danni Oliver, CSIRO. ■

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*(Above left) The rainfall simulator at work at SRA Meringa as part of the trials. (Above right) CSIRO and SRA have been assessing biochar filters for helping to reduce water quality impacts.*





# Australian Agriculture: Growing a Digital Future

**DIGITAL TRANSFORMATION IS A BIG CULTURAL CHANGE FOR ALL SECTORS, BUSINESS AND PEOPLE: A STRATEGIC GUIDED APPROACH IS NEEDED TO MANAGE THE CHANGE.**

**The Australian agricultural sector has examined the current and future state of digital agriculture in Australia via the Australian Government's Rural R&D for Profit project *Accelerating precision to decision agriculture (P2D)*. The project was led by CRDC and estimated that digital agriculture could lift the gross value of production (GVP) of agriculture by \$20.3 billion, a 25 percent increase on 2014-15 levels. However, according to findings from the P2D project, Australian producers are not ready to reap these benefits.**

CRDC's Jane Trindall says the report from the project made 13 recommendations in areas of strategy, leadership, governance, digital literacy and enablers to achieve these gains. This collaboration was the first time all 15 of Australia's RDCs joined forces on a sector-wide initiative.

To implement the recommendations from P2D, 11 RDCs have collaborated to submit a new Rural R&D for Profit application: *Australian Agriculture: Growing a Digital Future*.

"We made this application so we can lift the digital maturity of the sector from ad-hoc to competitive, lift economic growth and prepare the workforce for the future," CRDC's Jane Trindall said.

"This effort could lift GVP by an additional 1.8-3.6 percent over and above the average GVP growth of the sector by 2022, adding \$1.3-2.7 billion to the sector.

"We will do this through three key investment areas."

## DIGITAL TRANSFORMATION HUB

A virtual digital transformation hub will include a team of digital/data experts to initiate digital strategies and support their implementation. Supporting resources including a digital maturity framework, agricultural data governance framework and information architectures will be developed. These may be the first of their kind for agriculture.

## DIGITAL CAPABILITY (DIGITAL LITERACY AND LEARNING PATHWAY FOR DATA SCIENTISTS)

The focus of which will be both upskilling those within industry and making sure those coming into the industry have the required skills. This project will develop and deliver a digital capability framework and training program, establish digital farms and fisheries and deliver a digital immersion program for imagining the future.

There is a need to build the STEM capability in the agricultural workforce and research community to solve today's and tomorrow's problems. This project aims to excite data scientist/analyst students to pursue a career in agriculture.

## FOUNDATIONAL DATA AND ANALYTICS

Interoperability has long plagued precision agriculture. This project sets out to harmonise identifiers for Australian producers, farms and fields to increase

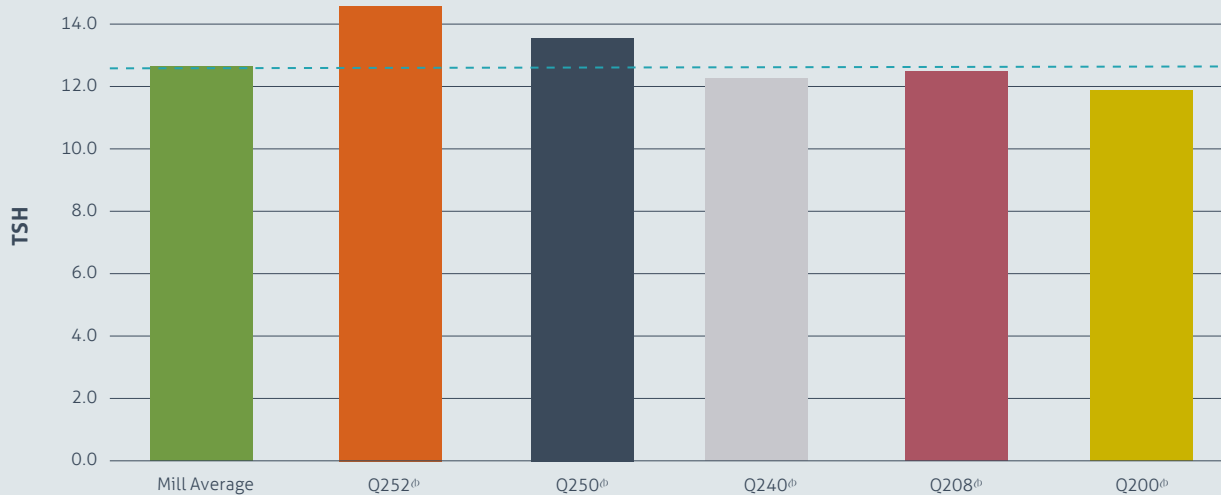
the interoperability of agricultural data. This will enable automated data exchange and/or the application of machine learning to provide producers with insights from their data.

This project is supported by funding from the Cotton Research and Development Corporation, Meat and Livestock Australia, Sugar Research Australia, Australian Wool Innovation, Fisheries Research and Development Corporation, AgriFutures, Wine Australia, Dairy Australia, Australian Pork Limited, Australian Eggs and Horticulture Innovation Australia. The project will be delivered in collaboration with six research partners and supported by the National Farmers' Federation, Food Agility CRC and four international digital agricultural programs.

"While the success of the application is unknown, RDCs are getting on with the job and will kickstart activities this year with the commencement of a Digital Transformation Taskforce for the Australian agricultural sector, and development of the digital maturity, data governance and digital capability frameworks with project partners including CSIRO and Griffith University and the University of the Sunshine Coast for endorsement by the taskforce," Jane said. ■

# QCANESelect<sup>®</sup> undergoing an upgrade

MULGRAVE - 2017  
CROP CLASS P TONNES SUGAR/HA (TSH)



2017

**TOTAL TONNES ALL CROP CLASSES**

Q252 <sup>Ⓞ</sup>	3,395	Q250 <sup>Ⓞ</sup>	104,479	Q240 <sup>Ⓞ</sup>	25,107
Q208 <sup>Ⓞ</sup>	595,525	Q200 <sup>Ⓞ</sup>	101,479		

**Good decision making in variety adoption and management relies on good information about variety characteristics and performance. SRA provides variety information in a range of different forms including information sheets, press releases, news articles, variety guides and through QCANESelect.**

SRA is preparing for a major upgrade of QCANESelect following completion of the rebuild of the SPIDnet database.

QCANESelect provides access to information generated by SRA as well as summarised commercial production data such as shown in the illustration. The upgrade will improve access to variety performance information including an interactive way to examine results from SRA plant breeding trials. This will provide data on head-to-head comparisons of the newest varieties with established commercial benchmarks.

In preparation for the upgrade, the Whole of Farm Plan and Block Recommendations are not available, however Variety Information, Regional Reporting and Tissue Culture ordering modules remain active. ■

*(Above) The Regional Reporting module in QCANESelect<sup>®</sup> provides access to summarised commercial production data that can be displayed or downloaded. In this example, varieties are compared for tonnes of sugar per hectare in plant crop at the Mulgrave Mill in 2017.*



# Clean seed underpins production in northern NSW

**A HEALTHY CROP STARTS WITH CLEAN SEED, ACCORDING TO NSW GROWER KEITH ROBINSON.**

**New South Wales grower Keith Robinson is passionate about sourcing clean seed cane for his farm.**

Farming at Kilgin in the Broadwater mill area, he has been using clean seed for more than 25 years, dating back to when he previously worked at the mill.

"We see clean seed as one of those basics like weed control, and which really makes a difference on the farm," Keith said.

He says it has helped with plant vigour, disease management, and overall productivity, and he acknowledged the hard work of Sunshine Sugar's Ag Services in having all three mill areas of NSW among the very top users of clean seed in the entire industry.

As well as getting the basics right around clean seed, Keith is also keen to learn as much as he can about potential new varieties, which is one of the reasons he has had SRA variety trials on his property.

"We grow most of our cane as two-year old – only cutting as one-year old if we need to manage a frost," he said. "So a new variety is then in the ground for six years, making it a long-term investment that we want to get right, and want more information on."

"We start at the mill plot, talking to the Ag Services and looking at their trials. We're looking at the trash on the varieties to keep the frost down, and of course looking at stalks for yield. Then we're also looking

at all the other information coming out on varieties and talking to other farmers to see what they have tried."

He said the variety trial helped give an insight into how new varieties might work on his farm, and it was also useful for the district to gather information on a range of farms and conditions.

These trials are led in the region by SRA Variety Officer, Anthony Cattle, and with the help of Bundaberg-based Senior Plant Breeder, Roy Parfitt. Roy is SRA's plant breeder for the Southern Region as well as Rocky Point and NSW.

Keith's son, Scott, said that they were looking for varieties that stood up to frost and had good two-year performance.

"We regularly get into the negative temperatures and have lost a fair bit of cane to frost over the years," he said. "We are looking to replace some of the older varieties like BN83-3120 with newer varieties, looking for similar vigour and durability."

They grow varieties such as Q208<sup>®</sup>, Q240<sup>®</sup>, Q254<sup>®</sup>, Q183<sup>®</sup> and Q232<sup>®</sup>.

They grow cane on about 120 hectares, with two farms with variable conditions in relation to frost and flood. Floods and wet harvests are often a challenge.

Last year, the first three rounds presented a smooth run, but the fourth round saw them confront about 240mm of rain

over a couple of weeks in October. This created plenty of headaches for ground management, and also saw them need to replant about 18 hectares, which had just finished going in as the first storm rolled over and the rain started.

"We had Rick Beattie from the Ag Services here digging each paddock to look at the cane. It had no roots, the eyes were black, and smelt like vinegar when we cut it open. In 45 years of farming I've seen plenty of wet weather but have never had cane not come up," Keith said. "So we replanted the lot, and heading into late summer it has gotten terribly dry."

For the Broadwater mill area, the 2018 crop averaged 127t/ha for the two-year cane (121t/ha in 2017) and 90t/ha for the one-year cane (83t/ha for 2017). The mill area harvested just over 767,000 tonnes with CCS at 12.21. ■


For more information on variety selection and performance, check out the 2018/19 Variety Guides on the SRA website [www.sugarresearch.com.au/sra-information/publications](http://www.sugarresearch.com.au/sra-information/publications)


*(Above) Keith Robinson checks over his cane earlier this year.*


## TOTAL RESEARCH AND DEVELOPMENT INVESTMENT


PROJECT TITLE	PROJECT NUMBER	R&D PROVIDER(S)	CHIEF INVESTIGATOR	END DATE
<b>🌱 Key Focus Area 1 (Optimally-adapted varieties, plant breeding and release)</b>				
AISRF: Genetic control and genomic selection for important traits in sugarcane	2016/803	SRA, Sugarcane Breeding Institute - Coimbatore	Anthony O'Connell	30/06/2019
Exploiting introgression for the development of productive & regionally adapted varieties for NSW	2013/022	Sunshine Sugar	Roy Parfitt	01/05/2020
Applying the genome sequence for variety improvement: validation and implementation	2013/030	CSIRO	Karen Aitken	01/04/2019
Licence to Farm: Nitrogen use efficient varieties to meet the future environmental targets	2016/044	SRA	Jaya Basnayake	01/07/2019
Improving early stage selection of SRA breeding program by indirect selection of plant vigour	2016/028	SRA	Jaya Basnayake	01/07/2019
Leaf sucrose: The link to diseases, physiological disorders such as YCS and sugarcane productivity	2015/016	SRA	Gerard Scalia	30/06/2019
Generation of a high throughput SNP chip for introgression of resistance genes from wild germplasm into sugarcane	2015/025	CSIRO	Karen Aitken	01/04/2019
Selecting high value chromosomes from wild introgression material to deliver more resistant varieties faster	2015/026	CSIRO	Karen Aitken	01/04/2019
Optimising productivity, variety recommendations and mill operations through analysis of mill data	2016/032	SRA	Jo Stringer	01/02/2021
New approaches to identify and integrate Pachymetra resistance genes from Erianthus into SRA breeding program	2016/039	SRA	Nathalie Piperidis	01/06/2019
Implementing and validating genomic selection in SRA breeding programs to accelerate improvements in yield, commercial cane sugar, and other key traits	2017/002	UQ	Ben Hayes	01/07/2022
Compendium of sugarcane traits and their associated genes	2018/001	CSIRO	Donna Glassop	01/06/2019
Validating root system traits for enhanced nutrient capture in challenging environments	2018/002	CSIRO	Anne Rae	01/09/2021
Impact of stool architecture on ratooning: extending current trial to 4R to strengthen correlations	2018/004	CSIRO	Anne Rae	01/03/2021
Genetic analysis and marker delivery for sugarcane breeding	2018/005	CSIRO	Karen Aitken	30/06/2022
Selecting high value chromosomes from Saccharum species - extension to 2015/026	2018/006	CSIRO	Karen Aitken	30/06/2020


<b>🌱 Key Focus Area 2 (Soil health, nutrient management and environmental sustainability)</b>				
Strategies to manage soil-borne fungi and mitigate sugarcane yield decline	2013/101	CSIRO	Paul Harvey	01/11/2018
More profit from nitrogen: enhancing the nutrient use efficiency of intensive cropping and pasture systems	2015/907	CRDC	Multiple	30/06/2020
SIX EASY STEPS - continuing perspectives in time and space	2017/004	USQ	Bernard Schroeder	01/02/2022
Measuring soil health, setting benchmarks and driving practice change in the sugar industry	2017/005	SRA	Danielle Skocaj	01/08/2022
Unravelling the impact of climate and harvest time on nitrogen fertiliser requirements	2017/009	SRA	Danielle Skocaj	04/03/2022
Seeing is believing: managing soil variability, improving crop yield and minimising off-site impacts in sugarcane using digital soil mapping	2017/014	UNSW	John Triantafyllis	01/10/2020
Decision support for choice of enhanced efficiency fertilisers - Herbert catchment pilot study	2017/015	CSIRO	Kirsten Verburg	28/02/2019


PROJECT TITLE	PROJECT NUMBER	R&D PROVIDER(S)	CHIEF INVESTIGATOR	END DATE
 <b>Key Focus Area 2 (Soil health, nutrient management and environmental sustainability - continued)</b>				
Implementation of root system diagnostics to deliver a field-based measure for root health	2018/003	CSIRO	Anne Rae	01/08/2021
Greenhouse gas emissions from sugarcane soils: strategies for increasing NUE and reducing environmental pollution	2018/007	QUT	Peter Grace	30/06/2021
Establishing sugarcane farming systems to improve soil health	2018/008	SRA	Barry Salter	01/03/2023
Development of commercial molecular biological assays for improved sugarcane soil health and productivity	2018/009	SRA	Rob Magarey	01/06/2020
SIX EASY STEPS Tool Box development for refined on farm nutrient management	2018/013	SRA	Barry Salter	01/02/2020
Complete nutrient management planning for cane farming ( <b>Funding provider:</b> Queensland Government DES)	2016/804/ RP161	SRA/Farmacist	Jayson Dowie	30/12/2020
Improved water quality outcomes from on-farm nitrogen management ( <b>Funding provider:</b> University of Queensland)	2016/805/ UQ_NESP	SRA	Danielle Skocaj	10/12/2020
Cane farmer trials of enhanced efficiency fertiliser in the catchments of the Great Barrier Reef ( <b>Funding Provider:</b> Commonwealth Department of Environment and Energy and Queensland Government Great Barrier Reef Innovation Fund (Reef Trust 4))	2016/807	CANEGROWERS / SRA	Barry Salter	31/12/2021


 <b>Key Focus Area 3 (Pest, disease and weed management)</b>				
Integrated disease management for sugarcane streak mosaic in Indonesia ( <b>Funding provider:</b> Australian Centre for International Agricultural Research)	2013/802	SRA	Rob Magarey	30/06/2019
Soldier fly management	2015/804	SRA	Andrew Ward	31/12/2019
Cane to creek: Russell Mulgrave growers and the nitrogen story ( <b>Funding provider:</b> Queensland Government Department of Environment and Science)	2017/801	SRA	Belinda Billing	01/06/2019
Feeding behaviour of Soldier fly	2017/808	SRA	Andrew Ward	11/12/2019
Development for an improved commercial assay for ratoon stunting disease (RSD)	BIOBRSD	SRA	Rob Magarey	30/06/2019
Modern diagnostics for a safer Australian Sugar Industry	2017/809	SRA	Nicole Thompson	01/06/2022
Solving Yellow Canopy Syndrome	2014/049	SRA	Danielle Skocaj	30/06/2019
Using Remote Sensing to improve canegrub management in North Queensland cane fields	2015/038	SRA	Kevin Powell	01/02/2019
Identifying new-generation insecticides for canegrub control as contingency for loss of amenity with the existing product	2016/003	SRA	Andrew Ward	01/01/2020
Investigation of biotic causes of yellow canopy syndrome	2016/064	UQ	Andrew Geering	01/12/2019
Keeping our chemicals in their place - in the field	2017/008	SRA	Emilie Fillols	01/07/2021
Delivering solutions for chlorotic streak disease	2017/010	SRA	Kathy Braithwaite	01/07/2020
Development of commercial molecular biological assays for improved sugarcane soil health and productivity	2018/009	SRA	Rob Magarey	01/06/2021
Moth Borers – how are we going to manage them when they arrive?	2018/010	SRA	Andrew Ward	01/08/2021


 <b>Key Focus Area 4 (Farming systems and harvesting)</b>				
A non-pneumatic cane cleaning system with no cane loss.	2014/035	QUT	Floren Plaza	01/06/2019
Increased Harvest Recovery: Reducing sugar loss and stool damage	2014/048	SRA	-	01/09/2019
Assessment of new management strategies for marginal soils	2015/007	SRA	Barry Salter	31/12/2019

PROJECT TITLE	PROJECT NUMBER	R&D PROVIDER(S)	CHIEF INVESTIGATOR	END DATE
 <b>Key Focus Area 4 (Farming systems and harvesting - continued)</b>				
Bio-prospecting for beneficial endophytes of sugarcane	2015/051	AgResearch	Stuart Card	01/02/2019
Sugar from space: improved data access, yield forecasting and targeted nitrogen application for the Australian Sugar industry	2016/062	UNE	Andrew Robson	01/01/2020
Understanding interactions between basecutters and other forward-feed components with the cane stalk, and determining practical strategies to minimise damage as harvester speed increases	2016/952	Norris ECT	Chris Norris, Phil Hobson	01/05/2020
Commercial scale economic evaluation of post-harvest cane cleaning to maximise the returns to the supply chain	2016/953	QDAF	Stephen Ginns	01/05/2019
Adoption of practices to mitigate harvest losses	2016/955	SRA	Phil Patane	01/04/2019
Southern Sugar Solutions	2017/012	DAFQ	Neil Halpin	01/01/2021
Improved irrigation system selection and operation for increased sugarcane productivity and profitability	2018/011	USQ	Michael Scobie	01/04/2019

 <b>Key Focus Area 5 (Milling efficiency and technology)</b>				
Real time harvest and transport system	2014/037	QUT	Geoff Kent	01/05/2019
Investigation into modifying pan boiling techniques to improve sugar quality	2015/013	QUT	David Moller	30/05/2019
Increasing capacity to undertake cane preparation research through modelling and experimentation	2015/018	QUT	Geoff Kent	01/05/2019
Online analysis systems to measure the available nutrients in mill mud	2016/019	SRA	Steve Staunton	01/06/2020
Reducing boiler maintenance costs and deferring capital expenditure through improved technology	2016/020	QUT	Floren Plaza	01/06/2021
Evaporator Liquor Brix Sensor	2017/003	Wilmar	Robert Stobie	01/01/2019
Managing aspects of raw sugar quality in the Australian sugar industry Part II	2017/006	Griffith University	Chris Davis	01/11/2019
Investigations to mitigate the effects of juice degradation in factory evaporators on sugar recovery and quality, corrosion and effluent organic loading	2017/007	QUT	Darryn Rackemann	01/03/2022
Pan design and operational changes to suit Australian pan stages operating on low pressure vapour	2018/012	QUT	Ross Broadfoot	01/11/2021
Evaluation of the Neltec Colour Q for measuring the purity of magma from C centrifugals	2018/201	Isis Central Sugar Mill Company Ltd	David Pike	01/05/2019
Improving the impact of evaporator calandria noxious gas bleeding arrangements on evaporator rate and condensate quality at Racecourse Mill	2018/202	Mackay Sugar Limited	Brett Bampton	01/06/2019
Understanding the cause of high colour sugar - intrinsic cane colour, extraneous matter or factory practices?	2018/203	Wilmar Sugar	Robert Stobie	01/05/2019
Activated sludge plants – optimising operations and technology	2018/204	Wilmar Sugar	Robert Stobie	01/05/2019

 <b>Key Focus Area 6 (Product diversification and value addition)</b>				
A profitable future for Australian agriculture: Biorefineries for higher-value animal feeds, chemicals and fuels	2015/902	QUT	Ian O'Hara	01/04/2019
Manipulation of carbon partitioning to enhance the value of sugarcane (ARC LINKAGE UQ collaboration with SRA contribution)	2016/801	UQ (SRA contribution)	Frikkie Botha	08/12/2018
Establishing a strategic roadmap for product diversification and value addition	2018/014	Lazudi	Eris O'Brien	01/04/2019

PROJECT TITLE	PROJECT NUMBER	R&D PROVIDER(S)	CHIEF INVESTIGATOR	END DATE
 <b>Key Focus Area 7 (Knowledge and technology transfer and adoption)</b>				
A boiler simulator for improved operator training	2016/001	QUT	Anthony Mann	01/05/2018
Protecting our chemicals for the future through accelerated adoption of best management practice	2016/002	SRA	Belinda Billing	01/08/2019
Development of an Intelligent Tool to allow real time evaluation of harvesting practices as part of a framework for improved harvester payment systems	2016/951	Norris ECT	Stuart Norris, Rob Crossley	01/05/2019
Productivity improvements through energy innovation in the Australian sugar industry	2017/011	Ag Analytics	Jon Welsh	01/07/2020
Pathways to water quality improvements in the Myrtle Creek sub catchment ( <b>Funding provider:</b> Queensland Government Department of Environment and Science)	2017/810/EHP17066	SRA	Phil Ross	17/05/2020

 <b>Key Focus Area 8 (Collaboration and capability development)</b>				
Sugarcane for water limited environments: Characterisation of a selected sugarcane germplasm for transpiration efficiency and high biomass production for the sugarcane growing regions in Australia	2014/102	UQ	Sijesh Natarajan, Shu Fukai	01/05/2018
Statistical data mining algorithms for optimising analysis of spectroscopic data from on-line NIR mill systems: improving system calibrations for quality measures and variety discrimination	2014/109	JCU	Justin Sexton	30/06/2019
Mesostigmatid mites as predators of nematodes in sugarcane soils: occurrence, ecology, food preferences and biocontrol potential	2015/103	University of Sunshine Coast	Matthew Manwaring	01/04/2019
Plant growth promoting Rhizobacteria for Australian sugarcane: Bridging the gap from simple systems to engineered microbiomes	2015/105	UQ	Selby Berg	01/07/2019
Combining controlled release and nitrification inhibitor properties to deliver improved fertilizer nitrogen use efficiency in high risk environments	2016/101	UQ	Chelsea Stroppiana	31/03/2020
Development and modelling of novel controlled release fertilisers for improved nutrient delivery efficiency	2016/102	UQ	Ian Levett	01/09/2020
Integrated standardised competency based training for Sugar Milling operations	2017/013	QUT	David Moller	01/01/2019
Re-evaluating the biology of the sugarcane root system: new knowledge allows for assessment of production impacts and implications for yield decline	2017/101	Southern Cross University	Anders Claassens	30/06/2020
Microwave sensors for sugarcane sugar analysis	2017/102	UQ	Scott Thomason	30/06/2020
New approaches to quantifying nitrogen fluxes in enhanced efficiency fertilisers in Australian sugarcane soils	2018/101	UQ	Aidan Chin	01/06/2022
Characterising nitrogen use efficiency in sugarcane	2018/102	UQ	Anoma Ranagalage	01/06/2022
Reducing basecutter cane loss and extending the wear life of basecutter blades through innovative hardfacing techniques	2018/401	UNISA	Christiane Schulz	01/08/2019
Developing a marker system to measure dosage of alleles for use as a selection tool in the sugarcane breeding program	2018/402	CSIRO	Meredith McNeil	01/12/2019



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