



Sugar Research  
Australia™

Our **quarterly magazine**  
bringing research to  
the field



# *CaneConnection*

*Winter 2016*

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## Welcome to the Winter 2016 edition of *CaneConnection*

*With the harvest upon us for another year, this edition has a strong focus on some of the holistic research, development and extension activities that SRA is investing in regarding reducing harvest losses.*

Harvest losses have been estimated by highly regarded researchers such as Chris Norris of Norris ECT as costing the Australian industry \$150 million per year. In response, the SRA Board has determined that reducing harvest losses is one of four priority Impact Areas for investment from SRA. As a result, SRA has taken a strategic approach to this investment and has prioritised a number of research projects related to reducing harvest losses. This edition provides more detail on a number of these new projects, and many of you will also have attended numerous SRA events related to harvest efficiency before the harvest.

This edition also takes a look at RD&E related to nitrogen research. We hear from a number of growers who have attended a SIX EASY STEPS™ workshop for the first time, as well as hear from leading researchers in this important area.

This June also marks 10 years since sugarcane smut was first discovered on the east coast. In this edition, we look at the progress that the industry has made in managing this disease, and in the same theme we also look at other important biosecurity research that is helping the industry to be prepared for other possible exotic incursions.

As always if you have any comments about this magazine please contact me on (07) 3331 3340 or [bpfeffer@sugarresearch.com.au](mailto:bpfeffer@sugarresearch.com.au).

**Brad Pfeffer**

*Executive Manager, Communications*

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Sunshine Sugar CEO Chris Connors.



## Project details

### Key Focus Area:

Farming systems and production management

### Project name

A non-pneumatic cane cleaning system with no cane loss

### Project number

2014/035

### Principal provider

QUT

### Project leader

Floren Plaza

# New cane cleaning options may reduce cane fires in NSW

*New research is hoping to provide innovative solutions that could greatly reduce the need for sugarcane burning in NSW, which is still commonly needed immediately before harvest in this region of the sugarcane industry.*

Currently, the high-yielding sugarcane crops in the NSW region are burnt because of their size, because of the two-year crop cycle, and because the soils and climate do not allow the sugarcane trash to break-down into the soil. Also, sending the trash to the mill can greatly reduce sugar quality.

But according to Sunshine Sugar CEO, Chris Connors, the industry is looking for proactive solutions for what to do with that sugarcane trash and reduce the need to burn.

"We don't want to burn, the growers don't want to burn and we know that the community does not want us to burn. But at the moment we have no choice," Mr Connors said.

The new research, being conducted by the Queensland University of Technology (QUT) and funded by Sugar Research Australia (SRA), is looking at ways that the whole crop could be brought to the mill. The research is looking at a new method of cleaning the cane by removing the trash and other impurities after harvest but before it enters the mill.

The project is being led by Floren Plaza at QUT and it builds upon a concept developed in a PhD study by Chris Henderson.

The PhD study involved a relatively small design, and this new project has an objective of scaling-up the technology.

Existing cane cleaning methods such as on the harvester have served the industry well, and are still required. However, financial pressure is resulting in harvesting operations where increased levels of extraneous matter and cane loss are the result.

The new research is looking at a method that uses less energy, has less cane loss, and can work in wet or dry conditions, and is working to scale up the concept previously developed at QUT.

Mr Connors said that this research was an important piece of a broader puzzle that needed to be solved. The next step would require a look at the logistics of moving cane around that had much more trash, as this was a lighter and less efficient load.

There was also the important step of harnessing the best value from the trash.

"Sunshine Sugar has a keen interest in that side of it, because we are still of the view that we want to take all of the crop in. There is this crop sitting out there where we are throwing so much away and only taking the stalk in the middle," Mr Connors said. "There is another 25% of material there that we can do something with."

SRA CEO Neil Fisher said that this research formed part of SRA's strategic plan, which focused on eight Key Focus Areas of research investment for the Australian sugarcane industry.

"This research has useful implications for both growers and millers. It has positive implications for the farming system and its efficiency, and also for product diversification and value-adding," Mr Fisher said.

**Above (right):** An investigation into a new cane-cleaning system could eventually lead to a reduced need for cane fires in some situations.



## Better data and tools to help inform best outcome for harvesting

*It is a complex numbers game as growers, harvesting operators, and millers work toward improving harvesting efficiency. SRA's Brad Pfeffer spoke to farmer and harvester operator Michael Brombal about meeting this challenge.*

Burdekin farmer and harvesting contractor, Michael Brombal (pictured above), approaches both of his businesses with a similar mindset.

Operating in partnership with his brother, Michael said that for both of the family businesses their focus was about looking at the capital invested in that asset and ensuring that it was providing a return.

With their 134 hectare sugarcane farm at Mona Park, this means that they have grown rotational mungbeans this year to try and best utilise the ground. "We are looking at the benefits of the beans for the soil, but it is not the sole reason why we are doing it. I think we need to get the most from our hectares," he said.

This is the same approach that the brothers have with their harvesting business, where they run a 107,000 tonne group of farms in the Delta.

"Whether it is land or a harvester, it is about having an asset and utilising it," he said. "All businesses are in business to make money."

While they cut for others, the Brombals use a contractor to have their own cane cut, allowing them a full perspective of the economic challenge that comes with achieving the right balance of cane quality and yield from harvest best practice (HBP) and managing the costs of the harvest operation.

Achieving the harvesting best outcome (HBO) and maximising everyone's profitability is an important objective in the industry.

He said the discussion of improving harvesting outcomes needed to start with an acknowledgement that all three parties – growers, harvester operators, and millers – all needed to make money

from the enterprise, which was also a key starting point for discussions around the industry's objective of reducing harvest losses.

"It is the holy grail of the sugar industry," he said. "We all want to cut as efficiently as we can, but it is a challenge for farmers to pay more for harvesting in the current economic market for sugar."

Mr Brombal said that there was always a challenge in determining a payment structure that rewarded all parties and also considered the economic challenges facing all businesses.

**Above:** Burdekin grower and harvesting contractor Mick Brombal says his objective as a contractor is to deliver the most efficient job that he could in relation to how much he is paid.

"I know for my contractor, knowing the financial situation of running a harvesting business, I would like to implement more HBO, but if I am to ask him to do it then it is going to cost me money," he said.

Finding the sweet spot of increased revenue from HBO and increasing harvesting costs is a challenge for much of the industry.

Sugar Research Australia has responded to industry requests for more research that could help provide sugarcane yield data in real-time, which is one tool that could help inform and improve HBO.

A new project has recently begun to complete a feasibility study on sensors for improved harvesting feedback.

The new, collaborative project is being led by Eloise Keeffe from SRA, and all investigators recognise the importance of changing the payment structure in driving positive practice change.

"However, there is currently no measurement mechanism available to facilitate a quality-based payment system," Ms Keeffe said.

"Real-time or rapid sensors in the harvesting environment will improve harvest quality across the board by allowing contractors to adjust harvester settings based on loss and quality indicators in real-time."

"It would also allow growers to monitor contractors' performance and adherence to HBO, allow mills to receive feed-forward information on the quality of incoming feedstock, and provide the data for a quality-based payment system."

The project is focussed around the completion of a feasibility study to identify the sensing opportunities that are likely to offer the most significant return to industry stakeholders.

The identified sensors will then be put forward as candidates for in-field testing in subsequent projects.

The feasibility study will rely on extensive industry involvement and consultation and the outcomes will be communicated to industry.

Mr Brombal said his objective as a contractor was to deliver the most efficient job that he could in relation to how much he is paid.

"We really need to stop looking at it as an 'us and them' issue, and let's all work together to keep the communication channels open. It is not going to be easy, and it may be a while off, but we need mills, farmers and contractors working together to see some change."

Harvester operators, millers, and growers have been invited to take part in a survey related to this project. For information contact Eloise Keeffe on (07) 3331 3351.

## *New tool to deliver informed harvest decisions*

Harvesting is a very large part of the total cost of production of sugarcane, and if not done well, the loss of value through the harvest and transport operation can exceed the 'visible' costs of harvesting.

SRA has recently invested in a new project to address this issue, as part of SRA's focus on reducing harvest losses as a priority impact area. The R&D provider of the project is Norris ECT, and the work is based around a program called SCHLOT.

SCHLOT, a program built by Norris ECT, allows growers, harvesting operators and millers to assess the cost of harvesting and where gains can be made to implement a payment scheme that increases the profitability of all three sectors, through finding the ideal compromise between harvesting costs and losses.

This type of tool promises to allow growers and contractors to achieve the Harvest Best Outcome under any conditions.



Picture courtesy: Jeff Cantamessa.

## Project details

### Key Focus Area:

Farming systems and production management

### Project name

Incorporation of Australian crop data and industry characteristics into a tool to facilitate informed harvest decision-making for the Australian industry

### Project number

2015/094

### Principal provider

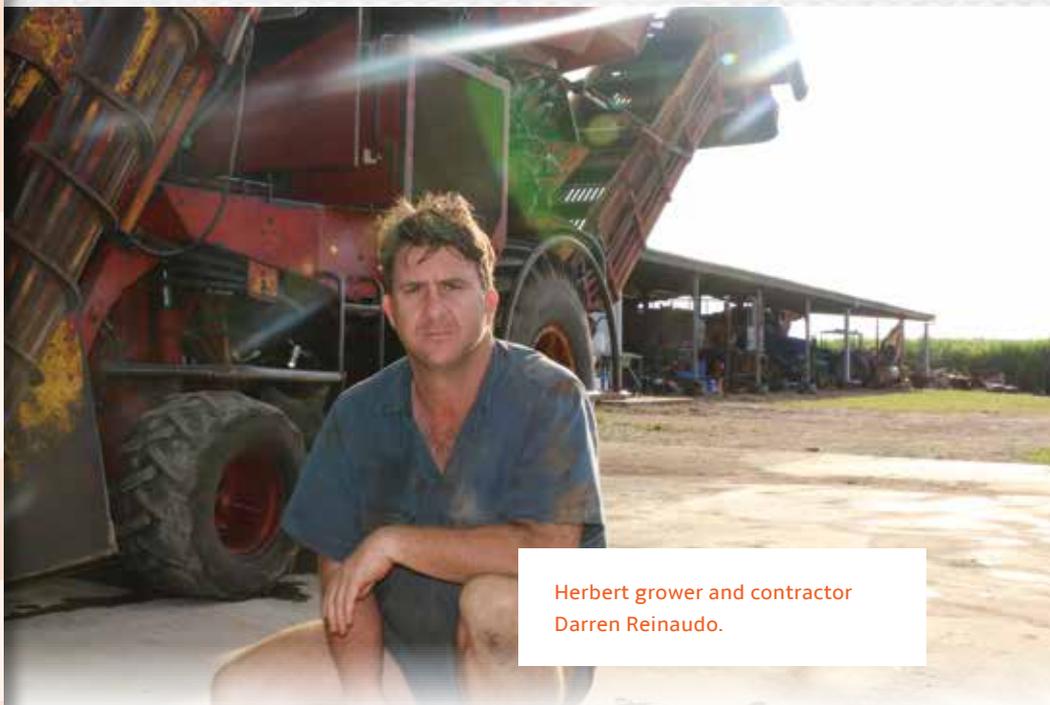
Norris ECT

### Project leader

Stuart Norris

### Project end date

September 2016



Herbert grower and contractor  
Darren Reinaudo.

# SCHLOT puts wealth of data at your fingertips

*Norris ECT has developed a new program that is aimed at giving the sugarcane value chain greater information about harvesting costs and practices. By Brad Pfeffer*

A new online tool is giving growers, harvester operators and millers access to new and detailed information to help inform discussions around optimising harvesting efficiency.

The new online tool is called SCHLOT, which is short for *sugarcane harvest loss optimisation tool*, and it can be accessed via the website [www.schlot.com.au](http://www.schlot.com.au).

Developed by Norris ECT, the tool brings together a vast array of information about harvesting practices and costs, and distils this down into a simple and readable tool for all three sectors of the industry.

Stuart Norris of Norris ECT said that the ultimate objective of collating the vast amount of data behind SCHLOT, and presenting it in a useful way, was not only to increase the size of the harvest pie, but also to more appropriately carve up that pie.

SCHLOT works through the harvesting, transport and milling processes, from cane in the field to sugar in the bin, and highlights the impact on the value chain (costs and revenue) of any change in harvesting practice.

"There are about 150 to 160 parameters that feed into the simulation, and then we look at what happens at the mill, and then we get the outputs," Mr Norris said.

"This (tool) is not about different sectors competing, but the industry as a whole. We know that maximising profit for one sector can often come at the expense of others, but with SCHLOT there is scope to have a conversation about how to best divide a bigger pie, and how to make sure the pie is as big as it can be."

The work is being assisted by SRA research investment, and workshops have been held across the industry in 2016 to raise awareness of the program.

Herbert grower and contract harvester Darren Reinaudo attended one of the workshops and welcomed the opportunity that would come with improved information via SCHLOT.

"We are always looking to improve on what we have, just like everyone else is," he said. "This is another guide for us to use. It is not the final gospel, but it is a guide to help inform decisions."

He operates a 90,000 tonne group and said that there would be a range of interest in SCHLOT across the group, although he also added that all parties want "to get the best product we can into the bin to make the most money".

"Most harvester drivers know the right thing to do, but there are outside factors that can make it hard to get to that level, be it the weather or a farm's layout, they all influence the result," Mr Reinaudo said.

“Farmers are also trying to do their best, and sometimes things are outside of their control.

“But having more information about a block lets us have a conversation about how we manage it.”

SRA Adoption Officer Phil Patane said that SCHLOT allowed an assessment of harvesting practices, and also a farmers’ particular block of cane.

“The problem is that the current payment system is broken. You may have one grower with long rows, easy to turn around on the headland and the weeds under control, and the next grower might have short rows. But the costs are the same per tonne,” he said.

“That’s where SCHLOT allows you to put the information in. At the end of the day, the operator is paid on a per tonne basis, and things like the machine turning around more often costs money.”

He added that SCHLOT was about collaboration. “It is key that all three sectors work together. SCHLOT allows people to assess different practices and scenarios, look at the dollar signs, and pay accordingly.”

Mr Reinaudo is also a close follower of other research into harvest losses. In this theme, he has recently shifted to EHS chopper drums.

These chopper drums have been the subject of current SRA research and have been shown to be one method of reducing chopper losses.

“This is the research that we pay for, and if the results are showing something consistently, whether it be on the harvester or with farming, it is important to do it,” Mr Reinaudo said.

“I start off talking to people like Phil, but I also then want to talk to owners and operators who have experience with it. That’s where we get our best understanding and make the decision. It really is about practical application of research.”

- [www.schlot.com.au](http://www.schlot.com.au)

### Screen shots of the new online tool, SCHLOT

Harvest speed	Cleaning rate	Elevator pour rate
		
<p>At harvesting speeds between about 4 and 6-8 km/hour the machine is moving fast enough for the gathering and feed systems to work well without excessive stool damage.</p> <p>Stool damage can occur at speeds both higher and lower than this optimum range in different crop configurations.</p>	<p>When the flow rate through the cleaning chamber is over about 90 tonnes/hour, the selectivity (ability to extract trash rather than cane) of the cleaning chamber drops rapidly, and the amount of cane extracted to the trash blanket increases significantly. It is important to appreciate that cane extracted by the cleaning system (especially at high rpm) is 'atomised' as it passes through the fan, and not visible in the trash blanket.</p>	<p>In green cane, elevator pour rates over about 150 tonnes/hour generally lead to boiling and spillage, and this increases losses.</p>

<b>Primary RPM</b> 750 rpm	<b>Estimated yield</b> 95	<b>Burned/Green</b> Green <input type="button" value="v"/>
<b>Harvest speed</b> 6 km/hr	<b>Crop lodged %</b> 50	<b>Field conditions</b> Average day hav
<b>Billet length</b> 100 % Max length	<b>Chopper</b> 6 Blade Chop <input type="button" value="v"/>	<b>Row spacing</b> 1.5 single <input type="button" value="v"/>
<b>Topping?</b> <input checked="" type="checkbox"/>		
<b>Generic high trash variety, Generic modern full sized harvester</b>		

<b>Yield delivered to mill</b>	<b>98 t/ha</b>
<b>Tonnes CCS lost / hectare</b>	<b>1.2</b>
<b>Fibre in Cane</b>	<b>18.6%</b>
<b>Extraneous matter (leafy) in cane</b>	<b>13.2%</b>
<b>Clean stalk lost through billeting</b>	<b>3.9</b>
<b>Clean stalk lost through cleaning</b>	<b>3.3</b>
Total crop yield as delivered to the mill, including clean stalk, tops and dry and green leaf.	

Ready to roll. The group travelled from Mossman to the Burdekin in April 2016.



## Next Gen farmers have a look over the fence

*Next Gen Farmers have recently investigated harvest losses and value chain improvements through a Sugar Industry Travel and Learning Award through SRA. By Gerard Puglisi, Next Gen Officer*

Our primary industries face unique challenges managing the impacts of physical, social, and economic change. How industry participants embrace new technologies will also continue to be of substantial importance. Next Generation leaders have a vital role to play in the future development and sustainability of the industry.

Through sharing their learning experiences as a group, Next Gen participants can better evaluate their leanings and more confidently adopt these into their own farming operations. Next Gen participants who are not the key decision makers of their farming operations can better present the case for trialling new concepts which may lead to practice change. The regular interaction of Next Gen participants within and between regions builds a reticulation of knowledge sharing and support. On the April 18 a group of 14 Next Generation participants from Mossman to Northern NSW left Mossman on a four-day trip to the Burdekin and back to Mossman.

The purpose of the trip was to provide next generation growers with greater knowledge and build their skills on minimising harvest losses, value chain improvements, farming systems, production management, how other regions work, and to build networks with other next generation people in other regions of the sugar industry.

*Next Gen and the participants would like to thank SRA, ACFA, and QSL for their support and the opportunity to attend this educational journey through the northern part of the Australian sugar industry.*

**The knowledge gained from this project will be used by the participants to help them with the adoption of new technology and research, and also with decision making to improve their farming businesses.**

**Some farming practice changes include:**

- Reviewing farm layouts for harvest.
- Explore commercial profitable alternative crops.
- Control traffic with the aid of a GPS to minimise compaction.
- Step Up, to gain Smart Cane accreditation.
- Take more soil samples and increase the focus on soil health.
- Optimise drainage on their farms.
- Use the QCANeselect™ tool in optimising varieties on their farms.
- Modification to harvesters to minimise losses through the chopper system.
- Uptake of new farming methods including GPS guidance.
- Reduced tillage.
- Electronic record keeping.
- Variable rate fertiliser boxes.
- Move to liquid fertilisers for planting and ratoon crops.
- Increased water efficiency and optimised timing of operations.

## Day 1

The group met in Mossman and travelled to Innisfail to meet with John Bletsas, Manager of Soils First, to demonstrate new products and methods to improve soil health and nutrient management.

After lunch the group travelled to MSF's Silkwood farm to meet with Robert Brooks, Harvest Manager North QLD to discussed harvesting methods, alternative row spacing and viewed modifications to a cane harvester. MSF are now farming most of their northern farms using controlled traffic on 2m centers with an 800mm wide row.

## Day 2

The group started in Townsville where we met with Carla Keith from QSL to receive an update of QSL activities and also to have a tour of the Townsville Bulk Sugar Terminal.

The group then travelled to Ayr to meet with Tiffany Hunt, Extension Agronomist from Burdekin Productivity Services (BPS) and Burdekin Next Gen Representative, to explain her role within the industry. The group was then shown the benefits of rice as an alternative crop which is now being grown commercially in the area.

The group then meet with Chris Hesp to view his alternative irrigation method and also had the opportunity to meet with SRA staff which were on Chris's farm conducting variety trials for new varieties to be released in the industry.

The group then had dinner with members of the Burdekin Next Gen group to discuss industry related issues and they also received a demonstration of the new Soil Info System soil analysis from Bryan Granshaw. The new system looks at the subsurface with the aim to grow a better crop.

## Day 3

The group travelled to Ingham to meet with Phil Patane from SRA, where the group learned about recent updates to the SRA Harvesting Best Practice manual and a report on minimising harvester losses within the industry.

After lunch the group received a presentation from Manager of Herbert Cane Productivity Services (HCPSSL), Lawrence Di Bella, to discuss environmental issues in the Herbert area and, more specifically, run-off related issues. After the presentation from Lawrence we had the opportunity to meet with other young sugarcane farmers from the district to share their experience of growing sugarcane in the Herbert.

## Day 4

The group travelled to Tully for a meeting with Greg Shannon from Tully Sugar and Jordan Villaruz from Tully Cane Productivity Services to explain their roles within the industry.

The most important knowledge gained by this project has been a greater understanding of the issues facing the whole agricultural sector. It contributed to increasing our communication skills as well as our ability to interact with others.

Through these skills, participants will be able to pass on information more effectively in their local networks. It is also important to keep young growers coming into the industry and the best way to do this is through maintaining networks of communication.

One of the participants said: "I will be using the information I gained on the Next Gen Bus trip to have a more positive outlook and I now also have the confidence to take on some of the challenges facing our industry because I learnt that all of agriculture faces similar problems and they are all possible to overcome."



### Clockwise from top left:

Gearing up to visit the bulk sugar terminal.

The Next Gen group discussed harvest best practice on the recent bus tour.

Touring the bulk sugar terminal with QSL.



Ashley Petersen in a crop of the soybeans that he grows in rotation with sugarcane on his Hervey Bay property to reduce nitrogen fertiliser inputs.

## Soybeans deliver win-win for profitability and the environment

*Farmers are using a sophisticated mix of new agronomy and farm practices that are improving the agricultural economy and providing an answer to the environmental risk of nitrogen fertiliser escaping into the atmosphere.*

For more than 20 years, north Queensland sugarcane farmer Simon Mattsson has seen the benefits that the soybeans he grows in-fallow between sugarcane plantings have brought to his paddocks.

As a natural nitrogen-fixing legume, soybeans provide a low-cost, alternative nitrogen supply for the following sugarcane crop, reducing and sometimes even eliminating the need for expensive nitrogen fertiliser inputs (legumes, such as soybeans and pulse crops take nitrogen from the atmosphere and fix it in the soil).

Any reduction in the use of manufactured nitrogen fertilisers also decreases environmental impacts, in particular nitrogen-rich water run-off into surrounding catchments and emissions of nitrous oxide (N<sub>2</sub>O), a greenhouse gas about 300 times more potent than carbon dioxide.

During the past few years, however, Mr Mattsson has taken his nitrogen-efficient practice a step further by intercropping soybeans and sunflowers with his sugarcane crop in a bid to further improve soil biology and the overall health of his farmland.

The Marian-based farmer says nitrogen use efficiency (NUE) is a hot topic for sugarcane farmers because their proximity to the Great Barrier Reef requires them to take care with nutrient use.

“And for me, it revolves around soil biology. If we have an ‘alive’ soil we can better fix nitrogen naturally from the atmosphere.”

His ‘whole farm’ approach to soil biology is echoed by fellow sugarcane farmer Ashley Petersen, who farms 600 hectares of sugarcane, 50ha of pineapples and runs cattle on 1000ha at Hervey Bay in south-east Queensland.

Like Mr Mattsson, Mr Petersen’s approach to soil health includes a legume rotation, controlled-traffic farming (restricting machinery to set wheel tracks to help avoid soil compaction on the rest of his land) and no-till practices.

It is a system that has reduced fertiliser use and tractor hours, allowing for the planting of other crops, and an increase in NUE and crop yield.

For this fifth-generation farmer, the journey towards more efficient nitrogen input use began about 20 years ago. Soybeans were chosen when a break crop was needed to deal with ratoon stunting disease.

That decision saw the Petersen family rethink other on-farm practices and over the next decade, they converted to controlled-traffic farming, followed by no-till practices.

“For 10 years, we have direct drilled the sugarcane into soybean residue,” Mr Petersen says. “It’s a big waste to plough it because the soybean residue on top is so beneficial to the soil. It also saves us about \$200/ha in paddock preparation costs.”

The continual goal to improve soil biology now also includes more crop diversity – with mungbeans and pineapples part of their sugarcane rotation. Mr Petersen also adds about 50 tonnes/ha of mill mud to his soils.

This has allowed him to reduce his nitrogen fertiliser applications by about 100 kilograms/ha.

“We used to put down 140kg/ha on the plant cane (the first crop after a soybean fallow). Now it’s a total of 40kg/ha in a split application. A liquid application of 10kg/ha is put down at planting and is topped up in the season with fertiliser granules,” Mr Petersen says.

“Crop yield has also increased due to this whole package of farm management practices.”

Mr Mattsson says growing soybeans has also reduced his overall urea requirements from 150kg/ha to 80 to 120kg/ha. “And on the plant cane crop, we use no urea at all. We rely on the soybeans to provide the nitrogen.”

In work funded by the National Agricultural Nitrous Oxide Research Program (NANORP), researcher Dr Weijin Wang tested the approach now practiced by these sugarcane farmers.

The goal, says the Queensland Department of Science, Information Technology and Innovation (DSITI) principal scientist, was to assess the influence of in-fallow soybean rotations and subsequent residue management practices on N<sub>2</sub>O emissions, productivity and crop nitrogen uptake.

In an experiment at Bundaberg, Queensland, a soybean crop was harvested and then different residue management options – including tillage, no tillage, using a nitrification inhibitor spray before tillage, and sowing a cereal (triticale) – with varying fertiliser regimes were tested.

The research echoed what farmers have found: in-fallow soybean rotations can reduce the need for applied nitrogen fertiliser.

Dr Wang found nitrogen fertiliser applications could be reduced by 120kg of nitrogen (N)/ha. He also found that N<sub>2</sub>O emissions dropped by 55 percent, compared with tests where conventional fertiliser was applied to bare fallow.

The research is important given those nitrogen losses from leaching deep in the soil, lateral run-off and denitrification (where nitrate is converted into gas) remain problematic.

According to Dr Wang, between 40 and 60 percent of applied nitrogen is lost from the system, with N<sub>2</sub>O a good indicator of much larger gaseous losses of dinitrogen from denitrification.

Dr Wang’s research found that growing soybeans in fallow also had other benefits in terms of improved soil biology and NUE.

For example, mineralisation of the organic nitrogen in soybean crop residues was generally much slower than the rate at which nitrogen is released from fertiliser, such as urea.

Dr Wang says this is significant. “This slow-release should increase the opportunity for plant uptake of the mineralised nitrogen and minimise the accumulation of large amounts of mineral nitrogen in the soil, particularly in the wet season when denitrification can be prolific.”

N<sub>2</sub>O emissions following a soybean rotation were further reduced by adopting no-till, growing a nitrogen catch-crop, such as triticale, following soybean harvest and spraying soybean residues with the nitrification inhibitor 3,4-dimethylpyrazole phosphate (DMPP) before tillage.

Although the different fallow, fertiliser and soybean residue management practices did not significantly affect sugarcane productivity, Dr Wang says profit from the additional soybean was \$400 to \$590/ha compared with a bare fallow regime.

Mr Mattsson is also testing a nitrogen catch-crop, daikon radish, as part of a multi-species trial with the University of Queensland.

Now in its third year, the trial is looking at intercropping raddish, turnip, chickpeas, soybean, vetch, sunflower, oats and cereal rye with sugarcane. And last year, using controlled-traffic farming on two-metre centres, he planted and harvested sunflowers among his sugarcane rows. The sunflowers were harvested over the top of the growing sugarcane.

Although the alternative crops provide another income stream, Mr Mattsson says the intercropping is primarily about improving soil health and more efficient use of nitrogen inputs, leading to increased profitability and better outcomes for the Great Barrier Reef and the wider environment.

#### For more information

Simon Mattsson on 0417 862 979  
or email [mattsson@mcs.net.au](mailto:mattsson@mcs.net.au)

Ashley Petersen on 0418 787 032  
or email [ashlone@bigpond.com](mailto:ashlone@bigpond.com)

Dr Weijin Wang (Queensland DSITI)  
on 07 3170 5768 or email  
[weijin.wang@dsiti.qld.gov.au](mailto:weijin.wang@dsiti.qld.gov.au)

*\* Dr Weijin Wang’s work was completed as part of NANORP, which is funded by the Grains Research and Development Corporation, through the Australian Department of Agriculture and Water Resources.*

# Growers continue interest in SIX EASY STEPS™

*SIX EASY STEPS™ is a science-based nutrient management tool that enables the adoption of best practice nutrient management on-farm. It is acknowledged as industry best-practice of nutrient management to optimise productivity and profitability without adversely influencing soil fertility or causing off-farm effects.*

SRA continues to hold SIX EASY STEPS™ introductory and refresher workshops across the Wet Tropics from Mossman to Ingham. Workshops are also occurring in other regions across the industry. The workshops have largely been run by SRA Adoption Officer, David Calcino, and retired agronomist Alan Hurney. David and Alan have held 66 workshops involving 726 growers and 101 other attendees, with 79 percent of the cane area of the wet tropics represented at a workshop.

In addition, since March 2015, half-day refresher nutrient management workshops have been held in the wet tropics. This includes 12 workshops with 130 growers and 24 other attendees.

There has also been 14 other full workshops throughout the industry including NSW. Government advisers and milling staff have been provided with workshops specifically for them.

Terrain NRM has, and continues to, fund many of the workshops in an effort to achieve on-farm practice change to reduce nutrient losses and improve water quality.

SIX EASY STEPS™ focuses on maximising productivity and reducing nutrient losses. Therefore, the productivity benefit coming from the SIX EASY STEPS™ program is totally compatible with the good environmental outcomes growers and the community seek.

Below is what some of the growers and attendees had to say at a recent workshop in 2016 at Mourilyan.

Mr Hurney said the workshops were aimed at giving growers training so they could best utilise the SIX EASY STEPS™ guidelines and adopt them on their property.

"It is about productivity and keeping growers viable," he said.

*Read what the participants had to say below:*

“

I came to the workshop to learn if there are any procedures that we can improve on. It is important that we keep our efficiency as high as we can. Your soil is your biggest asset, so it is important that we preserve our soil health. I want to be able to maximise yield and maximise efficiency, to try and stay competitive.

**Daniel Borg,  
Cowley**

”

“

I came to do the SIX EASY STEPS™ workshop to see whether there are ways to improve what we are doing, and to see if we can save a few costs along the way as well as grow the crop that we have to.

You have to grow the best crop you can. In the area that we are in, the rainfall at times can give you not the yield that you would like and you have to ride the rollercoaster with the weather with the good and the bad. Hopefully in the end there is more good than bad. SIX EASY STEPS™ is hopefully giving you what you need to grow a crop, without any extra cost.

**Steve Bonso, Mirriwinni**

”

“

I have recently bought a farm and I came here today to try and learn how to maximise the nutrients I am putting into the ground and how to minimise the loss of what I am putting in. I want to be able to benefit my financial future and also to grow the best crop that I can. I had heard about the SIX EASY STEPS™ program and what could be required, so coming today allowed me to learn those key points, so that I can start off on the right foot going into the business and into farming.

**Damien Wurth, Garradunga**

”

“

I bought my property in 2012. I am here today as I am trying to learn as much about farming as I can, and soil nutrition seems to be one of the most important aspects of it. I didn't know much about SIX EASY STEPS™, which was the reason I came along, to learn about it.

**Bob Moore,  
Mena Creek**

”



Professor Bernard Schroeder and David Calcino.



SRA technician Matt Tinai in the field with Professor Bernard Schroeder, USQ, and SRA Adoption Officer, David Calcino.

## Research continues to inform nitrogen use efficiency

*Sugar Research Australia plays a pivotal role investing in and researching activities related to nitrogen use. One of these current investments through the University of Southern Queensland is providing information to ensure the SIX EASY STEPS™ guidelines continue to evolve based on sound scientific evidence.*

With scientific information continuing to improve our understanding of sugarcane's nutrient use and requirements, a research project being led by the University of Southern Queensland is playing an important role in ensuring that the industry's nitrogen management guidelines are current.

The project is a collaboration between USQ and SRA, with input from other industry stakeholders through a project consultative group. The project involves multiple trials in the field throughout the industry, as well as laboratory investigations and glasshouse work.

The project is specifically aimed at boosting nitrogen use efficiency (NUE) in sugarcane production. It has two main parts to its investigation.

The first is looking at the environment where fertiliser is applied, studying factors such as soil type and soil variability, and the need to be more precise in recognising the significant impact of soil types (the spatial environment) on nitrogen (N) availability and uptake.

The second is looking at enhanced efficiency fertilisers, and in particular how they release nitrogen over time in relation to the crop's needs (the temporal environment), and how this compares with the N availability and uptake patterns of N from standard urea fertiliser.

Professor Bernard Schroeder is the lead investigator of the project and said that the objective was to ensure that the industry had the best information to match the supply of nitrogen fertiliser with the uptake in the crop.

"We are answering the question: is there evidence to suggest that we can change our guidelines to further meet the spatial and temporal needs of the crop," he said. "As the SIX EASY STEPS™ is a process that promotes profitable cane production in combination with environmental responsibility, we need to base any further development of the system on sound science.

"Part of the project is annually looking at the evidence available from ourselves and the research from others, to assess this information and incorporate new results into SIX EASY STEPS™, where appropriate."

"The SIX EASY STEPS™ nutrient management guidelines need to suit the needs of growers. It's a foundation to remain productive, remain profitable on their farms, and for the industry to remain viable.

"We also need to ensure that we recognise and take consideration of the bigger environmental picture. Sustainability means a combination of all of the above," he said.

"Our objective is to optimise cane production all the time. We don't want to under-apply N because that will lead to yield losses. We also do not want to over-apply N because that may create a risk to the environment and it can also affect on-farm economic prosperity."

The research being conducted by USQ forms part of a much bigger picture of nutrient research that is being funded through SRA in collaboration with the Queensland Government.

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



Bryan Granshaw with the soil testing rig.

## Soil science delivers productivity gains for farmers

*Local farmers and researchers are using new soil health tactics to help stop the loss of nitrogen into the atmosphere as a potent greenhouse gas.*

From the back of a HiLux ute Bryan Granshaw drives a mechanical probe into the ground to test, among other things, the soil's water and nutrient-holding capacity.

The job can be difficult and the ute needs to be anchored so it does not tip as the probe pushes to get past the usual 400-millimetre stopping point to reach deeper into the soil.

Mr Granshaw, until recently a fourth-generation sugarcane farmer at Dalbeg, says a soil's water-holding capacity is closely linked to its health and its ability to use nutrients, including nitrogen.

"Sugarcane roots should be able to grow to a depth of 1.6 metres. But common practice in the Burdekin region, where I'm now based, sees sugarcane roots grow to just 400 millimetres. The soil's inability to let the roots travel down any further is just one aspect of soil health and biology, but it can have a domino effect."

Using probes to test the soil is a new job for Mr Granshaw, in his new role as a soil specialist for Trimble's Soil Information System.

As with many of the other sugarcane farms in the Dalbeg district, Mr Granshaw's farm was sold to Tropical Forestry Services to become an Indian sandalwood plantation.

Although sad to move on, the principles practiced each day on his farm are helping Mr Granshaw in his new advisory role.

"Finding out everything you can about the soil is the best way to improve what is already there," he says.

"On the farm, we spent the past 20 years investing in our soils. We wanted to do a better job with what we had, which led to productivity and profitability gains."

One of the first things he and his father John and brother Terry examined was their soil's water-holding capacity.

"Irrigation was our second biggest cost," he says. "We wanted to control what our outgoings were because we couldn't control what we were paid for our sugarcane. So our initial motivation was to make sure our farming system could deliver a profit by using less inputs."

Mr Granshaw says many farmers see a paddock not performing and therefore increase their use of nitrogen and phosphorus inputs. "We wanted to understand what was happening first."

The process led to controlled-traffic farming, in which machinery keeps to set wheel tracks to avoid soil compaction on the rest of the property, and no-till farming.

"About 90 percent of our soil was compacted and we were able to reduce that by half using controlled-traffic farming."

With other on-farm improvements, such as legume rotations, intercropping and split fertiliser applications, the Granshaws saw productivity increase to six percent above the district average and inputs drop to 30 percent less than the district average.

The positive results from these on-farm changes are echoed by the National Agricultural Nitrous Oxide Research Program (NANORP), which is looking at ways to increase nitrogen use efficiency on farms to improve the agricultural economy and reduce environmentally damaging nitrous oxide ( $N_2O$ ) emissions.

The program found that management options farmers can use to improve nitrogen use efficiency, reduce nitrogen losses and minimise  $N_2O$  emissions include better matching fertiliser applications with a crop's actual nutrient needs, and growing a legume crop during the fallow period to reduce the need for nitrogen fertilisers in the next crop (the roots of legumes fix nitrogen into the soil).

Using enhanced efficiency fertilisers, such as nitrification inhibitors, can also reduce  $N_2O$  emissions by about 60 percent.

Although the NANORP work covers a range of agricultural industries, it is particularly important to the sugarcane industry where up to one kilogram of nitrogen per hectare per day can be lost to the atmosphere as  $N_2O$ , a greenhouse gas about 300 times more potent than carbon dioxide.

$N_2O$  is also an indicator of nitrogen use inefficiency and much larger losses of gaseous nitrogen ( $N_2$ ), which is difficult to measure but could be up to 50 times the amount of  $N_2O$  emitted.

One such research project that aims to reduce these emissions and improve on-farm productivity is being undertaken by Professor Scott Donne from the University of Newcastle.

The aim of his research is to develop a slow-release nitrogen fertiliser based on activated charcoal. The intent is for the activated charcoal to release the nitrogen needed for crop growth and at the same time lower greenhouse gas emissions as  $N_2O$  from the soil.

Preliminary studies have shown that 'best-bet' materials chosen for the work function effectively to lift crop yields and better use the nitrogen contained in the charcoal, suggesting that the slow-release fertiliser would reduce  $N_2O$  emissions.

For Mr Granshaw, any improvements to soil health and nitrogen use efficiency are important. "The soil is our greatest asset. With the technology available now we can understand how the soil is working and how we can help improve it."



**Left:** Drawing on experience as a Queensland sugarcane grower and soils specialist, Bryan Granshaw, aims to reduce applied nitrogen losses, and in turn, reduce greenhouse gas emissions of nitrous oxide.

**For more information:**

**Bryan Granshaw**

0419 508 692

[bgranshaw@bmslasersat.com.au](mailto:bgranshaw@bmslasersat.com.au)

**Professor Scott Donne**

University of Newcastle

02 4921 5477

[scott.donne@newcastle.edu.au](mailto:scott.donne@newcastle.edu.au)



Daryl Larsen in the crop where the trial is taking place.



Adam Royle of HCPSL chats with Herbert grower Daryl Larsen.

## Project NEMO delivers practical on-ground results for nutrient management

*Nutrient management is the focus of an Australian and Queensland Government funded program called Project NEMO, taking place in the Herbert and the Burdekin. By Brad Pfeffer*

Herbert cane grower Daryl Larsen is keen to get the most from every kilogram of fertiliser that is applied to his property.

With that in mind, Mr Larsen is participating in a demonstration trial being run by Herbert Cane Productivity Services Limited (HCPSL) that will look at new enhanced efficiency fertilisers (EEF) and their performance.

The demonstration, which is part of project NEMO (nitrogen efficiency management on-farm) will compare conventional urea applied at his SIX EASY STEPS™ rate to applications of eNtrench and Entec.

The small trial covers plots of just over half of one hectare for each treatment and is in MQ239<sup>®</sup>. It is on traditionally poorer soil that is prone to flooding.

"We want to use the same amount of fertiliser that we have been using, but see if the nitrogen can last longer and give us more tonnes at the end of the day," Mr Larsen said.

"I want to see if I can make up the difference in the cost of these new fertilisers and pick up some profit by using them.

"We have the trial in a lower block which usually would run water over it, and therefore we would hopefully notice more of a difference. Although this year it has been dry and at the moment (May) there is no visual difference.

"The block can yield okay in a dry year because it holds the moisture, but it is part of the farm that usually has less return from it as it would submerge under water a couple of times per year. This year that hasn't happened at all."

The real test will come when the harvester enters the paddock later this year, and Mr Larsen said he was keen to pursue the work for a couple of years to get a very clear picture.

"We have to keep trying new things and we have to keep being as efficient as possible. This trial is a way to assess that," Mr Larsen said

"And Entec and eNtrench are two products that we hear a lot of growers talk about their performance and impact on soil biology. We wanted to try and see the results for ourselves and sort out what is true and what is not."

Adam Royle manages Project NEMO for HCPSL in the Herbert and said that Mr Larsen's aim was about trying to grow more cane – and therefore being more efficient with his applied nitrogen.

“When it comes to efficiency, some growers are looking at efficiency in terms of reducing the fertiliser rate to grow the same cane, while Daryl is looking at the same rate to grow a bigger crop. Relative to the amount of cane produced, the nitrogen use is more efficient,” Mr Royle said.

“These products are not new, but there is an increasing interest from growers. Some see it as risk management. Some years they may not see much difference in yield, but when they get adverse conditions, it tends to take out the big dips in their yield.

“Often growers using these products want to improve productivity without increasing nitrogen use.”

SRA is currently funding a three-year research project being conducted by Kirsten Verburg from CSIRO on controlled-release fertilisers. The project is titled *Role of controlled release fertiliser in Australian sugarcane systems* and is to run until July 2017. Results from this research, which is separate to project NEMO and the work on Daryl’s farm, will be detailed in future editions of *CaneConnection*.

It builds on previous work on EEF conducted across the Australian sugarcane industry, along with other existing projects.

Mr Royle said the work through project NEMO, on Mr Larsen’s farm, was an example of the practical activity that formed part of Project NEMO. The project uses a mix of trials and demonstrations with a strong extension component that includes economic data related to any practice change.

“There has been a huge interest,” Mr Royle said. “In one region alone through initiatives such as Project NEMO growers have made a quantum leap from spreading conventional urea on the surface to applying a nitrogen use efficient product, subsurface. The essence of this project is about extension, and to be able to extend that information we need to demonstrate to growers in a rigorous way that these practices work.”

“The work at Daryl’s farm is just one example of this demonstration.”

Project NEMO is funded by the Queensland and Australian Governments.

**Below:** HCPSL continues to hold activities across the region to update growers on activities that are part of Project Nemo.





## Indonesian research project to help protect our sugarcane

*A collaboration between Australian and international sugarcane researchers is setting a foundation to help protect the Australian industry from an exotic sugarcane disease.*

SRA scientist, Dr Rob Magarey, is leading a new project to research an important Indonesian disease that could one day threaten Australian sugarcane crops. The disease is caused by *sugarcane streak mosaic virus* (SCSMV; pictured above) and was first found in Indonesia in 2005. The project, partially funded by the Australian Centre for International Agricultural research (ACIAR), involves scientists from Australia, Indonesia and France.

First recognised in the 1990s in south Asia, SCSMV rapidly infects cane crops, often leading to whole crops becoming diseased. It is now very common and widespread in SE Asia and South Asia (India, Pakistan).

"Much remains unknown about the disease, including how it spreads, where it occurs in Indonesia, the resistance of our commercial varieties, and the level of resistance needed to manage the disease," Dr Magarey said.

"We don't even know whether insects spread the disease."

"The disease is similar to wheat streak mosaic virus, which created significant havoc in Australian cereal crops when it entered Australia in the early 2000s."

The focus of the project is to develop successful management strategies, including assessing the resistance of the Australian industry's commercial varieties. SRA scientists recently visited Indonesia for the annual project review meeting. While there, they formed experimental plans for the coming year after a discussion on the results from the last 12 months research.

"The project continues the close cooperation between Australian and Indonesian scientists as we deal with the pests and disease threats of highest priority to the Australian sugarcane industry," Dr Magarey said.

"SRA is of the belief that we can't afford to wait for diseases to strike our industry before adequate preparations are made. Once the horse has bolted it is too late to shut the gate."

### *The objectives of this project on SCSMV are to:*

- Assess its importance in Indonesia and incidence in Java, Sumatra and Sulawesi
- Determine potential for disease escalation and conditions required to maintain a disease-free nursery (epidemiology)
- Assess economic importance in Indonesia
- Identify resistance of varieties by developing a rapid varietal-screening method
- Develop cheap, rapid detection methods
- Adoption of integrated disease-management strategies

**Australian sugarcane researchers have a strong collaborative history with Indonesia.**  
**Some of our recent and ongoing projects include:**



## Indonesia and Australia: A strong collaborative partnership

**Potential future collaboration:**  
Borer management

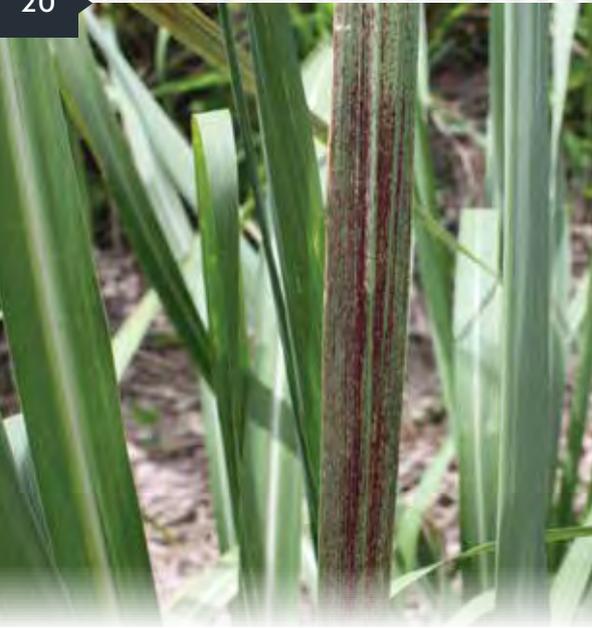
**Potential future collaboration:**  
Woolly aphids

**Potential future collaboration:**  
Diseases

**Objectives:** A project on borers would assess efficacy of biological-control programs and the level of field parasitism. It would evaluate systemic soil-applied insecticides for management of mothborer larvae, as well as refine foliar pesticide application including timing and application methodology. It would develop reliable pest-monitoring and pest-forecasting systems. It would also review varietal response of new and existing varieties to moth borers and develop capability through training postgraduate students from both Indonesia and Australia.

**Objectives:** A project on Woolly aphids, which are a vector for RSD, would have similar objectives to a project on borers.

**Objectives:** There are number of diseases that warrant future collaboration, including **Downy mildew** (PNG, fungal pathogen); **Leaf scorch** (Sumatra and Java, fungal pathogen); and **Xylaria root and basal stem rot** (Sumatra, a sleeper, very serious disease causing patches of dead stools but unlikely to spread rapidly except in soil or on stalk pieces). Also, **sembur** and **sereh** are two diseases of unknown aetiology that caused widespread losses in the early 1900s in Indonesia but have not been recorded for many decades.



## Project details

### Key Focus Area:

Pest, disease and weed management

### Project name

Securing Australia from PNG biosecurity threats

### Project number

2015/046

### Principal provider

SRA

### Project leader

Dr Rob Magarey

### Project end date

2017

# PNG: a long-term sugarcane research partner

*A research collaboration with Papua New Guinea is helping to put the Australian industry on the front foot and prepare for biosecurity risks. By Dr Rob Magarey, SRA, Tully*

Papua New Guinea is where the first sweet sugarcane was located (world-wide), and it was from PNG that this useful plant species was transferred around the world, including across paddocks across North Queensland.

In the early part of the 20<sup>th</sup> century, the common garden sugarcane variety 'Badila' was our most important commercial variety.

It came originally, not from a plant breeding program, but from a garden near Alotau (Milne Bay) in the late 1890s. Badila was first grown at Kamerunga, near Cairns, having traversed the short distance across the Torres Strait with Henry Tryon – a sugarcane collector.

Visiting the country is eye-opening as it is immediately obvious to the discerning eye that sugarcane is growing everywhere – including roadsides, creek banks, backyard gardens, and in grasslands. Commercial crops have now also been growing there for over 30 years; these crops are harvested and milled as in Australia. If you want to see sugarcane in all its forms, go to New Guinea!

It comes as no surprise therefore that many sugarcane pests and diseases are also located in PNG. With some Australian islands located within 3-4 kilometres of the PNG coastline, the Australian industry is very dependent on good quarantine strategies to keep these pests and diseases out of our country and our commercial crops.

SRA (and its predecessor organisations) have been working closely with the PNG industry to research the PNG pests and diseases of greatest concern to our industry. PNG scientists have been very cooperative and provided much needed assistance with the research required, so that we can understand more about how to keep these threats out and how to manage them should they arrive in Australia.

Australian researchers provided consultancy services to the PNG industry from the early 1980s to 2009 and we have conducted collaborative research with Ramu Sugar Limited (PNG) since 2000.

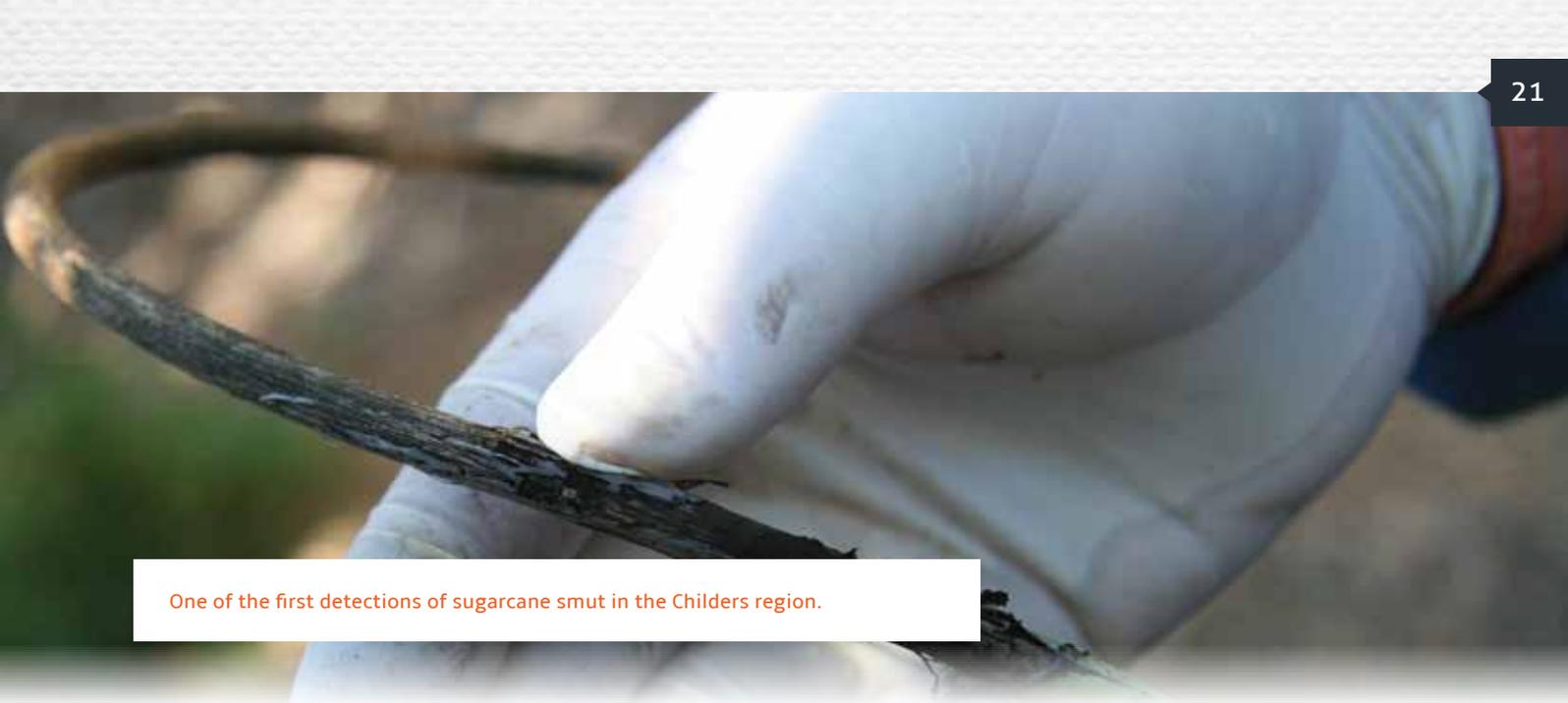
SRA has just started a new research project that is dealing with the important diseases downy mildew and Ramu stunt

– plus sugarcane moth borers (a major sugarcane pest group not present in Australia and of great concern for commercial cropping).

SRA scientist, Dr Rob Magarey is leading the project, which aims to gather important varietal resistance information for our major commercial varieties. Better diagnostic techniques for identifying the diseases and pests present in PNG is also a focus.

We hope the collaborative arrangement with the PNG industry, and scientists, will continue well into the future so that our industry remains secure in the midst of these important pest and disease threats located close-by. SRA acknowledges the funding contribution from the Queensland Department of Agriculture and Fisheries towards this research activity.

**Above (left):** Downy mildew is one aspect of a current collaboration with PNG researchers. **Above (right):** The collaboration is also looking at moth borers, which are a major pest of sugarcane globally but are not present in Australia.



One of the first detections of sugarcane smut in the Childers region.

## Anniversary marks 10 years of tackling the smut challenge

*This June is 10 years since sugarcane smut was first detected within the east coast cane industry. A decade on, we take a look back at that challenge and how the industry has handled this major disease incursion. By Brad Pfeffer*

Childers farmer Joe Russo remembers the day clearly. It was in June 2006 and sugarcane smut was something that seemed like a distant threat for most farmers. Smut was recorded for the first time in Australia in the Ord River region of Western Australia in 1998 and was present in crops of our Asian neighbours to the north, but never had it been seen in the major growing regions of Queensland or NSW.

Isis Productivity Services' Bruce Quinn had been conducting routine plant inspections for ratoon stunting disease at Joe's property and while doing that he noticed something suspicious.

Bruce immediately worked with the local BSES extension officer to send a photograph for a visual analysis by BSES (now SRA) pathologist Barry Croft, based at Woodford. Samples were then taken to Brisbane to confirm whether it was smut.

Joe, who was on the BSES Board at the time, was in Brisbane over that June long weekend and he was there in the lab while Mr Croft confirmed that the sample was indeed sugarcane smut.

Federal and State Biosecurity officials were immediately notified and the incursion management response was initiated.

A control centre was established in Brisbane, as well as a coordinated effort and response with the State Government, which made significant funding contributions to the response, along with the Commonwealth Government.

"Once it was confirmed that this infectious disease was present, everything went into very strict quarantine with a whole range of procedures and protocols started," Joe said.

"You couldn't walk around without a quarantine suit on. It was a week or so before the harvest and we couldn't move machinery and we were also told that cane had to be walked through for inspection before harvest, as well as all the focus on plough out of infected crops."

What followed was a full scale government and industry red alert in the hope that the disease could be eradicated and every effort was made to assess and stop its spread.

Meetings in places such as Childers and Bundaberg saw a packed house of growers keen to know more about this new disease that had struck the industry.

Mr Quinn said there was a lot of unease among growers in the region as they faced a delay to the start of the harvest by two weeks, and uncertainty about having to plough out blocks of cane.

"I am proud though of how our growers moved so quickly to resistant varieties, which meant we didn't see the losses we could have seen," he said.

"In some cases, people were ploughing out first ratoon crops, and there was a lot of heartbreak, but I feel we came out the other side of things pretty good."

The region had a heavy reliance on the susceptible variety Q205<sup>®</sup>, which meant there was a mammoth effort by BSES in sourcing resistant varieties from other milling regions on behalf of the industry.

BSES preparations for an incursion meant they knew exactly which varieties were resistant and could quickly make arrangements to source suitable seed cane for the southern growers.

Mr Russo says thanks to all that hard work, he feels that the real impact at Isis was mostly just in that first year, and after that the region recovered fairly well.

"There was a lot of angst at those early meetings with growers getting upset with some of the procedures. But I will never forget in one of these meetings there was one grower who stood up and said: 'I am glad it was found here, because this is a region that can work together to beat it'. That really lifted morale and that is what happened."

The initial hope that it could be contained evaporated as it was found in other parts of the southern region and, later that year, in the Mackay and Herbert regions. It was eventually found in all regions.

The focus then became strongly upon assisting the industry through a very challenging period and addressing serious risks to long term productivity and viability.

"Our emphasis at the time was that it was serious but also manageable, although in the heat of the moment it certainly took on a tone of gloom and disaster," Mr Croft said.

"Our emphasis quickly became focused on preparing the industry for the long-term by switching to resistant varieties and ensuring our plant breeding program continued to produce high yielding new varieties but now with smut resistance as an essential extra trait."

## Research

The preparations for the 2006 incursion began many years prior to detection on the east coast.

BSES researchers, many of whom continue their work at SRA today, identified the risk that smut posed to the industry and knew that early preparation could one day be a valuable insurance policy for the industry.

They knew that losses to infected crops could be severe, ranging from 30-100% in susceptible varieties.

And like with all insurance policies, they hoped that it would never actually be needed – but were glad that it was there when smut struck.

Their work had been going already for about 10 years, first in Indonesia, and then in the Ord when it was discovered there in 1998. As a predecessor to SRA, BSES researchers had been increasing the emphasis within the breeding program toward greater resistance for sugarcane smut.

This put the industry on a strong footing to deal with the problem when it arrived.

Dealing with the solution to sugarcane smut came through varieties. For example, in the immediate term, 3000 tonne of smut resistant varieties, Q208<sup>®</sup>, Q177<sup>®</sup> and Q200<sup>®</sup>, was transported from the Burdekin to the southern region in 2006, which were varieties that the region did not have at the time.

KQ228<sup>®</sup> and Q232<sup>®</sup> were scheduled for release and the release was accelerated by supplying these varieties as tissue culture plantlets.

The focus quickly centred on the long term recovery, which has continued over the last decade through several "Smut Buster" programs that have occurred as part of the SRA breeding program.

The aim of this program and its successors was to develop high-yielding smut-resistant varieties, and without it there would have been fewer productive and smut-resistant varieties released to growers.

"We decided at the time to minimise the immediate losses by replacing susceptible varieties with the resistant varieties we had identified in trials in the Ord and Indonesia and to concentrate on the long term solution," Mr Croft said.

"We feel we managed it successfully, and now it is considered just another one of the important diseases that we can successfully manage with resistant varieties."

He said that nearly all susceptible varieties have been removed from production.

More information on the smut tolerance of varieties is available via the online tool, QCANESelect™.



**Above:** SRA pathologist Barry Croft says that the SRA strategy to focus on the long-term solution post-smut has served the industry well.

## 10 years on

When smut was detected later in 2006 in the Mackay region and in the other regions in 2007 and 2008, it was clear that the problem was here to stay.

Looking back, Herbert grower Chris Bosworth said that everyone had expected that at some stage the east coast would face smut, but that it arrived sooner than expected.

"I was fortunate that I had a lot of Q200<sup>®</sup> and it being resistant meant that I wasn't in as bad of a position as some people in the district," he said. "But a lot of the varieties we lost were heavy yielding, such as Q174<sup>®</sup> in particular, which was an excellent variety, so this had a huge impact on a lot of people."

He said that the local industry continues to battle smut to this day, but it was now a problem to be dealt with like other diseases.

Back at Childers, and Joe Russo said that the early days of the smut detection were now a memory of a stressful time, but that the industry has recovered.

"10 years on, to BSES's and SRA's credit, smut is very high on the agenda when it comes to the criteria for releasing new varieties. It is not really the problem that we feared it could be," Joe said.



10 years on and Herbert grower Chris Bosworth says that smut is now dealt with just like other crop diseases.



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## Chasing efficiency and productivity at Bundaberg

*Bundaberg farmers Mark and Brian Pressler are hopeful of obtaining about a five-year pay-off period for an investment in new irrigation infrastructure, and so far the results have been encouraging.*

*By Brad Pfeiffer*

The investment in a lateral move irrigator has boosted production and slashed costs for Bundaberg growers Mark and Brian Pressler.

The brothers farm about 105 hectares in the Millaquin mill area and are now entering their third year of operation for the lateral, which irrigates about 47 hectares and has a span of 216 metres (covering 230 metres with end guns).

They estimate that the \$200,000 investment should pay for itself in about five years.

Yields under the lateral in 2015 averaged about 120 tonne/ha, which included a large area of older ratoons, as well as some plant cane. This included about 11 hectares of fourth ratoon cane that yielded 130 tonne/ha, although the brothers made a hard decision to plough out this high-performing cane to make way for new varieties.

This compares to other parts of their farming area which are mainly under water winch, and yielded in the range of 100-110 tonne/ha in 2015.

"There are also large savings with power and manpower, as well as water use efficiency," Brian Pressler said. The efficiency of the lateral has been estimated to save around two thirds of water application costs.

Despite some good rain and growing periods over the summer, the irrigation equipment has also had a big job ahead of it in 2016. The lateral has had no problem in keeping up.

They are able to cover the entire 47 hectares in six days, which was a job that required up to two weeks with winches, and could see the crop moisture stress and production suffering as a result.

When *CaneConnection* visited in mid-April, it had been a mixed season to date, with some good falls of rain and hot and humid weather spurring strong growth, but with some long dry spells as well. All up, Brian is expecting the 2016 season to be fairly similar to the reasonable result that they had in 2015.

The positive results that the Presslers are achieving are about more than just the lateral, and are a combination of a number of factors where they play close attention to the finer details.

Most of the farms are red volcanic soils that the region is known for, while they also look after these soils with rotational crops at the end of the crop cycle.

They have successfully grown soybeans in the past, but access to a contract harvester has made this prospect difficult. This has seen them focus on fallow crops such as cowpeas or Dolichos Lablab.



2.



3.



4.

"We are hoping to get five ratoons out of our crop, and are having some good results. One block is fourth ratoon this year and is looking as healthy as plant cane," Brian said.

A contributing factor is that they harvest their own cane (as well as contracting) and an adherence to harvest best practice principles.

"We try to follow the work that the researchers have done and put that into practice. We know going too fast and having high extraneous matter affects the CCS, and also cutting the billets small may make it seem easier to keep the cane cleaner, but there's also a fair bit fly out before they make it to the bin.

"There's a better chance of hanging onto those billets by cutting them longer. We also know that it is a fine line with speed and getting the job done, and all you can do is your best."

Their harvesting schedule with the mill is one week on, one week off. They aim to cut their 40-50 bins per day hopefully by around lunch time, which allows them the afternoons and the off weeks to continue the farm work, as well as work contract planting.

Their main varieties are Q228<sup>®</sup> for early sugar and then Q240<sup>®</sup> for later sugar. In their harder black soil and gravel country, Brian said that Q242<sup>®</sup> appeared to be doing well in those conditions.

"We always try the new varieties when they come out, and know that sometimes they are not going to suit us and our conditions," he said.

"We look at the CCS and tonnes, but we also look at disease ratings, as although we don't have major concerns, we want to keep it that way and know that there are places in the district where Pachymetra has been a problem."

In 2015, the Presslers won the Reef Program Sugarcane Award, an award that recognises positive practice change that delivers positive outcomes for farm productivity and the environment.

#### Photos:

1. Brian Pressler says 2016 is looking to be a reasonable season.
2. The Presslers manufacture some of their own equipment, including this narrow tractor equipped for weed spraying. Brian concedes that operating it isn't the most enjoyable job on the farm, but says it is very effective in getting the job done efficiently.
3. Brian with some of the older irrigation equipment.
4. Checking out the crop and hoping for a similar or better result to last year.



A close up of a symphylan adult and a group of eggs.



The damage that symphylans can do under certain circumstances; restricting proper growth and even stopping germination, leaving a gappy crop.

## Symphyla – what's in your soil?

*They are small and hard to spot with the naked eye, but symphylans can cause significant damage to cane crops in certain circumstances. SRA Adoption Support Officer Jarrod Sartor takes a close look at this tiny arthropod.*

Symphylans are centipede-like, soil-dwelling, arthropods. They are creamy-white in colour, about 5-10 mm long, and the young have 6-10 pairs of legs and the adults have 12 pairs of legs.

Because of their small size they are very difficult to find in the soil with the naked eye. Both stages feed off plant matter and can attack the roots of the sugarcane.

Symphylan can be found in all regions, but the damage they cause is most notable in the clay-loams in the Herbert Valley or the granitic-loams in the Mossman and Tully regions. Symphylans are present in the soil all year round with a life cycle of about 5-6 weeks from egg to adult.

Generally, the presence of symphylans can be an indication of a healthy soil and you will usually find one or two in each shovel-load.

Symphylans help break down and decompose rotting plant matter meaning their numbers can rapidly increase when excess food is available and drop rapidly once the food runs out, or the soil begins to dry.

Symphylans become a problem when the population has expanded on rotting plant matter (a disced-in legume crop or weed fallow) and once the plant matter is gone they begin to gather around and feed on the fresh cane roots.

They first attack the apical bud or growth point of the root tip. When secondary buds start to form the symphylans will begin to bore into them; causing the root mass to become restricted and clumped.

High amounts of damage caused by symphylans is quite rare since there has to be a high population density (10 per stool). Damage is worse if the root growth has been slowed, for example if it has been a cold and wet winter after planting.

Typically affected plants will show slow growth and weak tillering because of their stunted root-ball. This can directly or indirectly affect yield as the plant with a restricted root mass will wilt easily in hot weather or not grow at all; making the cane appear patchy throughout the field.

There are various methods to manage symphylans. Spring-planted cane is less susceptible to damage than autumn-plant, due to rapid germination and root growth.

If you are planting into a furrow, in some cases it has been seen that a drill 'rolled' after planting shows less damage; probably because the slightly compacted soil restricts symphylan movement. After discing in green manure, allow time for the material to decay, reducing symphylan population and damage. Chlorpyrifos (e.g. Lorsban™ 500 EC, Chlorpyrifos® 500 EC) and bifenthrin (e.g. Talstar® 250 EC) are registered insecticides for use against symphylans, applied onto the billet and surrounding soil at planting. Insecticide treatments at planting for wireworm will also usually manage symphylans.

All cane growing areas in Australia will have symphylan. They are a natural part of the ecosystem and underground food-web.

Normally they do not feed on cane roots, but at a high population density they can and will cause damage. This damage is ordinarily minor in sugarcane and can be managed, but it is essential to diagnose damage correctly. Field operations like fill-in and hill-up should not be delayed for the sake of some slower growing parts of a block. For more information please read the SRA Symphyla information sheet available via [www.sugarresearch.com.au](http://www.sugarresearch.com.au).

## SRA affirms science-based commitment to nitrogen research

*Sugar Research Australia (SRA) has affirmed its commitment to a proactive and science-based approach to researching nitrogen use in the Australian sugarcane industry and to seek collaborative opportunities to deliver economically viable improvements in productivity.*

Confirming SRA's position today in Townsville, SRA CEO Neil Fisher said that SRA was committed to providing robust and independent research into nitrogen use in the Australian sugarcane industry.

"Our aim is to assist our industry investors to optimise productivity and profitability, while also moving towards meeting water quality targets," Mr Fisher said.

Mr Fisher said that a cornerstone of SRA's research investment and the industry's nitrogen use was the SIX EASY STEPS™ nutrient management guidelines.

"SIX EASY STEPS™ is based on extensive research. The principles guide nutrient management to enable the adoption of best practice nutrient management on-farm," Mr Fisher said. "It is recognised as industry best-practice for nutrient management to optimise productivity and profitability by maintaining soil fertility and minimising off-farm effects on water quality.

"A review of nitrogen use efficiency in sugarcane last year found that there is significant potential for the industry to refine nitrogen application rates through continued use and evolution of SIX EASY STEPS™, to better match nitrogen application to crop requirements via precision agriculture farming techniques. There is also scope to evaluate the potential of enhanced efficiency fertilisers to better match N supply with crop demand, and minimise N losses to the environment."

Mr Fisher said there was still a need for ongoing research to further validate SIX EASY STEPS™, particularly around a range of soil types, farming systems, and climatic conditions.

"SRA shares a strategic alliance with Queensland Government agencies Department of Environment and Heritage Protection (EHP), Department of Agriculture and Fisheries (DAF), and Department of Science, Information

Technology, and Innovation (DSITI), with many of our research investments in this area.

"This is a strategic alliance that SRA and the Queensland Government share and which continues to be highly valued by the SRA Board, our industry investors, and State and Commonwealth governments."

Mr Fisher said this research investment occurred both internally in SRA, and externally through other organisations.

"To deliver our research outcomes, SRA partners with a range of credible research agencies and co-investors, including USQ, CSIRO, UQ, JCU, Queensland Government Departments, as well as productivity services organisations, private sector companies, and others," he said.

"SRA participation in this research ensures logical, scientific research and we will continue to leverage our research investment to maximise impact."

## Growing more with less: Government funds improved nitrogen efficiency R&D

A project aimed at improving the efficient use of nitrogen in the irrigated sugar, cotton, dairy, cherry, and mango industries has been announced as one of the successful Rural R&D for Profit programme projects by Deputy Prime Minister and Minister for Agriculture and Water Resources, the Hon. Barnaby Joyce, in the second round of the programme.

The project, *More profit from nitrogen*, is a partnership between the major nitrogen-using industries of sugar, cotton, dairy, and horticulture, led by the Cotton Research and Development Corporation (CRDC) in conjunction with fellow rural research and development corporations (RDCs) Dairy Australia, Sugar Research Australia and Horticulture Innovation Australia and 15 other research partners.

The project aims to improve the yield of sugarcane growers. It will also help all four industries to mitigate the extent and impact of off-farm nutrients on water quality.

CRDC Executive Director Bruce Finney welcomed the announcement of funding, which will see up to \$5.8 million directed from the Rural R&D for Profit programme to this project.

"Optimising nutrition is essential for maximising yield and profit – be it in cotton, dairy, horticulture or sugar. Too little nutrition will reduce yield potential, while too much can impact growers' profitability through increased costs, contamination of groundwater, excessive vegetation growth and

related insect and disease problems. And, too much nitrogen also contributes to greenhouse gas emissions and adds to the carbon footprint of all of our industries," Mr Finney said.

"As a result, CRDC and our fellow RDCs and research partners have collaborated on this project, which is designed to enhance the use of nitrogen in our intensive cropping and pasture systems.

"Through this joint project, growers will gain a better understanding of the various influences on nitrogen use efficiency and improved confidence to adopt management practices tailored to their specific crop requirements – thus optimising nitrogen use efficiency, and their profits.

# Total Research Investment

Project Title	Project Number	Principal R&D Provider	Chief Investigator	End Date
<b>Key Focus Area 1 (Optimally-adapted varieties, plant breeding and release)</b>				
Maximising the rate of parental improvement in the Australian sugarcane breeding program	2008/319	SRA	Xianming Wei	01/05/2016
Australian support for the International Consortium for Sugarcane Biotechnology (ICSB)	2010/002	SRA	Frikkie Botha	01/07/2016
Maximising genetic gain from family and within family selection	2011/343	SRA	Roy Parfitt	01/12/2016
New germplasm to develop more productive varieties with enhanced resistance to nematodes, pachymetra root rot and smut	2011/344	SRA	Barry Croft	01/05/2016
Development and testing of a SNP marker platform in sugarcane	2012/025	CSIRO	Karen Aitken	01/06/2016
SmutBuster II: accelerated breeding of smut-resistant varieties	2012/325	SRA	Roy Parfitt	01/06/2016
Improving the accuracy of selection in sugarcane breeding trials through accounting for site variability	2012/351	SRA	Xianming Wei	01/05/2018
Exploiting introgression for the development of productive and regionally adapted varieties for NSW	2013/022	Manildra	Roy Parfitt	01/05/2020
Sugarcane for future climates	2013/029	CSIRO	Chris Stokes	01/06/2017
Applying the genome sequence for variety improvement: validation and implementation	2013/030	CSIRO	Karen Aitken	01/08/2018
Developing cytogenetic and molecular tools to improve selection for soil-borne pathogen resistance in wild hybrids	2013/358	SRA	Nathalie Piperidis	01/10/2016
Phase 1: advancing yield, disease resistance and ratooning by exploiting new sources of genetic variability from wild relatives of sugarcane	2014/053	SRA	George Piperidis	30/06/2017
Optimising productivity and variety recommendations through analysis of mill data	2014/054	SRA	Joanne Stringer	01/08/2016
Field assessment and further development of high-sucrose sugarcane	2014/069	UQ	Luguang Wu	31/10/2017
Sugarcane root systems for increased productivity; development and application of a root health assay	2015/002	CSIRO	Anne Rae	01/07/2018
Impact of stool architecture on ratooning ability	2015/004	CSIRO	Anne Rae	01/07/2018
Leaf sucrose: the link to diseases such as YCS and enhancement of sugarcane productivity	2015/016	SRA	Gerard Scalia	30/06/2018
Generation of a high throughput SNP marker chip for introgression of resistance genes from wild germplasm into sugarcane, targeting smut, pachymetra and nematodes, to generate more resistant varieties faster	2015/025	CSIRO	Karen Aitken	30/06/2018
Selecting high value chromosomes from wild introgression material to deliver more resistant varieties faster	2015/026	CSIRO	Karen Aitken	01/08/2018
The Sugarcane Hub, development of a interface between the sugarcane genome sequence and sugarcane genetic data to allow researchers to identify genes that underpin important agronomic traits	2015/027	CSIRO	Karen Aitken	01/08/2017
Improving early stage selection of SRA breeding program by indirect selection of plant vigour	2016/028	SRA	Jaya Basnayake	2019
Optimising productivity, variety recommendations and mill operations through analysis of mill data	2016/032	SRA	Jo Stringer	2021
New approaches to identify and integrate Pachymetra resistance genes from Erianthus into SRA breeding program	2016/039	SRA	Nathalie Piperidis	2020
Licence to Farm: Nitrogen use efficient varieties to meet the future environmental targets	2016/044	SRA	Prakash Lakshmanan	2019

Project Title	Project Number	Principal R&D Provider	Chief Investigator	End Date
<b>Key Focus Area 2 (Soil health and nutrient management)</b>				
Quantifying the effects of microbial additions to sugarcane soils on crop productivity	2013/069	Farmacist	Jayson Dowie	01/05/2016
Ameliorating clay sub soils to improve crop yields	2013/072	DAG	Glen Grohn	Closed
Strategies to manage soil-borne fungi and mitigate sugarcane yield decline	2013/101	CSIRO	Paul Harvey	01/08/2017
Regenerating a soil food web capable of improving soil health and reducing losses from soil-borne pests and pathogens of sugarcane	2014/004	Biological Crop Protection	Graham Stirling	01/07/2017
Role of controlled release fertiliser in Australian sugarcane systems	2014/011	CSIRO	Kirsten Verburg	01/08/2017
Modelling extreme yields in the wet tropics to improve nitrogen use efficiency	2014/024	JCU	Yvette Everingham	Closed
Boosting N-use efficiency in sugarcane through temporal and spatial management options	2014/045	USQ	Bernard Schroeder	01/10/2017
Assessment of new management strategies for marginal soils	2015/007	SRA	Barry Salter	31/12/2019
Improving NUE for sugarcane crops with constrained yield potential	2015/065	SRA	Danielle Skocaj	30/06/2019
Decision support for informed nitrogen management: soil nitrogen mineralisation test and the assessment of soil crop N contribution to crop N requirements	2015/069	DSITI	Phillip Moody	30/06/2018
Spatially explicit estimation of Achievable Yield Potential – an improved basis for fertiliser management	2015/070	CSIRO	Rob Bramley	01/07/2017
Improving management practices of legume crop residues to maximise economic and environmental benefits	2015/074	DSITI	Weijin Wang	30/06/2018
How much N will that crop need? Incorporating climate forecasting into nitrogen management in the Wet Tropics	2015/075	JCU	Yvette Everingham	01/05/2018
<b>Key Focus Area 3 (Pest, disease and weed management)</b>				
Rapid detection of ratoon stunting disease	2013/001	CSIRO	Amalia Berna	01/06/2016
Mass production of the Adelina disease to better manage greyback canegrubs	2013/356	SRA	Nader Sallam	30/06/2016
Innovative approaches to identifying the cause of chlorotic streak and new management strategies	2013/357	SRA	Barry Croft	01/06/2016
Development of controlled-release formulations of imidacloprid for canegrub control	2014/006	SRA	Andrew Ward	01/04/2016
Solving Yellow Canopy Syndrome	2014/049	SRA	Dave Olsen	30/06/2017
Developing an alternative herbicide management strategy to replace PSII herbicides in the Wet Tropics area	2014/050	SRA	Emilie Fillols	01/01/2018
A Novel Polyphasic Framework to resolve Yellow Canopy Syndrome Paradox	2014/082	UWS	Brajesh Singh	01/11/2016
Validation of LSB-PCR diagnostic for ratoon stunting disease and characterisation of non-Lxx strains of Leifsonia associated with sugarcane	2014/086	USQ	Anthony Young	30/06/2017
Review of the sugarcane Industry Biosecurity Plan (IBP) and development of a Grower Biosecurity Manual (GBM)	2014/088	PHA	Rodney Turner	01/10/2016
Delivery of remote sensing technology to combat canegrubs in Queensland cane fields	2015/038	SRA	Nader Sallam	01/01/2018
Securing Australia from PNG biosecurity threats	2015/046	SRA	Rob Magarey	02/08/2017
Identifying new-generation insecticides for canegrub control as contingency for loss of amenity with the existing product	2016/003	SRA	Andrew Ward	2020
You can't manage what you can't identify: Managing threats from exotic moth borers through accurate identification	2016/041	SRA	Nader Sallam	2019
Molecular assay of major soil-borne pathogens for better exploitation of commercial varieties	2016/047	SRA	Rob Magarey	2018

Project Title	Project Number	Principal R&D Provider	Chief Investigator	End Date
<b>Key Focus Area 4 (Farming systems and production management)</b>				
Implementing a framework for farmers to engage in the use of precision technologies	2012/013	USQ	Troy Jensen	Closed
Developing targeted, seamless weather/climate forecasting systems for critical early season harvest periods	2013/004	USQ	Roger Stone	01/06/2016
Developing remote sensing as an industry wide yield forecasting, nitrogen mapping and research aide	2013/025	UNE	Andrew Robson	01/10/2016
Product and profit – delivering precision to users of precision agriculture in the Australian sugar industry – yield monitoring	2014/028	USQ	Troy Jensen	01/02/2017
A non-pneumatic cane cleaning system with no cane loss	2014/035	QUT	Neil McKenzie	01/12/2017
Too wet to forget – reducing the impact of excessive rainfall on productivity	2014/046	SRA	Barry Salter	01/07/2017
Increased harvest recovery: reducing sugar loss and stool damage	2014/048	SRA	–	01/07/2017
Modernisation of furrow irrigation in the sugar industry	2014/079	USQ	Malcom Gillies	01/07/2017
Demonstration of GPS-guided laser levelling and its associated productivity response	2014/094	Mulgrave Central Mill	Matt Hession	01/02/2018
Bio-prospecting for beneficial endophytes of sugarcane	2015/051	AgResearch	Stuart Card	01/01/2019
Cropping solutions for the sugarcane farming systems of the Burdekin (extension of 2011/922)	2015/077	SRA	Barry Salter	01/01/2017
Incorporation of Australian Crop Data and Industry characteristics into a Tool to Facilitate Informed Harvest Decision-making for the Australian Industry	2015/079	NorrisECT	Stuart Norris	01/09/2016
Sensors for improved harvesting feedback: a feasibility study	2015/080	SRA	Eloise Keefe	14/02/2017
Opening the data highway: Access to remotely sensed spatial and temporal data for the Australia sugar industry to assist with yield forecasting and nitrogen management	–	UNE	Andrew Robson	2019
<b>Key Focus Area 5 (Milling efficiency and technology)</b>				
Determine the optimum tube dimensions for Robert evaporators through experimental investigations and CFD modelling	2012/054	QUT	Ross Broadfoot	01/09/2016
Improved modelling of wet scrubbers	2012/055	QUT	Anthony Mann	01/05/2017
Determination of factory processing procedures to better manage sugar quality issues	2012/057	QUT	Ross Broadfoot	Closed
A retrofit to a mill to reduce its operational and maintenance costs	2013/059	QUT	Geoff Kent	02/08/2017
Reducing the maintenance costs of mill rolls	2013/060	QUT	Geoff Kent	01/08/2019
Real time harvest and transport system (under contract)	2014/037	QUT	Geoff Kent	01/09/2017
Improving mill efficiency through rapid analysis methodologies	2014/051	SRA	Eloise Keefe	01/08/2017
Managing aspects of raw sugar quality in the Australian sugar industry	2014/052	SRA	Eloise Keefe	01/08/2017
Investigation into modifying pan boiling techniques to improve sugar quality	2015/013	QUT	David Moller	01/06/2017
Increasing capacity to undertake cane preparation research through modelling and experimentation	2015/018	QUT	Geoff Kent	01/05/2017
Develop a blueprint for the introduction of new processing technologies for Australian factories	2015/043	QUT	Ross Broadfoot	01/09/2017
Developing online analysis systems to measure the available nutrients in mill mud	2016/019	SRA	Eloise Keefe	2020
Reducing boiler maintenance costs and deferring capital expenditure through improved technology	2016/020	QUT	Floren Plaza	2020
<b>Key Focus Area 6 (Product diversification and value addition)</b>				
Process for making bagasse paper pulp	2012/053	QUT	Thomas Rainey	01/04/2018
A profitable future for Australian agriculture: biorefineries for higher-value animal feeds, chemicals and fuels	2015/902	QUT	Ian O'Hara	01/04/2019

Project Title	Project Number	Principal R&D Provider	Chief Investigator	End Date
<b>Key Focus Area 7 (Knowledge and technology transfer and adoption)</b>				
Pachymetra awareness project for Condong mill area	2012/064	CANEGROWERS	Doug Irby	Closed
Increasing farm business intelligence within the sugar industry	2014/001	AgProfit	Matthew Bryant	30/06/2017
Measuring the profitability and environmental implications when growers transition to Best Management Practice (as defined by the new Canegrowers Smartcane BMP)	2014/015	DAF	Mark Poggio	02/05/2018
Improving industry returns through harvest best practice	2014/091	Manildra	Ian McBean	30/06/2017
Understanding the impact of harvester speed on subsequent ratoon performance in the Burdekin	2014/092	BPS	Robert Milla	30/06/2017
Tissue culture – managing impediments to adoption in Tully	2014/093	TCPSL	Jordan Villaruz	01/01/2017
Sugar industry productivity and data recording spatial data hub for research and extension	2015/045	Agtrix	Robert Crossley	28/02/2018
Pre-commercial evaluation of a PCR-diagnostic for Ratoon Stunting Disease and the development of a business case for full implementation	2015/078	SRA	Nicole Thompson	01/03/2017
Protecting our chemicals for the future through accelerated adoption of best management practice	2016/002	SRA	Andrew Ward	2019
Master classes in soil health/soil biology for the sugar industry	2016/025	SRA	Andrea Evers	2019
<b>Key Focus Area 8 (Capability development, attraction and retention)</b>				
Modification of lignin biosynthesis in sugarcane for the production of cellulosic ethanol	2010/068	QUT	Patrick Bewg Heather Coleman	Closed
Climate forecasting to improve sugarcane nitrogen management in the wet tropics	2011/062	SRA	Danielle Skocaj	Closed
Biodegradable polymer nanocomposites derived from natural fibre and starch	2011/071	QUT	William Gilfillan William Doherty	Closed
Enhancing sugarcane for decreased water content and increased sugar content at harvest	2011/072	QUT	Anthony Brinnin Mark Kinkema	01/05/2016
Production of furanics and chemicals from bagasse and molasses	2012/074	QUT	Joshua Howard William Doherty	01/04/2016
Identifying and overcoming limitations in crop models with respect to drought tolerance and climate change	2013/076	JCU	Yvette Everingham	Closed
Investigating the utility of mill mud for soil health conditioning and nutrient use efficiency on sodic soils within the Burdekin	2013/077	USQ	John Bennett	01/09/2016
Effect of organic nutrients on sugarcane growth, microbial activity and greenhouse gas emissions	2013/078	UQ	Susanne Schmidt	01/09/2016
Sugarcane for water limited environments: characterization of a selected sugarcane germplasm for transpiration efficiency and high biomass production for the sugarcane growing regions in Australia	2014/102	UQ	Sijesh Natarajan Shu Fukai	01/06/2017
Exploiting soil microbe associations with sugarcane roots for resistance to canegrubs	2014/104	UWS	Andrew Frew	14/09/2016
Investigation of genetic control of sugar accumulation within the sugarcane culm (stalk)	2014/107	UQ	Patrick Mason	01/06/2018
Soil nitrogen dynamics – a microdialysis approach to quantify nitrogen cycling in sugarcane soils	2014/108	UQ	Scott Buckley	01/07/2018
Statistical data mining algorithms for optimising analysis of spectroscopic data from on-line NIR mill systems: improving system calibrations for quality measures and variety discrimination	2014/109	JCU	Justin Sexton	30/05/2018
Reduction of post-harvest deterioration of sugarcane	2014/401	SRA	Anthony O' Connell	01/08/2016
Enhancing sugarcane growth and yield by biocontrol agents/biofertilizers	2014/402	QUT	Jan Zhang	01/12/2016
A boiler simulator for improved operator training	2016/001	QUT	Anthony Mann	2019

**Sugar Research Australia Limited**  
ABN 16 163 670 068

**Head Office**  
50 Meiers Road  
Indooroopilly QLD 4068  
Australia

**Postal Address**  
PO Box 86  
Indooroopilly QLD 4068  
Australia

**Tel** 1300 SRA 111  
**Fax** 07 3871 0383  
**Email** [sra@sugarresearch.com.au](mailto:sra@sugarresearch.com.au)  
**Web** [sugarresearch.com.au](http://sugarresearch.com.au)

