CaneCONNECTION

Winter 2019

6 New prototype diagnostic test for yellow canopy syndrome
14 Topping: Not just for ice cream
10 New air seeder to help legume efficiency
22 Controlled traffic improving soil health
Welcome to the Winter 2019 edition of CaneConnection. With the harvest getting underway, we have taken the opportunity to check in with some of the recent activity in improving harvesting efficiency through the SRA adoption team.

On page 14, you can read more on some of the stats on topping in relation to CCS and yield. We also visit the Woodburn Cane Harvesting Cooperative at Broadwater in NSW to look at trials they conducted in 2018 that compared low-loss after market chopper drums with conventional chopper drums. Through that work, they have now decided to put the drums on both of their harvesters, which is being helped by an incentive through Sunshine Sugar to encourage adoption of this technology.

We also once again talk farming systems and soil health. This includes several growers involved in Project Uplift run by MSF Sugar, where the program is helping growers improve productivity and sustainability by adopting an improved farming system. We also talk with Mackay grower Ray Abela about a new precision air seeder that he is building, and Tweed grower Robert Quirk about his involvement in one of the projects within the Soil Health Program.

In this edition we also provide an update on yellow canopy syndrome, ratoon stunting disease, and enhanced efficiency fertilisers.

Thanks for reading.

Brad Pfeffer
Executive Manager, Communications
BY THE NUMBERS

$225
THE ESTIMATED RETURN PER HECTARE – FOR THE FARMER – ESTIMATED THROUGH TRIALS OF LOW LOSS CHOPPER DRUMS IN NSW, LAST SEASON. PAGE 16

0.6
THE IMPROVEMENT IN CCS THROUGH PROPER TOPPING OF CANE AT HARVEST. PAGE 14

5-60
THE RANGE OF POTENTIAL YIELD LOSS, AS A PERCENTAGE, FROM RATOON STUNTING DISEASE (RSD). PAGE 12

BUDDING SUGARCANE INDUSTRY PHOTOGRAPHERS ARE INVITED TO SHARE THEIR BEST PICTURES AS PART OF A NEW COMPETITION SHOWCASING THE BEAUTY OF THE AUSTRALIAN SUGARCANE INDUSTRY.

Both amateur and professional photographers are encouraged to submit their sugarcane industry photographs to the ‘Sugar Snaps’ competition, where they will have the chance to win prizes and see their work published in a 2020 shed calendar.

The purpose of this competition is to highlight pictures that illustrate the hard work, beauty, landscape and the contribution of the Australian sugarcane industry.

The 2020 shed calendar will be produced as part of a series of ‘RP161’ Nutrient Management projects which are currently being delivered in the Burdekin, Mackay Whitsunday and the Herbert regions.

The RP161 Nutrient Management projects are delivered by Farmacist, Mackay Area Productivity Services, and Herbert Cane Productivity Services Limited (HCPSL) and funded by the Queensland Government Reef Water Quality Program and Australian Government Reef Trust.

Entries close September 27, 2019. To submit your entry and for more information visit, sugarresearch.com.au/sra-information/sugar-snaps/
Far North Queensland cane grower HJ Way had heard plenty of people say that it was not possible to grow peanuts in the Wet Tropics. He’d also seen plenty of others doing it successfully for many years.

This year, he is testing things for himself and has planted peanuts for the first time over about 10 hectares of his fallow country in the Little Mulgrave area, west of Gordonvale.

It was a learning curve from the start. He had hoped to plant in December 2018, but conditions were too dry. Then wet weather set in for several months and it was only in early March that he could plant, and even then he faced muddy conditions.

He has used on-farm ingenuity to keep costs down and ease the transition, building a two-row peanut planter and bed former with the help of his son, Daniel. The implement is an old rotary hoe, modified with a deep ripper to bust up compaction, old ratooning discs and a bed former, followed by the planter. The hope is that the mound for the peanuts will work nicely for minimum-till planting the cane soon after the peanuts.

He said he was still learning with keeping the seed flowing and the best speed for planting, but so far it had “done a beautiful job”.

“We’re not trying to grow the world’s champion peanuts. We’re trying to grow an economic crop,” HJ said.

“We’ll have a good look at our costs and returns and see how they stack up with profitability, after harvest in June or July.

PEANUT VENTURE IMPROVES FARMING SYSTEM

PEANUTS HAVE MADE AN APPEARANCE FOR THE FIRST TIME ON THE LITTLE MULGRAVE PROPERTY OF HJ WAY. BY BRAD PFEFFER
“We needed to look at something else to work with the cane and see if we could get a cash crop from our fallow. Once we take into account all our production costs, including insurance and repairs and maintenance, and everything with the business, there is only a few dollars per tonne in the cane on some of our farms, so we needed to look at other things.”

The peanut work forms part of Project Uplift, which is an initiative run by MSF Sugar and supported by the Australian Government Reef Trust. It works with growers to adopt practices identified through the Sugar Yield Decline Joint Venture and that are part of an Improved Farming System (IFS) or SRA Farming System.

As well as having a legume rotation, which for HJ is peanuts, Project Uplift encourages growers to adopt minimum tillage, controlled traffic, and green cane trash blanketing.

It offers interest free loans and cash grants of 50 percent for works such as re-designing blocks and drainage improvement. It also comes with the support of the MSF Sugar agronomy team, which has been vital for HJ in learning the ropes of a new crop and helping with specifics such as crop nutrition.

For example, MSF Sugar have assisted with advice for gypsum application to help the peanuts make the grade for calcium, knowing that lime would probably be too expensive, especially at the start as he assesses gross margins.

Project Uplift is also helping HJ adopt controlled traffic by purchasing GPS equipment through an interest free loan.

He is currently at 1.75m rows, but starting with the peanuts he is making the shift to wider rows of 1.85 metres. He started at 1.8m, but thanks to a sliding axle on his main tractor he shifted to 1.85 metres halfway through the peanut planting as he felt it gave him just that bit more for the bed top.

“Because of the 600mm tyres, 1.85m gave me that bit more room, while at 1.8m I was riding up onto the bed,” he said.

“Without the Uplift Program I never would have bought the GPS. Maybe I would have gone to wide metres rows, but now with the GPS I can see the system is so much better.”

Another learning curve came with the deep ripping.

“I was going down to about 700mm as the advice from the MSF blokes was that there was a second compaction layer down there, which I struggled to get through.

“I’d made longer legs for my ripper to get down, and with a nine tine ripper with the 240 horsepower tractor it had no pull.

“It took a while to get down past that 700mm because the layer was that hard and packed tight, and that’s why I’ve put a single tine on the peanut planter to get down past the 700mm. Even then you could feel it with the big tractor.”

He said this created a much larger root zone for the crop, which also had the benefit of assisting to keep nutrient accessible to the plant, especially in summers like 2018/19 where the Mulgrave Mill area had its second largest rainfall event on record.

Project Uplift has also helped him with on-farm works for drainage and sediment control.

“It has helped me build a rock wall at the bottom of a block that had a lot of water run through. Now, I’ve got that much sediment there I get bogged when I go down there, and that’s sediment that is not going down the river.”

He said that there was still plenty of work to continue to improve drainage, but he needed to tackle it gradually and in an affordable way.

All up, he said the program was a positive for growers, for the mill, and the environment.

“Everything is getting more efficient, and there’s no wastage of inputs, which is a big plus and one of the big benefits of Uplift,” HJ said.

“We want to keep our environment clean and leave this place in a better spot than when we came here. Since I was a kid I’ve always fished, caught prawns, and put a boat in the river. A lot of things have changed over the years, but we are trying to do as much as we can.”
One of the first steps with managing any crop issue or syndrome begins with diagnosing the problem. Therefore, to manage yellow canopy syndrome (YCS), it is important to first understand how this syndrome changes plant health and the development of symptoms.

While the cause of YCS is unknown, early identification is key to managing the syndrome. With this in mind, one of the major focus points of the YCS research program has been on finding ways to identify cane that is developing or has YCS.

Targeting this objective, SRA has recently been validating a prototype testing kit that will help productivity and adoption officers better understand if a crop has YCS.

This work has been led by SRA Principal Technician Gerard Scalia and is occurring through the project, Leaf sucrose: the link to diseases, physiological disorders such as YCS and sugarcane productivity.

"Early detection is one of the key objectives 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."

The kit is designed to help train industry service providers and researchers to better identify YCS in the field and help reduce misidentification, particularly given the range of other factors that can cause sugarcane leaves to turn yellow.

Over the last six months the prototype kit has been tested in the field with the assistance of Veronica Chapman (SRA) and Mike Turner (Bundaberg Sugar Services Ltd) in the Southern Region.

This work has helped validate the kit to the point where it is now being tested in more regions, although it is not yet ready for widespread distribution.

Once further validation has occurred, the kit may be useful in providing a clearer understanding of the severity and distribution of YCS throughout the industry.

Field Officer with Bundaberg Sugar Services Ltd, Michael Turner, said the kit had helped him work with growers to determine the cause of yellowing in a paddock – helping to identify which blocks had YCS, and also where there was some other issue affecting the crop.

“I have also used it to identify a block that was quite green – a block of KQ228 that was just turning yellow – and successfully identify that it had YCS,” Michael said.

"The dry summer in the region has been our main focus in this region, and YCS is not front of mind for growers here this season, but the kit has been helpful to give an indication of what is happening, especially with some YCS occurring after some late rain.”

Adoption Officer Veronica Chapman said the kit was easy to use and had been helpful in identifying true YCS as opposed to other conditions.

"The testing kit allows us to identify elevated levels of sucrose and starch in the leaves, which is a key symptom of YCS," she said.

"We are also looking for visual symptoms, which generally start with yellowing on one side of the midrib and then can move to both sides as the symptoms progress."

"We are looking for these yellowing symptoms in the mid canopy – above that natural senescence, and not in the new leaves in the upper canopy."

The kit works by applying a solution to a cut midrib section of the leaf. When viewed with a small magnifying glass, the mid-rib of YCS-affected cane has notably darker veins than non-YCS cane. Because sucrose and starch begin to elevate naturally throughout the day, the test needs to be conducted before 8am.

“We are seeking to couple the visual assessment of the leaf with the result from the kit, and if we get those two together then it is a fair indication that the grower has YCS," Veronica said.
SRA Executive Manager, Strategic Initiatives, Dr Frikkie Botha, said that there was also work occurring within the research program to develop more accurate identification methods.

“The in-field kit is a simple way of testing for sucrose and starch in leaves, but we are also working on finding more precise methods,” Dr Botha said.

“We are continuing work to develop a biomarker that is unique to YCS looking within the DNA and RNA.”

In parallel with work to diagnose YCS, other aspects of the research program continue to search for the cause and management solutions. This is occurring through a range of field trials, in the Burdekin, Herbert and Far North Queensland.

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

To see a video of the YCS testing kit in use, visit sugarresearch.com.au
The EEF60 project is designed to identify when and where enhanced efficiency fertilisers (EEFs) can provide a significant increase in nitrogen use efficiency (NUE) and a reduction in nitrogen losses, resulting in a more profitable and sustainable farming business.

The project is running replicated field trials over three seasons at sites in Queensland from Mossman to Childers. The objective is to capture 180 “years” worth of trial data.

These trials will provide information on the effect of EEFs in terms of cane and sugar yield, CCS, and nitrogen use efficiency. This will be put into context with an economic analysis.

Environmental losses (run-off and deep drainage) are also being assessed at six of the 60 sites.

The project team has completed its first full year of trials across 2018, and has re-established sites for 2019. This will allow the assessment of EEF products over a new set of environmental conditions.

The range of weather conditions in early 2019 – from floods to droughts – will provide important opportunity to assess the EEF treatments. It will improve our ability to identify conditions where EEFs offer a benefit to growers and industry.

Grower participants have received preliminary data from their harvest results.

With one year of data collected, the project is not able to provide definitive results and conclusions for the industry. There have been a range of results at different sites, which is a demonstration of the complexity of factors influencing these products.

As data builds over the next two years, and is then combined with an economic analysis, this project will be in a solid position to communicate and extend meaningful results for the industry. These results will also be put into the context of other EEF activities happening across projects and among other organisations.

EEF – WHAT ARE THEY AND WHAT DO THEY DO?

There are two main types of EEFs: controlled release fertilisers and nitrification inhibitors.

Controlled release fertilisers (CRFs) release nitrogen slowly through a protective coating. Currently, polymers are used but, in the future, coatings are likely to be made from biodegradable products.

Nitrification inhibitors (NIs) are applied alongside or added to the urea to temporarily stabilise the nitrogen in the
ammonium form, which makes it less susceptible to losses.

In both cases, the aim is to keep the amount of soil nitrate low to reduce the risk of nitrogen loss and therefore optimise efficiency and yield.

EEFs may allow “trickle feeding” of nitrogen to the crop over time to better match crop nitrogen (N) demand with N supply. Matching demand and supply reduces risk associated with having large amounts of available N in the soil when the crop does not require it.

WHEN TO USE THEM

Multiple research and extension projects are underway across the Australian sugarcane industry, helping to build our knowledge on when and where EEFs may provide the most benefit.

The efficacy of EEFs is complex and site-specific and we strongly recommend seeking advice before using them.

Researchers and productivity services are working on tools and information to help growers define the specific conditions where these products show a benefit. From results to date it appears unlikely that their general use across a whole farm in all seasons will be beneficial.

Given these products can also be more expensive than conventional fertiliser, the EEF60 project is also considering economics, with the help of the Queensland Department of Agriculture and Fisheries.

For more information, please contact:
Dr Barry Salter
SRA Key Focus Area Leader
E bsalter@sugarresearch.com.au
T 07 4963 6802

Mr Burn Ashburner,
CANEGROWERS Project Manager
E burn_ashburner@canegrowers.com.au
T 07 3864 6474

SRA acknowledges Herbert Cane Productivity Services Ltd & CSIRO in assisting with this information.

The EEF60 project is funded by the Australian Government Reef Trust and Queensland Government Great Barrier Reef Innovation Fund.
NEW LEGUME PLANTER TO HELP IMPROVE FARMING SYSTEM

CENTRAL REGION CANE GROWER RAY ABELA HAS LEARNT LESSONS DIRECT FROM THE GRAINS INDUSTRY TO IMPROVE HIS FALLOW CROPPING, AND HAS PUT THIS KNOWLEDGE TO USE BY BUILDING A NEW IMPLEMENT THIS YEAR. BY BRAD PFEFFER

This year has seen no shortage of wet weather days in the shed for many growers in northern parts of the Australian sugarcane industry. Ray Abela, who farms in the Central Region, has been in the same boat as many others, but the bright side is that it has given him more time for engineering his own precision air seeder. When it has been raining, and even when it hasn’t, Ray has spent a lot of time grinding, welding and machining as part of this project that has been brewing in his head for a couple of years now.

He said the desire to build the air seeder was triggered by wanting a better way to get his fallow legumes in the ground and with a chat with a retired broadacre grain grower.

“In talking, we quickly realised that there was plenty that the cane industry can offer the grain industry, and there’s also a lot we can learn from the grain industry, especially as we grow more of these crops in the fallow period,” Ray said.

“The air seeder is a combination of his advice and my experience and trying to put the two together into something that suits the farming system. I’ve used air seeders on properties out west, but by no means do I have an intricate knowledge of how they work.”
The design and the project has been a few years in the making, but it is coming to fruition this year. Ray has built it from the ground up, except for the legs, which he bought from a property near Moonie in southwest Queensland.

It’s an implement that he hopes will play a big role in ongoing work to improve his farming system and soil health, as well as letting him strike the windows of opportunity when they open. It is built to match his 1.9 metre row spacing and will plant four rows of legumes into each bed.

His current planter is only allowing him to plant two rows per bed, and he is also hoping this new implement will allow him to have more control over his plant population and utilisation of the bed. “These are all questions at the moment and things I’ll need to experiment with.”

The plan is to put it to work after the first round of cutting this season.

For Ray, he normally fallows cane blocks after his first and second cuts, and then plants mung beans which come off in December. This leaves time to plant soybean between December and January, which should go through to about May. After that, he plans for another crop, which could be a range of options such as oats or a mixed species fallow.

“I’ve then got time to spray it out and let it dry, and then prepare paddocks for planting cane in one pass.”

“That’s the theory, anyway,” he said. “The weather can beat us and we’ve made plenty of mistakes and learnt a lot of lessons along the way.

“The thing with mistakes is that there’s a lesson in them. I’ve had more failures than successes, but at least with legumes I’m not really losing because of the improvement to soil health and nutrition for the next cane crop.

“It’s the reality of our environment with the humidity and rain that we are always going to have failures. But I’m trying to do what I can to remove the manmade errors from the equation.”

Ray started making changes to his farming system around 2004/2005 when he faced both orange rust and low sugar prices and needed to cut costs. He decided he needed to spend money to save money, which led him to GPS, although he admits it came with a steep learning curve in the early days.

He has shifted away from tillage as much as possible and rarely does a plough-out. “Back then, I had a 185 horsepower tractor with dual wheels and 10 foot (3m) gear behind it, and I was noticing massive lumps in the paddock. But where I went zonal till and didn’t drive on the ground, the soil was friable,” he said.

“I’ve since gone to a smaller tractor and the ripper is sitting in the shed, half pulled apart. I have a 120 inch (3 metre) hoe that sits in the shed about eight years out of 10, and I’ve gone to an 80 inch (2 metre) hoe and use it at speed.”

The ripper has also changed from the 10-foot (3m) gear to a two-legged ripper with curved legs and operated at speed. “I don’t want the machines burying themselves down and grinding everything to a pulp. Every lump in the soil is one I’ve created, so if I don’t create it then I don’t have to deal with it.”

He says his farming system has significantly reduced costs, although is reluctant to say it has improved production. “The only way to know that would be to have a ‘no treatment’ paddock, and to me that’s just not an option.”

Ray farms on 93 hectares just outside of Eton and said that for him he reckons future viability is about improving productivity and reducing cost on his existing land rather than expansion. “It’s about keeping everything at low cost, utilising what we have.”
SRA is changing the way we analyse samples for ratoon stunting disease (RSD) for the Australian sugarcane industry.

This change has seen SRA shift from an old method called ELISA (which stands for enzyme-linked immunosorbent assay) to a method called qPCR (which stands for quantitative polymerase chain reaction).

This is a technological step forward for the SRA RSD laboratory and for the industry, allowing us to be more precise in diagnosing RSD and consequently leading to better outcomes in managing RSD.

The ELISA test has been reliable and served the industry well, but it is less sensitive than molecular based methods such as qPCR. Greater precision of information will be valuable for extension providers and growers in managing RSD.

Leading up to this change, which was recently approved by the SRA Board, we have been working with productivity services organisations (PSOs) on ensuring the qPCR test is practical in the field and in the laboratory. We have seen the potential for this technology for the Australian sugarcane industry for many years, but it has been important to take a methodical approach and ensure that this change is workable and efficient.

A major part of assessing the new method had SRA analyse all samples in parallel in 2018, using both the ELISA and the qPCR.

From this, we learnt that the ELISA was not diagnosing all cases of RSD.

These parallel tests showed that the number of positive test results more than doubled from 157 to 336 for the season with qPCR. These additional positive tests included a number of “spiked” samples provided by PSOs to assess the accuracy of the SRA testing service. These detections increased industry confidence in the service significantly.

While the new qPCR is more precise, it is also more expensive than the old ELISA test, and as such the SRA Board will manage the increased cost of the new service to encourage its early adoption.

The cost for industry of the qPCR test will be $10.50 per field, with this number based on the current throughput of the RSD laboratory.

RSD is one of our major sugarcane diseases and because it is so difficult to visually identify, and because it is so easily spread, the testing service is vital for our industry. SRA recognises this and therefore continues to place a very high priority on this service.
RSD has been estimated to impact fewer than 5 percent of fields in the industry, but its yield losses can vary from 5 percent to 60 percent.

Once you have RSD in your paddocks, it is very hard to eradicate and it is easily spread around your farm or between farms.

This all means that the SRA RSD laboratory is a vital part of the process for helping to keep the industry on top of RSD.

Our new service will allow industry to improve our understanding of RSD prevalence and risk, and to better manage it.

The majority of samples through the SRA laboratory come from PSOs across the industry, although a proportion come through growers.

SRA has been working with PSOs on the sample collection method for RSD for the qPCR method and we also have explanatory fact sheets on the SRA website, as well as the form for submitting samples. Growers should contact their local PSO as their first port of call for more information on RSD.

We continue to encourage regular testing for RSD, especially in blocks of planting material.

The SRA website also has a range of resources around farm hygiene and ensuring you are using clean planting material.

The best attitude to have is to keep the disease off your farm. This can be achieved by simply having a clean seed and hygiene strategy/system in place for your farm and equipment.

For more information contact
SRA Senior Technician
Amanda Johnson
E  ajohnson@sugarresearch.com.au
T  07 3331 3372

(Above) Sampling in the field for ratoon stunting disease (RSD). (Over page) An example of the difference between infected cane (left) and healthy cane, with all other conditions exactly the same.
Topping: Not Just for Ice-Cream

With the season underway for another year, growers and contractors are being reminded of the importance of topping cane, both for achieving clean cane supply and for maximising CCS.

There are plenty of times when the topper on the harvester can’t be used. When crops are lodged due to size or weather — or both — there is just no way of removing the tops from the cane.

However, there are other times when there is an opportunity to be grabbed by improving the use of toppers across the industry.

So what is in those tops, and what does it mean for the cane ending up in the bins?

The short answer is that topping cane has a significant positive impact on profitability. The issue with not topping is that tops increase extraneous matter (EM), decrease CCS and reduce sugar quality through increased colour, ash and starch.

Topping can also mean “losing a bit to gain a bit more”.

Australian industry trials from 2002 indicated that although topping reduced total yield by 6 tonnes per hectare (t/ha), it resulted in an improvement in CCS of 0.6 units and growers’ incomes increased by $110 per hectare ($/ha). In that trial, trash reduced by one percent and tops reduced by five percent.

Grower returns increased by greater than $1 per tonne, although harvester returns reduced.

Another trial from 2012 also looked at the economics of topping versus not topping. The result (see table) was an improvement of $165/ha for the grower.

SRA Adoption Officer for Harvesting, Phil Patane, said topping was just one part of the puzzle with finding the sweet spot to achieve optimum harvest outcomes. He added that it required a collaborative relationship between the contractor and the grower to make the most of the opportunity and to ensure harvester operators were also being rewarded for implementing best practice.

According to the SRA Harvesting Best Practice Manual (available via sugarresearch.com.au), cane should be topped at the growing point, as tops generally represent 40-45 percent of total extraneous matter. Phil said that removing tops also helps reduce the load on the extractors, which allows for improved cleaning, reduced cane loss and less wear and tear on the machine.

Herbert region harvesting contractor, Greg Chiesa, said it was important for contractors to talk to growers about what they wanted.

“Obviously if the cane is laying down, there’s no point running the topper, but if the cane is standing then we are running the topper and following the growers’ instructions,” he said. “There’s no point sending tops through for no reason only to be trying to pull them out with the extractors.”

Generally, only crops that are relatively even and erect can be topped effectively, with typical topping efficiency in a good erect crop being 75–85 percent.

While there have been attempts to automatically control topper height, they have not yet been successful. The operator must therefore manually control topper height, and make appropriate adjustments when the basecutting height is adjusted.

To receive a hard copy of the SRA Harvesting Best Practice Manual contact Samantha Ryalls on E sryalls@sugarresearch.com.au T 07 3331 3308.
NEW STAFF TO BOOST SRA ADOPTION CAPACITY

SRA has welcomed new members to its Adoption Team as part of the delivery of the industry-led Adoption Strategy for Australian cane growers and millers.

The new staff are Mr Tim Liebelt (Tully/South Johnstone), Ms Clare Gersch (Mackay), Mr Will Higham (Meringa) and Ms Molly O’Dea (Proserpine).

As part of the Adoption team, they will work closely with SRA research staff, growers, millers and other service providers to help the Australian sugarcane industry improve productivity, profitability and sustainability. They will work on a range of activities and projects specific to their respective regions, including Cane to Creek 2.0 and Pathways to Water Quality Improvement in the Myrtle Creek Sub-catchment.

In addition, Ms Hannah Russell joins SRA as part of the QFF-led agricultural extension work placement program, funded by the Queensland Department of Environment and Science.

Based in Bundaberg, Hannah will have the opportunity to receive professional workplace development and on-ground extension experience with growers, millers, harvester contractors and a range of service providers in the region.

SRA Executive Manager, Regional Delivery, Mr Ian McBean, said the new staff were eager to work with industry in their respective regions to deliver outcomes for the industry.

“SRA’s Adoption Team provides a vital conduit between research and growers and millers, assisting industry to adopt practices and technology that improve their bottom line,” Mr McBean said. “These appointments provide vital capacity to assist with the ongoing delivery of the industry-led adoption strategy.”

(Below) Ms Hannah Russell has recently joined Sugar Research Australia in the Southern Region, based at Bundaberg, as part of a work placement program for recent agricultural graduates.

Register now for this International Sugar Conference in Cairns

10 16 July – Join the full day sugar industry tour
16 17 July – Experience a full day conference - outstanding industry speakers and panellists
17 18 July – Attend the Market Evaluation, Consumption and Statistics sessions
18 Be informed, share your expertise and ideas in interactive sessions
19 Network and enjoy the social activities planned

www.isoaustraliacouncil.com.au

Profitability Through Sustainability: Adapt... Innovate... Evolve.

IS02019 MEETINGS & CONFERENCE

16 to 19 JULY 2019

PULLMAN CAIRNS INTERNATIONAL, AUSTRALIA

Contact Conference Manager Jann George for sponsorship or event questions
jann@isoaustraliacouncil.com.au or call 0417 780 670
SIDE-BY-SIDE TRIAL EXAMINES AFTER-MARKET CHOPPER SYSTEMS

ALONGSIDE A SERIES OF FIELD TRIALS LOOKING AT OPTIMUM PARAMETERS FOR HARVESTING, SRA HAS ALSO COMPARED STANDARD CHOPPER DRUMS TO AFTER-MARKET OPTIONS AVAILABLE FOR THE AUSTRALIAN SUGARCANE INDUSTRY.
Standard Case and John Deere chopper drums have been compared to after-market low-loss chopper drums in recent field trials conducted by SRA.

The purpose of these trials was to complement work with harvesting groups across the industry to help optimise harvesting efficiency, and to understand the differences in sugar recovery with after-market drums, and also harvesters with optimised feed trains.

In New South Wales, one of these trials was conducted with the assistance of Woodburn Cane Harvesting Cooperative during the 2018 season, with the trial comparing standard John Deere drums on their two 3520 machines. While the group runs a CH570 and 3520 as their main machines, with a 3520 as a backup, the trial was done with the two 3520s to ensure a like-for-like comparison.

The harvesters ran in the same paddock on the same day with sugar loss assessed and measured by the SRA harvest losses team, as part of the Rural R&D for Profit Project that has been working across the industry on in-field trials for the last two seasons.

Based on the trial and earlier work, the NSW region’s milling company, Sunshine Sugar, is offering a subsidy for the installation of three or four blade per drum low-loss chopper systems and feed train optimisation for each harvester that will operate in the 2019 season.

CEO Chris Connors said they were impressed by the results.

“On average, using low loss chop systems means an extra 1.3 tonnes of sugar for each hectare harvested, which backs up work from Sunshine Sugar’s own trials at Harwood in 2016,” Mr Connors said.

“The extra sugar translates to an extra $225 per hectare for the farmer. Based on last year’s 16,000 hectares harvested this would return an extra $3.6m for NSW. Add the increased harvest group and mill revenue and it is something that we cannot ignore, particularly given the weather effects on the current and future crop.”

Broadwater region grower Stephen Wagner is a Director of the Woodburn Cane Harvesting Cooperative (Co-op) and said they were “blown away” by the data from the trial.

“The day of the trial, we thought there would be some difference, but it was when we received the results of the new chopper system we had installed that we were surprised,” Stephen said.

“It was in a block of big cane nearly twice the yield of most of our blocks – over 250 tonnes per hectare – so we know that the numbers need to be scaled back proportionately.

“But, at the same time, it’s clear that the whole value chain stands to be winners.

“It is not often these days that new technology comes along in farming that can make such a big change. 30 years ago we made huge gains with costs and economies of scale, improved chemical usage and zero till, but in the last decade the gains have been smaller.

“But we see this as a real game changer in our burnt-cane system.

“We are also grateful to Sunshine Sugar in being extremely generous and subsidising the cost of the investment.”

The current after-market drums on their 3520 are four blades per drum, but they have chosen three blades per drum for their CH570 this year.

The co-op consists of 38 growers and last year cut 197,000 tonnes between its two primary harvesters.

SRA has also worked with the co-op on assessing harvesting parameters such as fan speed, ground speed and pour rate.

Graeme Bell is an employee of the co-op and spends most of the season in the harvester seat.

He said that, as a grower-owned co-op, their existing harvesting settings were not too far from the recommended settings, especially in big crops, but he also said the co-op still faced other factors in getting to the sweet spot with harvester settings.

“With burnt cane we have deadlines to meet to get it off quickly, and we also have deadlines to meet with the mill,” Graeme said.

While most of the cane is two-year, yields can still vary, especially in recent flood years or years like 2019 when there was severe drought over the summer.

The Rural R&D for Profit project is supported by SRA and the Australian Government Department of Agriculture and Water Resources.
IRRIGATORS MOVE TOWARDS PROFIT AND SUSTAINABILITY

AMIDST RISING ENERGY GRID COSTS AND SQUEEZED PROFIT MARGINS, RESEARCH FINDS THAT CANE IRRIGATORS CAN INVEST IN RENEWABLE ENERGY TO GENERATE HIGHER RETURNS AND REDUCED EMISSIONS.

BY ALYS MARSHALL

(Below) Janine Powell (AgEcon) speaking to Kallee Buchanan (ABC Rural, Wide Bay) at the Southern Region SRA grower research update earlier this year.
A study conducted by AgEcon and supported by SRA and the Queensland Government aimed to find solutions to lower pumping costs and reduce environmental impact through the use of grid connected micro-grids - clusters of generators that are able to be operated as a single entity.

“We focused this study on three different farms, all with different energy demands and irrigation application methods,” said AgEcon research economist, Jon Welsh.

The case studies were situated in three different sugarcane farming locations and featured furrow irrigation, centre pivot and travelling gun systems.

The results of the three case studies found that the economic feasibility of renewable energy sources is subject to how often they are being used, referred to as “utilisation rates” either by an electric load or export back into the grid.

The study also indicates that seasonal loads with large periods of inactivity between use are only economically viable when the site qualifies for a Feed in Tariff (FiT).

“A Feed in Tariff is a payment to an energy producer – in this case a farmer – when sustainable energy is exported back to the national grid,” said Mr Welsh.

“An example of this is the furrow irrigation case study, which uses both 15 kilowatt (kW) and 18kW pumps for furrow irrigation on a seasonal basis,” says Janine Powell, research economist for AgEcon.

Optimisation software called HOMER was used to design a solution. “By using this software, we were able to reduce the energy cost of this site by 26 percent with the use of a grid connected micro-grid comprising of 39kW solar photovoltaic and 30kW inverter while staying eligible for FiT. The investment has an estimated payback time of five years,” Ms Powell continues.

“This site’s high economic returns were a result of shifting irrigating from nights to days so half of the grid energy was offset by solar, a change in tariff and the FiT income stream.

“Gensets were considered as an alternate energy source for cloudy days, however as the price of diesel rises, it can be assumed that within a few years this will no longer be a cost-effective solution, so gensets were not included within the micro-grid.”

For the two larger case study sites also with a sporadic, seasonal load, the micro-grid was restricted to a 30kW inverter to ensure the sites remained eligible for a FiT under Ergon’s embedded generation connection policy.

AgEcon modelled the installation of a micro-grid including 39kW photovoltaic to supplement the national electricity grid, which resulted in only nine percent of the site’s annual load being met by solar power.

This ensures that when pumps are not being used, outside the irrigation season, an income is still being generated by the solar. The micro-grids for these sites reduced the cost of electricity by 12 percent and 20 percent and had a payback period of 10 and nine years.

In comparison, a larger micro-grid designed to cover the site’s whole electricity load resulted in the export limit of 30kW being exceeded and therefore no FiT, with economic returns being insufficient.

In all three case studies completed by the AgEcon research team, the economically optimal solution was a grid connected micro-grid including solar photovoltaics that remained eligible for FiT.

“As sustainability becomes an increasingly topical issue for the sugar industry, micro-grid technologies will be at the forefront in providing an alternative form of electricity to that of the national grid system,” said Mr Welsh.

The carbon dioxide abatement for each site ranged between 1245 – 1314 tonne of carbon dioxide (equivalent) over the 25 year scenario.

Each site was restricted to 39kW photovoltaic, so there is potential for greater carbon abatement.

Ergon’s evolving tariff structures, FiT and export policies are critical to a micro grid investment. Renewable energy is currently incentivised through participation in Federal Government policy called the Renewable Energy Target, which contributes to a micro-grid’s ability to reduce on-farm energy costs.

More information can be found at agecon.com.au

<table>
<thead>
<tr>
<th>Parameter: change (base value)</th>
<th>% Change in LOCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Export (with FiT): 50-0kW (base 30kW)</td>
<td>-60%</td>
</tr>
<tr>
<td>Net metering: ON (base OFF)</td>
<td>-30%</td>
</tr>
<tr>
<td>FiT: +/-30% (base 10.2c/kWh)</td>
<td>6%</td>
</tr>
<tr>
<td>Battery: -20,-40,-60% (base $800/kW)</td>
<td>0%</td>
</tr>
</tbody>
</table>

The graph indicates the renewable investment is most sensitive to a change in the amount of energy that can be sold back to the grid. The quantity exported, rather than the price received, has the highest effect on the economic feasibility of the investment.
CENTRE PIVOT INVESTMENT DELIVERING YIELD & COST SAVINGS

FOR TONY BUGEJA, GROWING THE BEST CROP POSSIBLE IS ESSENTIAL FOR PROFITABILITY, AND HE IS MAKING THE MOST OF OVERHEAD IRRIGATION TO ACHIEVE PRODUCTIVITY GAINS AND IMPROVE EFFICIENCY. BY BRAD PFEFFER
Irrigation has been one of the last things on Tony Bugeja’s mind for most of this year.

Throughout late summer and early Autumn, his ground has been mostly saturated from rain and there has been very little need to put any water on.

It was a different story for the latter months of 2018, though, when drought gripped the region and triggered some of the worst bushfires on record.

For Tony, who farms with his son Mark and brother John, it meant that the family had their irrigation infrastructure running flat out.

Growing cane on about 350 hectares near Homebush, the Bugejas have invested in five centre pivots starting in 2011. The pivots range from 250 metres to 405 metres.

“When the heat was on, and the time of the fires in the Pioneer Valley, we had some of the pivots putting on up to 40 millimetres for each circle. The crop was sucking it up and our g-dot moisture sensors were showing us that the crop needed it,” Tony said. “The evaporation rate was incredible, but we could still see the growth in the cane.”

Six months later, and even with a turn in the wet season, he can still see that this year’s crop is in a good position thanks to the investment in irrigation in the closing months of 2018.

Beyond the visual estimate, he also has confidence in the irrigation based on past on-farm trials that have given him numbers on yield and cost.

“We did a full analysis comparing pivots to water winches about six years ago, comparing labour and energy. Through that we found the water winch was costing us roughly $33 per hectare more than the pivot.”

He followed this up with weigh trials to assess yield, assisted by Farmacist, and also saw a productivity gain under the pivots.

“This was in a block of Q240th plant cane and we could see the difference under the circle, compared to the triangle corners under water winch,” Tony said. “I thought it would be in the range of 25 tonnes per hectare, but it ended up being 42 tonnes per hectare with the same amount of nutrients.

“We’re not saying that we’ll see that all the time, every year, but those results were an eye-opener to us.

“Centre pivots aren’t cheap, but you don’t buy them for one year. When you look at the cost saving in operating expenses, and even if you estimate 20 tonne per hectare in increased production, and look at that over a 10-year period, I reckon we’re on the right track.”

The Bugejas have two pivots on electricity, two on diesel, and one on both.

Tony said he didn’t see much cost difference between the electricity and diesel. While the diesel has the benefit of being variable speed, they had chosen diesel for those sites because there was no existing power and it would have been uneconomic to run lines there.

He said the one pivot with both diesel and electricity is generally run at diesel during the day and electricity at night to take advantage of night time electricity tariffs.

“We also find the pivots deliver benefits to other parts of the farming operation,” he said. “So if you need to put on 15mm or 20mm after a chemical application, you can know the chemical is in place and manage your farming practices more easily.”

Water is sourced from bores, re-use water from the Mackay city, and their own 300 megalitre on-farm storage, which has also delivered major environmental benefits in capturing run-off water.

Harvesting their own cane, they also cut farms in halves or quarters to allow them to run the pivots on a half or quarter circle. Nutrients are applied straight after harvest and the crop irrigated as soon as possible.

“The quicker we can get the cane to uptake nutrients, the more time it has for making sugar. “We have a variable nutrient rate program in place with our agronomist, Farmacist, and are reducing nutrients outside the circle of the pivot, into the corners. We still irrigate the corners with water winches, but we are seeing smaller cane outside the circle.

“We are always looking for ways to improve our input efficiency.”

He is the first to admit that the price of electricity and water has put pressure on margins, even with the investment in overhead irrigation. Despite the expense, though, when he looks at the yield numbers and costs he also reckons that irrigating and growing the best possible crop is essential for profitability.

“The increase in power in the last 10 years is absolutely phenomenal, but it has made us look for efficiencies,” he said. “We don’t benchmark ourselves against other farmers, but with our accountant benchmarking ourselves against last year’s figures.

“The sugar price is beyond our control, so we are focused on growing the best crop possible.”

For more information on irrigation systems and efficiency, you can access the SRA Irrigation Manual under ‘growers and millers’ on sugarresearch.com.au.
CONTROLLED TRAFFIC HELPING IMPROVE SOIL HEALTH

(This page) The Bonso family’s new planter and modified tractor.
(Over page) MSF Sugar Senior Agronomist, Michael Porta, and Steven Bonso checking over the crop earlier this year.
It was after a trip to Maryborough that Far North Queensland farmers Steven and Leo Bonso saw the potential of adopting controlled traffic at their farm.

The Babinda father and son were visiting Tony Chapman’s farm, where Tony had been practicing controlled traffic for about 20 years.

“When we poked a stick into the bed, it sunk straight down into the soil, and we saw that there was something in it for us,” Steven Bonso explained.

The Bonso family grow cane on about 1,150 hectares near Babinda and after that visit they set about learning more about improved farming systems, especially with local support from the MSF Sugar agronomy team. They soon decided to widen their rows from 1.65 metres to 1.8 metres.

They started with a trial block about four years ago, and after seeing no difference in yield since then, they’ve committed to the change across their farms starting in 2018.

Steven said their investments included a dual-row planter bought from the Burdekin, and getting a new fertiliser box built that is adjustable and could accommodate both the 1.65m rows and the 1.8m rows as they transition.

They do their own harvesting, with the harvester already set up with a long elevator, so the main investment entailed installing GPS.

Their main tractor was modified to a 3.45m spacing and Steven said this width was the limit so that they could float it on a truck when moving between farms. It originally had dual wheels on the back, but they moved to singles and also made their own spacers for the front.

“The whole reason we went this way is to save time,” he explains.

Time is precious for Steven. There’s not just the farm to run, but also the harvesting business, and a freight business that hauls liquid fertiliser and also cane for parts of the region where there is no rail network. He is also a Director of the local CANEGROWERS and of Innisfail Babinda Cane Productivity Services Limited.

“The window of opportunity with farming can be minimal in the Wet Tropics,” he said.

“We need to go when we can. With the new planter we can cover a lot of country in a day so long as we keep the cane up to it.”

This work has been assisted and accelerated in recent years through the Bonso family’s participation in Project Uplift, which is an initiative of MSF Sugar and supported by the Australian Government Reef Trust program to achieve a range of water quality outcomes for the Great Barrier Reef through reductions in sediment, nutrients and pesticides entering the reef catchments.

Through Uplift, they are undertaking drainage and levelling work, looking at a block when it reaches the end of the crop cycle.

“We’ve got three main soil types – a brown clay, a grey clay, and granite at the top end of the farm,” Steven said. “We’ve had problems where the granite and clay meet, so we’ve improved the sub-surface drainage, and made the drains deeper and wider. We’ve turned the place into something that wouldn’t grow cane in a wetter environment, to something where we generally get above mill average each year.”

They have also taken the first steps for adopting a legume fallow. In recent years they worked with Derek Sparkes from the Queensland Department of Agriculture and Fisheries on testing a range of legume crops.

“I was all set to do it this year, but the weather was a disaster and we had well over two metres of rain for the summer, so it didn’t happen,” he said.

“This year I will have my own planter, so by the time the season finishes the legumes will be going in straight behind the harvester.”

In the past, they have gone for a sprayed-out fallow as they haven’t wanted to disturb the soil and risk erosion. They’ve also been concerned about growing legumes in the wet conditions, but after working with DAF, MSF Sugar, and observing other farmers, they decided it would work and was worth a go. Steven said the best option appeared to be Meringa cowpea, but they also were taking a keen interest in mixed species fallows that are the subject of research trials and are already being grown on some farms in the region.

Steven sees it all as part of the farming system to improve soil health and he continues to be involved in industry activities and events looking to improve soil condition.

He uses liquid fertiliser and said it was easier and quicker than fertiliser out of the bag. “It has been a lot of outlay, but it has been worth it with the area we are covering.

“We have definitely gone into improved farming systems in a bigger way since we became involved with Project Uplift, We have scale, but everything still has a cost attached to it, and with sugar prices being low, we need every bit of extra help we can get. It has enabled us to do all these things.”

In the past, they have gone for a sprayed-out fallow as they haven’t wanted to disturb the soil and risk erosion. They’ve also been concerned about growing legumes in the wet conditions, but after working with DAF, MSF Sugar, and observing other farmers, they decided it would work and was worth a go. Steven said the best option appeared to be Meringa cowpea, but they also were taking a keen interest in mixed species fallows that are the subject of research trials and are already being grown on some farms in the region.

Steven sees it all as part of the farming system to improve soil health and he continues to be involved in industry activities and events looking to improve soil condition.

In the past, they have gone for a sprayed-out fallow as they haven’t wanted to disturb the soil and risk erosion. They’ve also been concerned about growing legumes in the wet conditions, but after working with DAF, MSF Sugar, and observing other farmers, they decided it would work and was worth a go. Steven said the best option appeared to be Meringa cowpea, but they also were taking a keen interest in mixed species fallows that are the subject of research trials and are already being grown on some farms in the region.

Steven sees it all as part of the farming system to improve soil health and he continues to be involved in industry activities and events looking to improve soil condition.

He uses liquid fertiliser and said it was easier and quicker than fertiliser out of the bag. “It has been a lot of outlay, but it has been worth it with the area we are covering.

“We have definitely gone into improved farming systems in a bigger way since we became involved with Project Uplift, We have scale, but everything still has a cost attached to it, and with sugar prices being low, we need every bit of extra help we can get. It has enabled us to do all these things.”

In the past, they have gone for a sprayed-out fallow as they haven’t wanted to disturb the soil and risk erosion. They’ve also been concerned about growing legumes in the wet conditions, but after working with DAF, MSF Sugar, and observing other farmers, they decided it would work and was worth a go. Steven said the best option appeared to be Meringa cowpea, but they also were taking a keen interest in mixed species fallows that are the subject of research trials and are already being grown on some farms in the region.

Steven sees it all as part of the farming system to improve soil health and he continues to be involved in industry activities and events looking to improve soil condition.

In the past, they have gone for a sprayed-out fallow as they haven’t wanted to disturb the soil and risk erosion. They’ve also been concerned about growing legumes in the wet conditions, but after working with DAF, MSF Sugar, and observing other farmers, they decided it would work and was worth a go. Steven said the best option appeared to be Meringa cowpea, but they also were taking a keen interest in mixed species fallows that are the subject of research trials and are already being grown on some farms in the region.

Steven sees it all as part of the farming system to improve soil health and he continues to be involved in industry activities and events looking to improve soil condition.

In the past, they have gone for a sprayed-out fallow as they haven’t wanted to disturb the soil and risk erosion. They’ve also been concerned about growing legumes in the wet conditions, but after working with DAF, MSF Sugar, and observing other farmers, they decided it would work and was worth a go. Steven said the best option appeared to be Meringa cowpea, but they also were taking a keen interest in mixed species fallows that are the subject of research trials and are already being grown on some farms in the region.

Steven sees it all as part of the farming system to improve soil health and he continues to be involved in industry activities and events looking to improve soil condition.

In the past, they have gone for a sprayed-out fallow as they haven’t wanted to disturb the soil and risk erosion. They’ve also been concerned about growing legumes in the wet conditions, but after working with DAF, MSF Sugar, and observing other farmers, they decided it would work and was worth a go. Steven said the best option appeared to be Meringa cowpea, but they also were taking a keen interest in mixed species fallows that are the subject of research trials and are already being grown on some farms in the region.

Steven sees it all as part of the farming system to improve soil health and he continues to be involved in industry activities and events looking to improve soil condition.
MIXED SPECIES FALLOWS BEING PUT TO THE TEST

TRIALS ARE UNDERWAY IN MULTIPLE REGIONS LOOKING AT MIXED SPECIES FALLOW CROPS AS PART OF SRA’S SOIL HEALTH PROGRAM OF INVESTMENT.

The benefits of fallow crops – especially legume crops – for sugarcane soil health and productivity are widely acknowledged.

But in recent years there has been interest to investigate if there are greater productivity gains to be had by looking at other break-crop options.

A number of growers have already looked at mixed species fallow crops in trials or their own on-farm experiments, but a new project is looking at this fallow option over several years at sites in New South Wales, Mackay and the Wet Tropics.

The project is called Establishing sugarcane farming systems to improve soil health and is led by Dr Barry Salter at SRA and run in collaboration with Mr Rob Sluggett from Farmacist and Dr Lukas Van Zwieten from New South Wales Department of Primary Industries.

The mixed species fallow crop trials are one part of the project, which is also looking at other aspects of the farming system including sub-surface organic matter application, intercropping trials and long-term green cane trash blanketing. The project is part of SRA’s Soil Health Program of investment, which is a 10-year commitment from SRA to improve adoption and extension around the industry’s soil health.

NSW grower Robert Quirk is one of the growers with a trial site on his farm for the mixed species fallow, and said he was keen to learn more about something that was novel to NSW.

“I’ve tried a number of different practices here over the years such as intercropping and skip row, and had some good results, so I am keen to see where this mixed species trial goes,” he said.

He said that soybean fallows had widespread adoption across the three NSW mill areas, and were often an important cash crop to the region, but that this trial would provide valuable information on alternative fallows with a focus on cane production, and would add value to information collected in other regions.

He said it was useful to understand if other fallow options, even if they were not taken through to harvest, offered greater benefits to the soil health and the sugarcane farming system.

In the trial, the mixed species fallow crop will be compared to bare fallow, as well as a mixed species cover crop plus intercropping.

Cane will be planted this year at the sites and yields and various measures of soil condition will be assessed across the harvests of 2020, 2021, and 2022. Results will be communicated to the industry as the project continues.

Robert Quirk said soil health was crucial at his property, as he had faced huge problems with acid sulphate soils over the years.

To combat this problem, he has implemented a broad range of practices at his farm including laser levelling,
IT WASN’T LONG AFTER ROBERT QUIRK STARTED FARMING THAT HE KNEW HE HAD A PROBLEM.

It was the late 1960s and Robert and his brother had recently finished school and converted the Tweed Valley farm from a dairy to sugarcane. Robert and his brother farm separately but share equipment, and say that this practice has been the strength of the NSW sugarcane industry for many years.

Their early years of farming cane yielded good results, but within about 10 years they saw yields declining as they faced major problems with acid sulphate soils. Their farms are just half a metre above sea level and confront regular floods from the nearby Tweed River. The farm sits above a shallow groundwater table.

Before starting cane farming, flood gates and levees had been built on the property, but these had created their own problem with mineral oxidation. Robert said their soil pH was as low as 2.6, with a severe acid problem. “We had the equivalent of about 10 litres of sulphuric acid per square metre, or 100 tonne per hectare over the 100 hectares,” he explained.

He has also more recently gone to 1.8 metre rows and GPS. Like many across the region, he has seen positive results through improving his farming system, and in recent years he has averaged 93 tonnes of cane per hectare across the 100 hectares (including one-year, two-year, and fallow). Farming on the Tweed in the northern-most of NSW’s three mills, most of Robert’s crop is cut as one-year cane, although he said he does cut about 20 percent as two-year-old.

Not only was productivity severely impacted but there was also public scrutiny on the problem.

Over time, along with the rest of the industry in NSW, he has embarked on a series of measures to combat the problem and create a sustainable farming system. The work of the industry on tackling this challenge is a significant success story for the industry in NSW.

For Robert, he has laser levelled blocks, uses lime regularly, and harvests green as much as possible. He uses minimum tillage and legume fallows and regularly soil tests to only use replacement quantities of urea.

“We developed a drainage management plan. We also have had to deal with the wet weather and have pumps that can move about four megalitres per hour off the farm in wet times. So we can handle about 50mm of rain per day and not sustain too much damage.”

Through all this work, he said he maintains the water table at minus 600mm, which gives the roots a better environment and has improved soil pH. He said he had increased organic carbon content from about 2 percent to over 5 percent in surface soils.

He added that between the environmental outcomes and improvement in sugarcane productivity, the investment was well worth the effort. “The sustainable yield and improvement in soil characteristics justified the additional work and expense of the improved soil management practices.”

(Over page) Mixed species fallow crop trial on Robert Quirk’s farm in January 2019. (Right) Robert is a keen participant in a range of research trials at his farm on the Tweed River.
SRA scientists have discovered a type of fungi that can cause significant productivity losses in sugarcane in glasshouse and experimental conditions.

The fungus, called Sclerotium rolfsii, was recently identified and analysed in a series of experiments at SRA’s Woodford pathology farm and, through this work, the fungus was shown to cause germination loss of greater than 70 percent in experiments.

However, it is not yet known if the fungus is affecting commercial sugarcane.

SRA Principal Researcher (Disease Management) Dr Shamsul Bhuiyan conducted the work with fellow SRA staff Priyanka Wickramasinghe (former staff), Stephen Mudge, Prakash Adhikari, and Kylie Garlick.

This fungus creates red to patchy-red lesions on the external surface of cane internodes, as well as pale-red to red discoloration of internal tissue of cane stalks. Other symptoms also include light-brown and water-soaked lesions at the base of leaf sheaths of a seedling, along with white tendrils of fungus.

Through their work, the scientists inoculated (infected) sugarcane with the fungus and compared it to clean cane using the varieties Q208® and Q205®. They showed the substantial germination losses of greater than 70 percent in field conditions.

“Five weeks after inoculation, sett germination was five-fold higher in un-inoculated (clean cane) compared to the inoculated plots,” Dr Bhuiyan said.

The sugarcane industry already deals with a range of fungi, with some of the most notable of these being Pachymetra root rot, and also sett-rot diseases like pineapple sett rot and fusarium sett rot.

“Sett rots are currently typically controlled by fungicides, but in the case of Pachymetra there are no fungicides that are effective at economic rates,” Dr Bhuiyan said. “Therefore, with the discovery of any new type of fungus, there are several steps that we need to take to learn more about what this means for our industry.”

One of the first steps would be to determine the prevalence of the pathogen – how widespread it is and how much of a problem it could be. Another step would be to investigate any variation in the pathogen, varietal resistance, and other management options, including whether currently used pineapple sett rot fungicides affect the fungus.

For more information contact Dr Shamsul Bhuiyan
E sbhuiyan@sugarresearch.com.au
T 07 5434 5902
Compaction can be a major impediment to sugarcane productivity. A penetrometer reading can give you a good handle on the hardness of your soil – but what does compacted soil really look like for sugarcane roots? A project being led by CSIRO, and funded by SRA, has revealed some images that illustrate what compaction can do to sugarcane roots.

These pictures from the CSIRO research team show the difference in sugarcane roots grown in compacted soil compared to uncompacted soil. They also show roots under magnification, where you can see that compaction has affected the cells of the root, including its central core, which is used for transporting water and nutrients.

There is more information on soil compaction on the SRA Soil Health Toolbox website sugarresearch.com.au/soilhealth, including a soil compaction guide produced by MSF Sugar.

This work is occurring through the project, Validating root system traits for enhanced nutrient capture in challenging environments (2018/002).
Far North Queensland cane growers Mick Andrejic and Mark Savina have always tried to extract the maximum from their farming operation. Running a large and diverse farming business called Salmec, Mick and Mark are business partners owning and leasing farms across about 1000 hectares. They also run contract harvesting and planting for a further 300ha of cane country in the Northern Beaches area outside Cairns.

For many years they have been keen participants in a broad range of research trials and innovations, to help inform early adoption of improved practices and technology for their farms.

Mick is the first to admit that their scale has helped their journey to running an improved farming system (IFS), but also adds that they have still had their share of challenges along the way.

One of their biggest changes came about 10 years ago with a shift from 1.52m to 1.8m rows using GPS guidance. Their investments included purchasing GPS units and base stations, installing flipper rollers on harvesters, widening some implements, and buying some new machinery. It took about five years to change all their machinery and their paddocks.

Far North Queensland cane growers Mick Andrejic and Mark Savina have always tried to extract the maximum from their farming operation.
The result has been significant reduction in labour, less maintenance and reduced fuel consumption.

Mick reckons yields have held, but the biggest benefit has been with looking after the cane stool.

“We’ve been on this system long enough to have harvested through some really wet years, and saw how much the stool suffered on narrow rows,” he said. “We’ve got paddocks that are going an extra ratoon now, and for our size area we are talking about 20 hectares each year that we don’t have to plant because of longer ratoons.”

He said that controlled traffic was only part of their ongoing improvements, and that these changes had been accelerated in recent years with the assistance of the Project Uplift Farming Systems Initiative run by MSF Sugar.

Project Uplift is based around farming systems principles first developed as part of the Sugar Yield Decline Joint Venture, specifically controlled traffic, minimum tillage, legume break crops, and green cane trash blanketing.

Mick said most of these aspects of the farming system were established in some way on Salmec’s farms, but Project Uplift has helped them fine-tune the system. For example, through the project they have modified an implement for deep ripping to break up the compaction layer and to ensure they are getting the most from their controlled traffic.

They are also continuing to improve drainage, and are increasing their use of legume fallow crops, including investigating options such as peanuts. They are also continuing to improve their nutrient and chemical management.

Project Uplift offers interest free loans for the purchase and modification of machinery, cash grants of 50 percent for farm re-design and drainage, and agronomy support from the MSF Sugar Agronomy team.

Because it synchronises with delivering positive water quality outcomes for the Reef, it is a program supported by the Australian Government Reef Trust.

For the cane growing area just north of Cairns, the adoption of IFS practices at Salmec is having ripple effects for their grower clients in the region, allowing these growers to make a similar transition more quickly and affordably.

In some cases, it is allowing these growers to tackle changes that would have been very difficult on their own.

John Westaway and his son Greg use Salmec for their harvesting and planting, which means they have happily come along for the ride with the IFS.

“For us, Mark and Mick start the change and we fine tune our equipment to fit,” John Westaway said. “It has been a big saving in fuel and time. We only receive so much for our crop, so we need to be getting smarter about our costs.”

Even with Salmec’s support, the Westaways had their own risks and challenges, which is where Project Uplift has given them a leg-up.

The project has helped with drainage work and they continue to tackle the built-up compaction problem on their farm. They are also bringing in a legume rotation.

Part of the Westaway’s farm is on the Captain Cook highway, making it highly visible to thousands of tourists and commuters each day. Groups of overseas farmers on tourist trips also occasionally visit the region’s farms to learn about local agriculture.

This is why they are keen to take part in Project Uplift, which is helping them continue to improve sustainability and productivity.

“We’re very conscious of the Reef and the community around us. Before we do anything here, we are really thinking about it,” John said.

“When I started farming the rows were four feet nine inches (about 144cm) and all our other farming practices were vastly different. We keep changing, but with change comes cost and we can’t just shift all our practices every year.

“That’s where Project Uplift and MSF have helped. It has worked out really well for us.”

John added that with challenges such as low sugar prices, and local issues such as urban encroachment and road resumptions, they needed to make the most from every hectare of land.

MSF Sugar agronomist Noel Wright said the project was about working collaboratively with growers.

“We aren’t telling growers how to farm, but are assisting them to tweak their farming regime and assist them with practices that make them more profitable. This creates opportunities for the next generation to come back to the farm – which is what we have here with Greg Westaway and Cameron Andrejc,” Mr Wright said.

“For MSF, it is about sustainable and productive cane supply.”

The Salmec business also works with a range of research projects, which also helps spread the research outcomes and information through the local area.

Following the 2018 harvest, they have also trialled low-tech irrigation using trickle tape on the surface, although they came in fairly late during the very dry period that led-up to December 2018.

When CaneConnection visited in March, they had already received over two metres of rain, but Mick said there was still a clear visual difference between the irrigated and the non-irrigated.

“We are just starting so that we can assess the cost and the yield, to work out where we might go from here. The tape on the ground is designed for single use, but if we can get two or three uses out of it, that would have a big influence on cost.”
SUGAR PLAYS AN IMPORTANT PART OF DIVERSITY MIX

The Atherton Tableland is one of the few places in the world that can produce almost everything for your smoko including milk, sugar, tea and coffee. The Gallo family are making a go of two of these important commodities for the region: sugar and milk. By Brad Pfeffer

For the Gallo family near Yungaburra, sugarcane is a diversification strategy.

They aren’t long term cane growers and you are just as likely to see Holstein cows grazing the paddocks or a busload of tourists going in their driveway as you are to see a paddock full of cane on their farm.

The family history on the Atherton Tableland goes back over 80 years, always with a strong focus on dairying, and it is only since 2012 that they have made a significant jump into sugarcane.

Today they grow just over 150 hectares of cane on country that had mostly been devoted to corn for silage for the dairy. They still are one of the major dairying businesses on the Tableland, milking 300 cows that supply milk for both the main factory in Malanda as well as their own on-farm manufacturing, which is complemented by their tourism business and café called Gallo Dairyland. Through their own factory, they have a strong focus on specialty chocolates and cheeses.

Johnny Gallo runs the business with his wife Linda and parents Frank and Ann, and he said they were attracted to the cane industry to help with tough times in the dairy industry.

“As a farmer, we wanted to grow something where you have a product that someone wants. Horticulture can be risky like that, and we saw MSF Sugar as very supportive of us coming into the industry,” he said.

“We also wanted something low risk, and that could fit in with the intense activity that is already happening on the farm with the dairying and tourism.”

Five years later, Johnny said he was still working to be a better sugarcane grower.

“With the farm here, there are other things that demand my attention even when I’ve set aside time for the cane, so I know there’s room to continue to improve our yields and efficiency,” he said.

One of the steps he is taking has been to get involved in Project Uplift, which is run by MSF Sugar and is designed to help growers adopt improved farming system practices.

He has shifted about 36 hectares to 1.8 metre rows so far, and will also be introducing a legume fallow as more of his country heads towards the end of its first crop cycle.

“We had grown a bit of cane in 2005, and we actually started with 1.8 metres then, and saw that the haulout bins were up out of the row because the elevator on the harvester wasn’t long enough,” he explained. “So in 2012 we started with 1.65m, but now as we switch back we can see that controlled traffic and wider rows is working with the harvester and the haulouts. The harvester has since been fitted with a flipper roller which enables the haulout bins to remain in the traffic zone.

“I’ve seen the information on compaction supplied by the MSF agronomy team, and it makes sense. I’ll be continuing with moving to controlled traffic as long as I don’t have a yield loss.”

He will also be moving to zonal tillage, which is another of the principles being encouraged through Project Uplift.

Johnny said that he was still learning when it came to varieties, but that he was making better decisions through planting larger trial areas usually of just under 10 hectares and accessing variety information through SRA.

“I have SRA6® and SRA10® planted as tissue culture this year, so I’ll plant them out to start looking at them. To keep ahead, you have to do your homework at a reasonably commercial scale.

“This is especially the case here. We are colder and wetter than the coast and we get frosts. The Tableland itself has three to four different climates and soil changes, so I like to see how things perform on my place.”

He welcomed the commitment from MSF Sugar in helping with practice change and water quality, especially through Project Uplift.

Even though the Gallo family are ‘inland’ cane growers, because their farm is in the Barron River catchment, flowing down to the Great Barrier Reef lagoon, they are an important part of the picture in terms of improving water quality outcomes through Project Uplift.

“MSF have committed funds and people to help motivate farmers to join the program. Without that, I wouldn’t have known about it.

“They are also innovative in their own business, at the mill, and on the farms as they step out of the old farming system, so they’re leading by example.

“The sugar price is out of our hands, but we can all work together to be as efficient as we can.”

(Over page top) Johnny Gallo checking over the crop earlier this year. (Over page bottom) Noel Wright (MSF Sugar), Johnny Gallo, and Nigel Young (MSF Sugar). Atherton Tableland farmers who are in catchments that flow to the east are an important part of the water quality outcomes being achieved through Project Uplift. Farms where drainage water does run to the Great Barrier Reef catchment are eligible for other initiatives through MSF Sugar.

Project Uplift is supported by the Australian Government Reef Trust program.
## TOTAL RESEARCH AND DEVELOPMENT INVESTMENT

### Key Focus Area 1 (Optimally-adapted varieties, plant breeding and release)

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

### Key Focus Area 2 (Soil health, nutrient management and environmental sustainability)

<table>
<thead>
<tr>
<th>Project Title</th>
<th>Project Number</th>
<th>R&amp;D Provider(s)</th>
<th>Chief Investigator</th>
<th>End Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>More profit from nitrogen: enhancing the nutrient use efficiency of intensive cropping and pasture systems</td>
<td>2015/907</td>
<td>CRDC</td>
<td>Multiple</td>
<td>30/06/2020</td>
</tr>
<tr>
<td>SIX EASY STEPS - continuing perspectives in time and space</td>
<td>2017/004</td>
<td>USQ</td>
<td>Bernard Schroeder</td>
<td>01/02/2022</td>
</tr>
<tr>
<td>Measuring soil health, setting benchmarks and driving practice change in the sugar industry</td>
<td>2017/005</td>
<td>SRA</td>
<td>Danielle Skocaj</td>
<td>01/08/2022</td>
</tr>
<tr>
<td>Unravelling the impact of climate and harvest time on nitrogen fertiliser requirements</td>
<td>2017/009</td>
<td>SRA</td>
<td>Danielle Skocaj</td>
<td>04/03/2022</td>
</tr>
<tr>
<td>Seeing is believing: managing soil variability, improving crop yield and minimising off-site impacts in sugarcane using digital soil mapping</td>
<td>2017/014</td>
<td>UNSW</td>
<td>John Triantafilis</td>
<td>01/10/2020</td>
</tr>
<tr>
<td>Implementation of root system diagnostics to deliver a field-based measure for root health</td>
<td>2018/003</td>
<td>CSIRO</td>
<td>Anne Rae</td>
<td>01/08/2021</td>
</tr>
<tr>
<td>Greenhouse gas emissions from sugarcane soils: strategies for increasing NUE and reducing environmental pollution</td>
<td>2018/007</td>
<td>QUT</td>
<td>Peter Grace</td>
<td>30/06/2021</td>
</tr>
</tbody>
</table>
## Key Focus Area 1 (Soil Health, Nutrient Management and Environmental Sustainability - continued)

<table>
<thead>
<tr>
<th>PROJECT TITLE</th>
<th>PROJECT NUMBER</th>
<th>R&amp;D PROVIDER(S)</th>
<th>CHIEF INVESTIGATOR</th>
<th>END DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Establishing sugarcane farming systems to improve soil health</td>
<td>2018/008</td>
<td>SRA</td>
<td>Barry Salter</td>
<td>01/03/2023</td>
</tr>
<tr>
<td>Development of commercial molecular biological assays for improved sugarcane soil health and productivity</td>
<td>2018/009</td>
<td>SRA</td>
<td>Rob Magarey</td>
<td>01/06/2020</td>
</tr>
<tr>
<td>SIX EASY STEPS Tool Box development for refined on farm nutrient management</td>
<td>2018/013</td>
<td>SRA</td>
<td>Barry Salter</td>
<td>01/02/2020</td>
</tr>
<tr>
<td>Complete nutrient management planning for cane farming (Funding provider: Queensland Government DES)</td>
<td>2016/804/ RP161</td>
<td>SRA/Farmacist</td>
<td>Jayson Dowie</td>
<td>30/12/2020</td>
</tr>
<tr>
<td>Improved water quality outcomes from on-farm nitrogen management (Funding provider: University of Queensland)</td>
<td>2016/805/ UQ_NESP</td>
<td>SRA</td>
<td>Danielle Skocaj</td>
<td>10/12/2020</td>
</tr>
<tr>
<td>Cane farmer trials of enhanced efficiency fertiliser in the catchments of the Great Barrier Reef (Funding Provider: Commonwealth Department of Environment and Energy and Queensland Government Great Barrier Reef Innovation Fund (Reef Trust 4))</td>
<td>2016/807 CANEGROWERS / SRA</td>
<td>Barry Salter</td>
<td>31/12/2021</td>
<td></td>
</tr>
</tbody>
</table>

## Key Focus Area 2 (Pest, Disease and Weed Management)

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

## Key Focus Area 3 (Farming Systems and Harvesting)

<table>
<thead>
<tr>
<th>PROJECT TITLE</th>
<th>PROJECT NUMBER</th>
<th>R&amp;D PROVIDER(S)</th>
<th>CHIEF INVESTIGATOR</th>
<th>END DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A non-pneumatic cane cleaning system with no cane loss.</td>
<td>2014/035</td>
<td>QUT</td>
<td>Floren Plaza</td>
<td>01/06/2019</td>
</tr>
<tr>
<td>Increased Harvest Recovery: Reducing sugar loss and stool damage</td>
<td>2014/048</td>
<td>SRA</td>
<td>-</td>
<td>01/09/2019</td>
</tr>
<tr>
<td>Assessment of new management strategies for marginal soils</td>
<td>2015/007</td>
<td>SRA</td>
<td>Barry Salter</td>
<td>31/12/2019</td>
</tr>
<tr>
<td>Sugar from space: improved data access, yield forecasting and targeted nitrogen application for the Australian Sugar industry</td>
<td>2016/062</td>
<td>UNE</td>
<td>Andrew Robson</td>
<td>01/01/2020</td>
</tr>
<tr>
<td>Understanding interactions between basecutters and other forward-feed components with the cane stalk, and determining practical strategies to minimise damage as harvester speed increases</td>
<td>2016/952 Norris ECT</td>
<td>Chris Norris, Phil Hobson</td>
<td>01/05/2020</td>
<td></td>
</tr>
</tbody>
</table>
### Key Focus Area 4 (Farming systems and harvesting - continued)

<table>
<thead>
<tr>
<th>PROJECT TITLE</th>
<th>PROJECT NUMBER</th>
<th>R&amp;D PROVIDER(S)</th>
<th>CHIEF INVESTIGATOR</th>
<th>END DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial scale economic evaluation of post-harvest cane cleaning to maximise the returns to the supply chain</td>
<td>2016/953</td>
<td>QDAF</td>
<td>Stephen Ginns</td>
<td>01/05/2019</td>
</tr>
<tr>
<td>Adoption of practices to mitigate harvest losses</td>
<td>2016/955</td>
<td>SRA</td>
<td>Phil Patane</td>
<td>01/04/2019</td>
</tr>
<tr>
<td>Southern Sugar Solutions</td>
<td>2017/012</td>
<td>DAFQ</td>
<td>Neil Halpin</td>
<td>01/01/2021</td>
</tr>
<tr>
<td>Improved irrigation system selection and operation for increased sugarcane productivity and profitability</td>
<td>2018/011</td>
<td>USQ</td>
<td>Michael Scobie</td>
<td>01/04/2019</td>
</tr>
</tbody>
</table>

### Key Focus Area 5 (Milling efficiency and technology)

<table>
<thead>
<tr>
<th>PROJECT TITLE</th>
<th>PROJECT NUMBER</th>
<th>R&amp;D PROVIDER(S)</th>
<th>CHIEF INVESTIGATOR</th>
<th>END DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investigation into modifying pan boiling techniques to improve sugar quality</td>
<td>2015/013</td>
<td>QUT</td>
<td>David Moller</td>
<td>30/05/2019</td>
</tr>
<tr>
<td>Online analysis systems to measure the available nutrients in mill mud</td>
<td>2016/019</td>
<td>SRA</td>
<td>Steve Staunton</td>
<td>01/06/2020</td>
</tr>
<tr>
<td>Reducing boiler maintenance costs and deferring capital expenditure through improved technology</td>
<td>2016/020</td>
<td>QUT</td>
<td>Floren Plaza</td>
<td>01/06/2021</td>
</tr>
<tr>
<td>Evaporator Liquor Brix Sensor</td>
<td>2017/003</td>
<td>Wilmars</td>
<td>Robert Stobie</td>
<td>01/01/2019</td>
</tr>
<tr>
<td>Managing aspects of raw sugar quality in the Australian sugar industry Part II</td>
<td>2017/006</td>
<td>Griffith University</td>
<td>Chris Davis</td>
<td>01/11/2019</td>
</tr>
<tr>
<td>Investigations to mitigate the effects of juice degradation in factory evaporators on sugar recovery and quality, corrosion and effluent organic loading</td>
<td>2017/007</td>
<td>QUT</td>
<td>Darryn Rackemann</td>
<td>01/03/2022</td>
</tr>
<tr>
<td>Pan design and operational changes to suit Australian pan stages operating on low pressure vapour</td>
<td>2018/012</td>
<td>QUT</td>
<td>Ross Broadfoot</td>
<td>01/11/2021</td>
</tr>
<tr>
<td>Evaluation of the Neltec Colour Q for measuring the purity of magma from C centrifugals</td>
<td>2018/201</td>
<td>Isis Central Sugar Mill Company Ltd</td>
<td>David Pike</td>
<td>01/05/2019</td>
</tr>
<tr>
<td>Improving the impact of evaporator calandria noxious gas bleeding arrangements on evaporator rate and condensate quality at Racecourse Mill</td>
<td>2018/202</td>
<td>Mackay Sugar Limited</td>
<td>Brett Bampton</td>
<td>01/06/2019</td>
</tr>
<tr>
<td>Understanding the cause of high colour sugar - intrinsic cane colour, extraneous matter or factory practices?</td>
<td>2018/203</td>
<td>Wilmars</td>
<td>Robert Stobie</td>
<td>01/05/2019</td>
</tr>
<tr>
<td>Activated sludge plants – optimising operations and technology</td>
<td>2018/204</td>
<td>Wilmars</td>
<td>Robert Stobie</td>
<td>01/05/2019</td>
</tr>
</tbody>
</table>

### Key Focus Area 6 (Product diversification and value addition)

<table>
<thead>
<tr>
<th>PROJECT TITLE</th>
<th>PROJECT NUMBER</th>
<th>R&amp;D PROVIDER(S)</th>
<th>CHIEF INVESTIGATOR</th>
<th>END DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A profitable future for Australian agriculture: Biorefineries for higher-value animal feeds, chemicals and fuels</td>
<td>2015/902</td>
<td>QUT</td>
<td>Ian O’Hara</td>
<td>01/04/2019</td>
</tr>
<tr>
<td>Manipulation of carbon partitioning to enhance the value of sugarcane (ARC LINKAGE UQ collaboration with SRA contribution)</td>
<td>2016/801</td>
<td>UQ (SRA contribution)</td>
<td>Frikkie Botha</td>
<td>08/12/2018</td>
</tr>
<tr>
<td>Establishing a strategic roadmap for product diversification and value addition</td>
<td>2018/014</td>
<td>Lazudi</td>
<td>Eris O’Brien</td>
<td>01/04/2019</td>
</tr>
</tbody>
</table>

### Key Focus Area 7 (Knowledge and technology transfer and adoption)

<table>
<thead>
<tr>
<th>PROJECT TITLE</th>
<th>PROJECT NUMBER</th>
<th>R&amp;D PROVIDER(S)</th>
<th>CHIEF INVESTIGATOR</th>
<th>END DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A boiler simulator for improved operator training</td>
<td>2016/001</td>
<td>QUT</td>
<td>Anthony Mann</td>
<td>01/05/2019</td>
</tr>
<tr>
<td>Protecting our chemicals for the future through accelerated adoption of best management practice</td>
<td>2016/002</td>
<td>SRA</td>
<td>Belinda Billing</td>
<td>01/08/2019</td>
</tr>
<tr>
<td>Development of an Intelligent Tool to allow real time evaluation of harvesting practices as part of a framework for improved harvester payment systems</td>
<td>2016/951</td>
<td>Norris ECT</td>
<td>Stuart Norris, Rob Crossley</td>
<td>01/05/2019</td>
</tr>
<tr>
<td>Productivity improvements through energy innovation in the Australian sugar industry</td>
<td>2017/011</td>
<td>Ag Analytics</td>
<td>Jon Welsh</td>
<td>01/07/2020</td>
</tr>
<tr>
<td>Pathways to water quality improvements in the Myrtle Creek sub catchment</td>
<td>2017/810/ EHP17066</td>
<td>SRA</td>
<td>Phil Ross</td>
<td>17/05/2020</td>
</tr>
</tbody>
</table>

### Funding provider: Queensland Government Department of Environment and Science
<table>
<thead>
<tr>
<th>PROJECT TITLE</th>
<th>PROJECT NUMBER</th>
<th>R&amp;D PROVIDER(S)</th>
<th>CHIEF INVESTIGATOR</th>
<th>END DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>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</td>
<td>2014/102</td>
<td>UQ</td>
<td>Sijesh Natarajan, Shu Fukai</td>
<td>01/05/2018</td>
</tr>
<tr>
<td>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</td>
<td>2014/109</td>
<td>JCU</td>
<td>Justin Sexton</td>
<td>30/06/2019</td>
</tr>
<tr>
<td>Mesostigmatid mites as predators of nematodes in sugarcane soils: occurrence, ecology, food preferences and biocontrol potential</td>
<td>2015/103</td>
<td>University of Sunshine Coast</td>
<td>Matthew Manwaring</td>
<td>01/04/2019</td>
</tr>
<tr>
<td>Plant growth promoting Rhizobacteria for Australian sugarcane: Bridging the gap from simple systems to engineered microbiomes</td>
<td>2015/105</td>
<td>UQ</td>
<td>Selby Berg</td>
<td>01/07/2019</td>
</tr>
<tr>
<td>Combining controlled release and nitrification inhibitor properties to deliver improved fertilizer nitrogen use efficiency in high risk environments</td>
<td>2016/101</td>
<td>UQ</td>
<td>Chelsea Stroppiana</td>
<td>31/03/2020</td>
</tr>
<tr>
<td>Development and modelling of novel controlled release fertilisers for improved nutrient delivery efficiency</td>
<td>2016/102</td>
<td>UQ</td>
<td>Ian Levett</td>
<td>01/09/2020</td>
</tr>
<tr>
<td>Integrated standardised competency based training for Sugar Milling operations</td>
<td>2017/013</td>
<td>QUT</td>
<td>David Moller</td>
<td>01/01/2019</td>
</tr>
<tr>
<td>Re-evaluating the biology of the sugarcane root system: new knowledge allows for assessment of production impacts and implications for yield decline</td>
<td>2017/101</td>
<td>Southern Cross University</td>
<td>Anders Claassens</td>
<td>30/06/2020</td>
</tr>
<tr>
<td>Microwave sensors for sugarcane sugar analysis</td>
<td>2017/102</td>
<td>UQ</td>
<td>Scott Thomason</td>
<td>30/06/2020</td>
</tr>
<tr>
<td>New approaches to quantifying nitrogen fluxes in enhanced efficiency fertilisers in Australian sugarcane soils</td>
<td>2018/101</td>
<td>UQ</td>
<td>Aidan Chin</td>
<td>01/06/2022</td>
</tr>
<tr>
<td>Characterising nitrogen use efficiency in sugarcane</td>
<td>2018/102</td>
<td>UQ</td>
<td>Anoma Ranagalage</td>
<td>01/06/2022</td>
</tr>
<tr>
<td>Reducing basecutter cane loss and extending the wear life of basecutter blades through innovative hardfacing techniques</td>
<td>2018/401</td>
<td>UNISA</td>
<td>Christiane Schulz</td>
<td>01/08/2019</td>
</tr>
<tr>
<td>Developing a marker system to measure dosage of alleles for use as a selection tool in the sugarcane breeding program</td>
<td>2018/402</td>
<td>CSIRO</td>
<td>Meredith McNeil</td>
<td>01/12/2019</td>
</tr>
</tbody>
</table>