



Sugar Research  
Australia

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



# *CaneConnection*

*Spring 2017*

p4

---

Examining  
harvester speed  
and front-end  
components

p12

---

Improving irrigation  
efficiency through  
**automation**

p18

---

Boosting **soil  
health** for better  
productivity and  
profitability

p26

---

SRA **grower survey**  
provides valuable  
insights

## Welcome to the Spring 2017 edition of *CaneConnection*



*We have another bumper issue for you inside these pages, looking at several of the research projects that SRA is investing in on behalf of sugarcane growers and millers.*

Our cover story this September looks at a harvesting project led by Norris ECT (page 4-5) where they are investigating the optimisation of the front-end components of the harvester with ground speed. With the trials underway, the industry can look forward to learning more about the results in coming editions.

We also go underground to look at soil health. Page 18-19 looks at the biocontrol agent, *Pastueria penetrans*, and strategies you can implement on-farm to maximise its potential for controlling root-knot nematodes. We have a look at companion cropping on page 20-21, and we head up to Mossman to learn more about Gerard Puglisi's wavy disc cultivator.

This edition also presents some of the results from the 2017 SRA grower member survey, where we spoke to 400 grower members in May. Thank you to everyone who shared their thoughts via this survey. We value your participation.

The results of individuals are fully confidential, and SRA received only the aggregated data, meaning no one's responses were identifiable to themselves as individuals.

In our newsletters, we also hear the latest from the yellow canopy syndrome (YCS) research program, and we hear about the new varieties SRA9 and SRA10 in the *Varieties and Plant Breeding Update*.

**Brad Pfeffer**

*Executive Manager, Communications*

# Contents

- 03 By the numbers
- 04 Singing on the same song sheet: Examining harvester speed & components
- 06 Long-term assessment of fallow crops shows potential for cash legumes
- 08 Practical on-farm demonstrations help boost efficiency and sustainability
- 11 Can 'big data' step-change agriculture?
- 12 Automation delivering efficiency in Burdekin gravity-fed irrigation
- 14 Automation: 110 fewer hours per year sitting in the ute
- 16 Making the most of the SIX EASY STEPS nutrient management program
- 18 Beneficial bacteria can help reduce losses from nematode pests
- 20 Research assesses the impact of legume companion cropping
- 22 On level ground
- 24 Diversification and innovation help ride the industry ups and downs
- 26 Talking to you: Grower survey provides valuable industry insights
- 28 Total Research Investment

ISSN 2203-1111 (Print) ISSN 2203-112X (Online)

© Copyright 2017 by Sugar Research Australia Limited. All rights reserved. No part of

*CaneConnection* (this publication), may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior permission of Sugar Research Australia Limited. Sugar Research Australia Limited acknowledges and thanks its funding providers, including levy payers (sugarcane growers and millers), the Commonwealth Government, and the Queensland Government (Department of Agriculture and Fisheries).

**Disclaimer:** In this disclaimer a reference to 'SRA', 'we', 'us' or 'our' means Sugar Research Australia Limited and our directors, officers, agents and employees. Although we do our very best to present information that is correct and accurate, we make no warranties, guarantees or representations about the suitability, reliability, currency or accuracy of the information we present in this publication, for any purposes. Subject to any terms implied by law and which cannot be excluded, we accept no responsibility for any loss, damage, cost or expense incurred by you as a result of the use of, or reliance on, any materials and information appearing in this publication. You, the user, accept sole responsibility and risk associated with the use and results of the information appearing in this publication, and you agree that we will not be liable for any loss or damage whatsoever (including through negligence) arising out of, or in connection with the use of this publication. We recommend that you contact our staff before acting on any information provided in this publication. **Warning:** Our tests, inspections and recommendations should not be relied on without further, independent inquiries. They may not be accurate, complete or applicable for your particular needs for many reasons, including (for example) SRA being unaware of other matters relevant to individual crops, the analysis of unrepresentative samples or the influence of environmental, managerial or other factors on production.





# 110

The number of hours, per year, that Aaron Linton **isn't** sitting in his ute each year thanks to automation of furrow irrigation

> *Page 14-15*



# 76%

The percentage of growers who gave SRA a **high** performance rating as part of the 2017 grower survey

> *Page 26-27*

## By the numbers



# 57%

The percentage of growers planting **fallow crops**, as measured in the 2017 grower survey

> *Page 26-27*



# \$8om

The estimated **cost, per year**, to the sugarcane industry from plant-parasitic nematodes

> *Page 18-19*

## Need to contact SRA?

If you have an issue that you would like to talk to SRA about, you can call any of our regional offices or our head office in Brisbane. The full list of contacts for SRA's research stations is available on the SRA website.

### Our contacts are:

**Broadwater:** (02) 6620 8200

**Condong:** (02) 6670 1760

**Indooroopilly:** (07) 3331 3333

**Ingham:** (07) 4776 8206

**Mackay:** (07) 4963 6810

**Meringa:** (07) 4056 4500

**Tully:** (07) 4088 0703

**Woodford:** (07) 5434 5902



## Singing on the same song sheet: Examining harvester speed & components



David Bartlett discusses billet length with Stuart Norris during the trials.

*Three modified sugarcane harvesters are part of field trials this season to examine improved synchronisation of ground speed and front-end components of the harvester.*

This new research is looking at the front end of sugarcane harvesters to see if their components can be better matched to ground speed.

The idea is simple. Currently, on factory-standard machines, the spirals, basecutter and knockdown and fin rollers are not specifically coordinated with the forward speed of the harvester.

All of these components play a crucial role in impacting quality of the cane supply, sugar loss, and ratoons, with previous research suggesting there is significant damage occurring even before the cane reaches the basecutters.

The research is asking the question: can the front end be improved?

As part of that question, Norris ECT is working with QUT on a project that is part of the Rural R&D for Profit project, *Enhancing the sugar industry value chain by addressing mechanical harvest losses*, which is funded by the Australian Government Department of Agriculture and Water Resources, SRA and QUT.

In 2017, field trials have begun assessing modified John Deere 3520s at northern NSW and Childers and a Case 8000 with Wilmar in the Burdekin.

*CaneConnection* caught up with Stuart Norris from Norris ECT in August while field trials were underway in the Tweed Valley at a property managed by David Bartlett.

"If you do some analysis, it looks like none of the front end components are really that well suited to the speeds and conditions we harvest at currently," Stuart said. "By doing these trials, we are hoping to determine the impact of the current speed of those components and is there any negative impact on yields. Is there some way to fix it to allow us to continue to harvest profitability?"

The 3520 at Condong, run by Tweed Valley Harvesting, has had another controller added that allows control of the speed of the basecutters, spirals and fin and knockdown rollers, so their speed can be changed and also automatically linked to ground speed.



Working in a block of dual-row 1.9m one-year old burnt cane, the trial involved four treatments:

- Low speed at factory front-end settings (4 km/hour)
- Low speed at synchronised front-end settings (4 km/hour)
- High speed at factory front-end setting (8 km/hour)
- High speed at synchronised front-end settings (8 km/hour).

"We are measuring the yield from the treatments in four-row plots as well as sampling the trash blanket, which is added to the mill yield to give an indication of the total biomass before harvest," Stuart said.

"We will then follow this over the next three to four years to look at differences between the plots.

"As part of the trial, we also pick sub-plots of rows where we count the stalks and inspect for damage, to look for things that have been cut, or bent, or had multiple cuts, or come out of the ground."

Stuart said there was enthusiasm from the trial collaborators and some early positive indications. Full information will be communicated to industry as the project progresses over the coming years.

"The three regions have different conditions. Here at Condong the crop is more erect, so the focus has been on the basecutters as opposed to the spirals, but when we move into more lodged trials in the Burdekin then that will see us assess the impact of the speed of the front-end more."

Stuart said that the project had already learnt valuable information about the front-end of modern Case and John Deere harvesters.

"Both need very different control systems due to the big differences in hydraulic systems between the machines.

"Aftermarket modifications on two of the machines have created some challenges, however working around these problems has greatly increased the understanding of the harvester hydraulic and control systems," he said.

QUT is continuing with the process of developing the detailed model of the behaviour of cane as it interacts with the front end of the machine, and is also continuing the process of engaging a PhD student to be involved in the project.



**Australian Government**  
**Department of Agriculture and Water Resources**

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

**For more information**

**Stuart Norris**

[stuart@schlot.com.au](mailto:stuart@schlot.com.au)

Grower Mark North assessing stools after the modified harvester has been over along with harvester driver Matthew Catteral.





Burdekin farmer Cy Kovacich has taken part in fallow cropping trials as part of an SRA project.

## Long-term assessment of fallow crops shows potential for cash legumes

*A long-term research project has improved the understanding of fallow cash crops in the sugarcane farming system in the Burdekin.*

### Project details

#### Key Focus Area

**Farming systems and production management**

#### Project name

Cropping solutions for sugarcane farming systems of the Burdekin

#### Project number

2015/077

#### Project end date

Concluded

The benefits of breaking the sugarcane monoculture are well understood.

But the decision around introducing cash crops into the sugarcane farming system is far more complex and involves a range of questions and considerations.

What to plant? When? How do I maximise potential for the next crop cycle? What investment is required? What are the risks?

To answer some of these questions, a long-term research project was established in 2011 to assess a range of fallow crop options and follow these through a sugarcane crop cycle.

The most recent aspect of the project was a collaboration between SRA and the Queensland Department of Agriculture and Fisheries, with SRA conducting the trial and DAF conducting an economic analysis.

Because of its irrigation availability and its scale, the work occurred in the Burdekin.

The water and scale in the Burdekin had already seen the investigation of numerous break crops at various times over the years.

The research project aimed to investigate the potential for these crops to add value to the sugarcane industry, which continues to be the primary economic foundation of the region.

The project was overseen by Dr Barry Salter and assessed a range of fallow lengths and combinations of different crops, which also resulted in different sugarcane planting times, depending on the length of the fallow and the crop or crops grown.

This included short fallows with mung beans and soybeans, and longer fallows that also included these pulse crops as well as other crops such as maize and cotton.

“Cash crops with a short growth cycle, which allow the cash crop to be harvested, time for residue management or decomposition and planting back to sugarcane prior to winter are potentially the optimum way of incorporating a cash crop into the sugarcane farming system,” Dr Salter said.

“Mung bean and soybean are probably best suited to this system, and efforts to improve the management of these crops within a cane farming system should be considered.”

He said that the economic analyses indicated that grower gross margins could potentially be improved with a summer legume (mung bean, soybean) cash crop, which allows sugarcane planting during autumn, and therefore ensures sugarcane productivity is maintained.

Longer fallow periods that delayed planting until spring, or missed an entire year of sugarcane, did not produce sufficient higher yields across the subsequent sugarcane crop cycle to offset the sugar production that was lost through the delay.

While the extended fallow treatments (17 months) resulted in higher yields in plant cane, this boost to yields did not carry through over the ratoon crops.

The DAF economic analysis showed the mean gross margin over the crop cycle for the farming system that included mungbean was \$2702/ha/year whereas for soybean it was \$2852/ha/year. There was no statistically significant difference between these systems and the farming systems that included a 17 month fallow with sequences of cash crops (eg. soybean, maize, mungbean) during the fallow period.

Farming systems with an extended fallow and multiple crop sequences are complex, and growers need to consider the challenges of accessing agronomic and extension support, and ensuring suitable supply chain infrastructure, processing facilities, and marketing organisations.

The trials were conducted on the Mona Park property of Cy Kovacich.

Cy said he had been experimenting with break crops since 2005 with both successes and failures. Because of that, he was keen to participate and learn more, particularly as he knew there was a learning curve around returning the ground back to cane and maximising production.

“One of the lessons we learnt through the work with Barry was to not have the mindset of harvesting the fallow crop and trying to go straight into planting cane,” Cy said.

“There was one point last year where I had 24 hectares of mung beans and I’d plant cane into them the day after harvest. We did not allow time for that crop to break down before going in with cane.

“It came away okay, but it was set back to the point where I considered destroying that paddock and starting again.” The crop ended up yielding 182 tonne/ha.

Cy said that the trial work built on the understanding of the Sugar Yield Decline Joint Venture.

“I have no doubt that break cropping leads to higher sugarcane yields per hectare,” he said. “That is a proven point and so unremarkable that we don’t even talk about it here anymore.”

#### For more information

Dr Barry Salter

bsalter@sugarresearch.com.au

(07) 4963 6802

The research has investigated the potential for fallow crops to add value to the sugarcane industry.







Growers and advisors viewing the on-farm demonstrations at the Tully farm of Don Colls.

## Practical on-farm demonstrations help boost efficiency and sustainability

*Protecting Our Chemicals for the Future is a project based in the northern Wet Tropics that works with grower groups to demonstrate the value of best management practices for chemical management on sugarcane farms. **By Belinda Billing, Researcher, SRA***

### Project details

#### Key Focus Area

**Knowledge and Technology Transfer and Adoption**

#### Project name

Protecting our chemicals for the future

#### Project number

2016/002

#### Chief investigator

Belinda Billing

The project looks at both water quality and weed management outcomes from improved management practices through on farm demonstrations and the use of water quality measurement tools such as a rainfall simulator.

The project has provided growers and extension staff with useful information for understanding chemical behaviour and practical ways of reducing off-site movement.

“The data has shown us new information, especially about the chemicals that are new for the industry,” says Tully Productivity Services Manager Jordan Villaruz.

“We can use this information when we provide chemical recommendations for growers. We need to consider all things when we are choosing herbicides, such as the efficacy of weed management, the cost, and the environmental impact.”

#### What is a rainfall simulator?

A rainfall simulator is a tool for simulating a rainfall event at a small plot scale, with a pre-determined “rainfall” intensity over a given time.

Simulators are used to measure losses of sediment, nutrients and pesticides and the amount of rainfall runoff under different conditions and time scales.

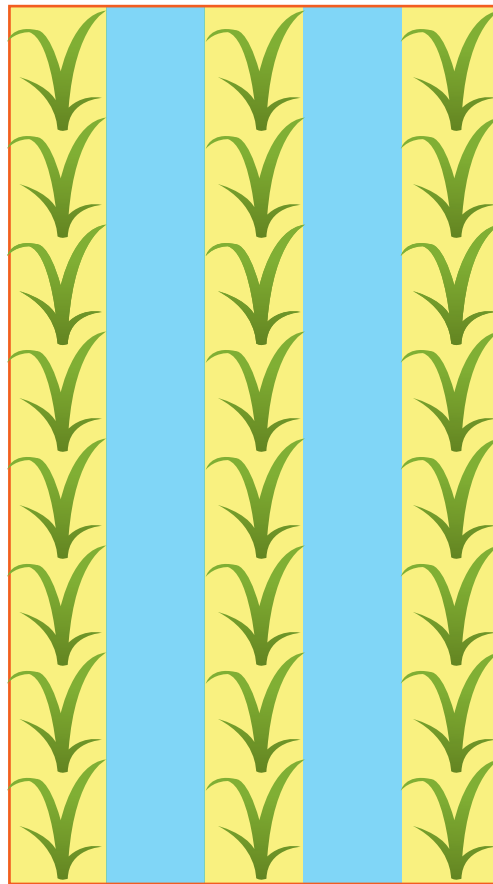


In this project we have used a rainfall simulator to look at losses from different herbicide application techniques and various herbicides commonly used in sugarcane. We simulated rainfall run-off at both three days after application and 20 days after application.

**Apply less – lose less**

Barrage (diuron and hexazinone) was applied to plots in a fifty percent band using a DAF dual herbicide spray bar. The spray bar directs the chemical predominantly towards the cane row, with a portion of the inter-row covered. Glyphosate was applied to the inter-row. This was compared to a blanket application of Barrage, applied with a flat spray boom.

Our rainfall simulations showed at least a fifty percent reduction in the loss of residual herbicides. Where less residual chemical is applied, there is less to lose to the environment. This can be achieved by banding, spot spraying or zonal treatment.

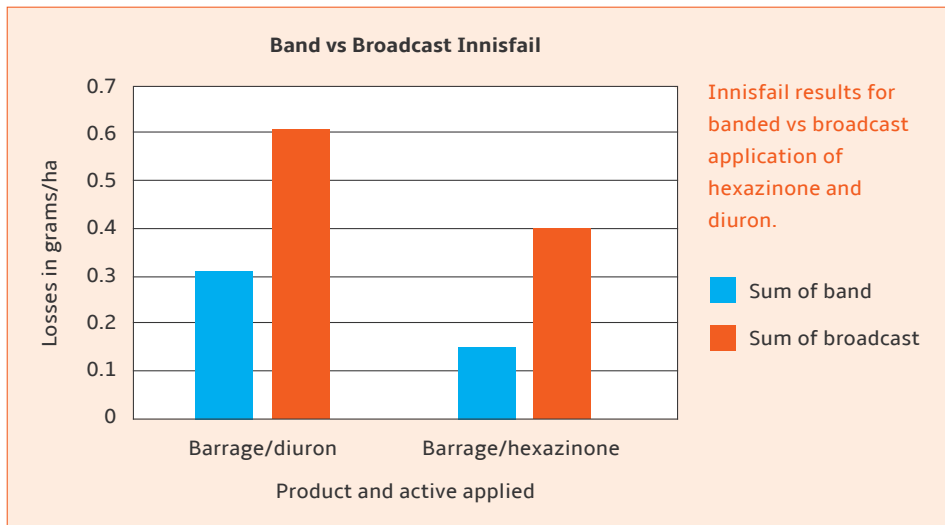


**Left:** Yellow band represents banded application of Barrage. Blue represents inter-row sprayed with glyphosate.

**Note:** If applying Barrage, Bobcat® combi or other diuron/ hexazinone herbicides after cane emergence at last cultivation or at close-in, it is a label requirement to only apply as a directed band spray over a maximum 60% of crop area unless applying at the lower rates of 900g/ha or less.

In the Queensland Wet Tropics, these products are only registered for rates below 900g/ha.

(In the rainfall simulation activity both the broadcast and banded application were applied at 900g/ha).



**Weed management in Sugarcane Manual**

Page 38 of the SRA Weed Management in Sugarcane Manual contains an error. Imazapic (Flame®) is included as a treatment for soybean. **Imazapic is not registered for use in soybean.** Apologies for this inadvertent error and thank you to those who brought it to our attention.

**Timing, incorporation and chemical selection**

A selection of commonly used residual and knock down chemicals were applied as a broadcast at 20 days and three days prior to applying the rainfall simulator to generate runoff.

Residual chemicals	Knock down chemicals
Atradox® (atrazine), Balance®750 (isoxaflutole), Barrage (hexazinone & diuron), Nufarm Bouncer 960S (s-metolachlor), Mentor®WG (metribuzin), Spark® (imazapic), Romper 440 EC (pendimethalin)	Agritone®750 (MCPA), Amicide® Advance 700 (2,4-D), Comet 400 (fluroxypyr), Kamba® 500 (dicamba), Nuquat® 250 (paraquat)

There was a significant reduction in losses of all chemicals when simulated rain was applied 20 days after application compared to three days after application.

This is due to increased time for binding to soil particles and chemical break down. Incorporating rainfall of 20mm over this time also helped to reduce run off by incorporation of chemical applied.

On both the three day and 20 day treatments, some chemicals consistently recorded low and even zero loss while others resulted in higher losses.

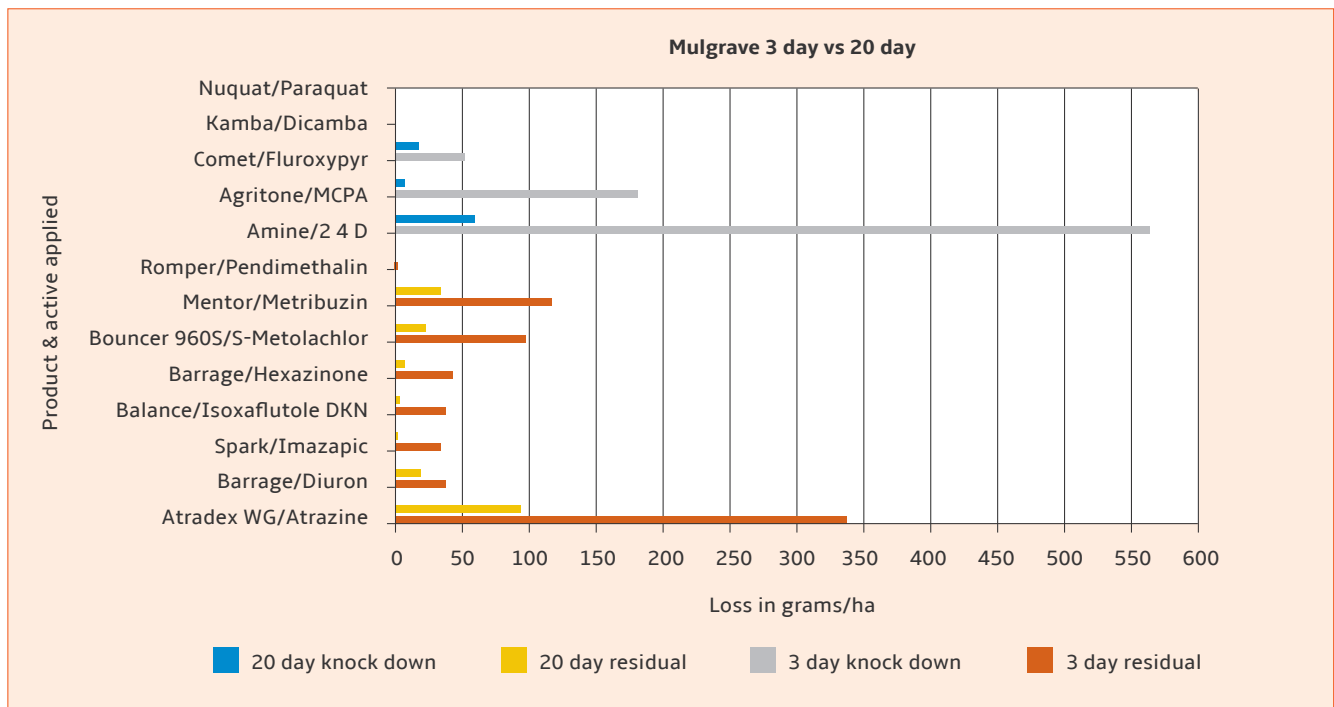
Examples of low losses are paraquat (zero loss across three site), dicamba (close to zero loss across three sites) and pendimethalin.

Higher losses were recorded with more mobile products such as atrazine and metribuzin in the residual chemical suite and 2,4-D and MCPA in the knock down suite. Factors that contribute to this are:

- Greater mobility (solubility in water and less ability to bind to soil) increases risk of loss and,

- The rate (or total amount) of the chemical applied; lower applied volumes reduce the risk of loss.

Early in the season there is a greatly reduced chance of loss of chemical to the environment. As the wet season approaches, and the likelihood of runoff within 20 days is increased, choose chemicals and your method of application carefully.



#### A note on relative risk

These results show loss of herbicides to the environment. This is one aspect of the risk posed by agricultural chemicals to the environment.

Any chemical's risk to the environment is also a factor of toxicity and half-life (length of time for the concentration of the chemical to decrease by half).

The relative risk of each chemical is also connected to mobility, which is a combination of the chemical's ability to bind to soil or organic matter and how soluble it is, which is reflected in the rainfall simulation results.

SRA is working with James Cook University, Department of Science, Information Technology and Innovation and the Department of Environment and Heritage Protection to bring this information together to create a resource that cane farmers can use when selecting chemicals.

#### Future activities

We are planning and implementing a series of paddock scale demonstrations with end of row water quality monitoring.

Growers in this project have had input into the treatments applied for both paddock scale demonstration and the 2017 rainfall simulation activities.

If you grow sugarcane in the northern Wet Tropics and would like to learn more or get involved contact Belinda Billing on 0475 954 437 or email [bbilling@sugarresearch.com.au](mailto:bbilling@sugarresearch.com.au)

The project is a collaborative effort, with SRA, EHP, TCPSL, Bayer, Crop Care, JCU, Tully Sugar and QDAF to address best management of weeds and pests and improving water quality in the Wet Tropics.

We acknowledge the support of MSF sugar.





# Can 'big data' step-change agriculture?

*A major collaborative project is underway, as part of the Rural R&D for Profit programme, to investigate the potential for farmers from big data and precision agriculture. By Nicole Baxter, GRDC GroundCover magazine*

Digital agriculture is rapidly becoming part of the farming landscape as growers, millers, and extension providers tap into this new toolkit.

One specialist in the area, Australian Farm Institute general manager of research Richard Heath, says one way to look at digital agriculture is to consider how precision agriculture, which is already in place, can better inform decision-making.

He has been involved with a research initiative called 'Accelerating precision agriculture to decision agriculture' (P2D), which is investigating the use of big data in Australian agriculture. The initiative is funded by the Federal Government's Rural Research and Development for Profit programme and draws support from all 15 of Australia's research and development corporations, including SRA.

Mr Heath says 'decision agriculture' has this name because it uses information from precision technology, which is connected seamlessly in the 'cloud' via information aggregation platforms. These platforms are linked to decision-support analytics to help improve decision-making.

As part of the P2D project, the Australian Farm Institute was tasked with writing case studies to show how big data is being used in agricultural supply chains in the US.

## Agrian

One case study focused on the farm management software platform Agrian.

Mr Heath says Agrian started as a compliance-based system for horticultural production in California, one of the most regulated states in the US, but has been expanded to meet the needs of broadacre agriculture.

He says Agrian supports compliance through the supply chain, from an agronomist's recommendation to a farmer's actual use, ultimately helping to assure safe application of crop protection products.

Other information that can be stored on Agrian includes paddock records, planting data, yield maps, satellite imagery, the results of mobile scouting, crop planning and budgeting records, laboratory analysis results, nutrient management and crop protection use and variable-rate application data.

Another feature of the platform is a manufacturer product database that enables users to search for detailed product information as well as safety and compliance data, such as where use of a product might be restricted.

"Regulatory requirements for agriculture, particularly in relation to environmental sustainability measurements, are likely to increase over time," he said.

"Platforms like Agrian provide the opportunity for farm equipment and record-keeping software to interface and integrate with other compliance and stewardship programs."

Mr Heath says the end result is that compliance programs become less of a burden for farmers and more integrated with standard farm management practice. To illustrate how this might work, he points to the Canadian Field Print Initiative, a Canadian Government program to provide environmental best practice benchmarks for fertiliser application.

"The developers of Agrian worked with the Canadian Government to create APIs so that farm data collected on Agrian's platform feeds directly into the Canadian Field Print Initiative, eliminating the need to have duplicate systems for record-keeping."



**Australian Government**  
Department of Agriculture  
and Water Resources

*This project is supported by funding from the Australian Government Department of Agriculture as part of its Rural R&D for Profit programme.*

## For more information

**Richard Heath**  
(02) 9690 1388  
heathr@farminstitute.org.au



Russell Jordan has gained significant efficiencies by automating his furrow irrigation.

## Automation delivering efficiency in Burdekin gravity-fed irrigation

*A project investigating automation of furrow irrigation has found that the system works effectively on gravity-fed irrigation systems, as shown through on-the-ground experience in the Burdekin.*

Russell Jordan has saved precious time and water through the use of automation technology for his gravity-fed furrow irrigation at his Upper Houghton farm in the Burdekin.

Not only that, because this farm is about 10km away from his home farm, he is no longer a slave to multiple trips, at specific times, to change irrigation shifts.

“Before the automation, I’d be around to this farm at least twice per day and most times more often. I also found that the shifts didn’t fit the same rotation as the other farms,” Russell explained. “That could lead into the night, and with the 10km each way I was easily losing 30 to 45 minutes each time.”

Like many farms in the BRIA, water is gravity-fed from the SunWater channel.

This farm does not have recycle pits, so Russell has always tried to be as efficient as possible – but this is now a much easier task with the installation of the technology.

The automation equipment was established at Russell’s farm as part of an SRA-funded project called *Modernisation of furrow irrigation in the sugar industry*, which was led by Dr Malcolm Gillies at the University of Southern Queensland and the National Centre for Engineering in Agriculture (NCEA).

Steve Attard with AgriTech solutions has worked on the project and said that the work at Russell’s property showed that you did not need mains power or pumps to make automation work.

“With advance sensors in the field, about 100 metres from the tail end, Russell can turn his first irrigation set on, and then when the water reaches that advance sensor, the system automatically recognises that, opens the next valve, and closes the first valve,” Steve said.

“Russell can now avoid the frustrating situation of being close to the end of a job on the tractor, but having to pull up stumps and go to another farm to avoid a flood at the end of the paddock. He knows this system is working.”

The sensors were originally placed closer to the end of the 1.3 km long field but based on initial measurements and modelling the correct position was determined so that water reaches the end of the block, while minimising the volume that runs off.



With Russell now having confidence in the position of those sensors, they will be trenched in permanently and deep enough to avoid damage from in-field cultivation.

The trenching and long cabling runs for these sensors increases the costs compared to the other sites in this project where the advance sensors are placed in drains close to the radio.

A pressure transducer is installed in the first cylinder from the channel outlet. This transducer provides a fail-safe by notifying Russell when the water pressure gets too high, such as if the valves haven't opened. If grates are blocked, or valves have remained open, or fluming has blown off, he also receives a notification if the water level drops too low.

"If anything goes wrong, the system shuts down and sends you an SMS or an email, which most people now have in their pocket 24/7. On this farm it is only gravity fed, so it is not as crucial, but this fail-safe is crucial if you had a pumping system," Russell said.

Five irrigation sets have been automated. Each cylinder has only one outlet which means one radio controls just one actuator.

This increases the cost of the overall system, although if there were two outlets per cylinder, each radio could control two actuators, which would reduce the cost.

Russell admitted that the technology was a bit daunting and needed to earn his trust initially, but he now has confidence in the system.

Russell has completed 85 hectares out of 104ha on this farm, and plans to expand with the technology to his other farms.

"I can see the savings, especially my own time. But there's also fuel and wear on my ute, plus the water savings. We also want to be efficient with our water – I'd much prefer to put the precise amount on my paddock.

"The costs are substantial, so it will be a job that we will stagger over a few years. But it will be great to get it all done."

This farm is also the focus of a federally funded Smarter Irrigation for Profit program, a collaborative project between the sugar, cotton and dairy industries.

In this project, Russell is continuing to work with Malcolm Gillies and Steve Attard on other technology that would improve the scheduling of irrigation events including growth measurement cameras, soil moisture probes, rain gauges, and weather stations.

"These cameras are in their early stages, but I think down the track we may be able to use them for growth measurements instead of stopping around in the mud, and then we may be able to optimise our irrigation scheduling."

**For more information**

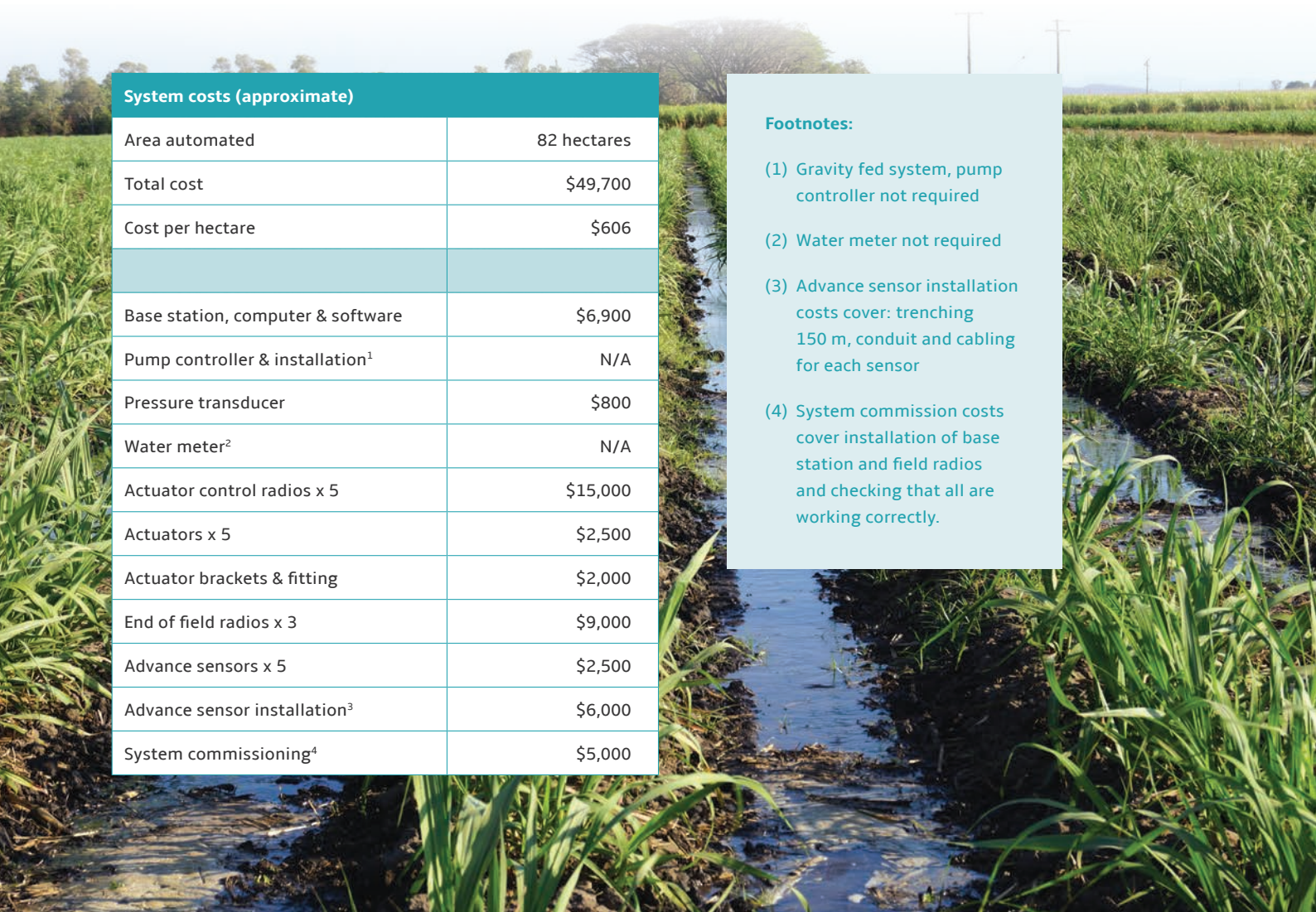
To see the CaneClip on Russell's experience, visit <https://sugarresearch.com.au/sra-information/media/>

**Russell Jordan**  
0427 768 479  
jorfarm@exemail.com

System costs (approximate)	
Area automated	82 hectares
Total cost	\$49,700
Cost per hectare	\$606
Base station, computer & software	\$6,900
Pump controller & installation <sup>1</sup>	N/A
Pressure transducer	\$800
Water meter <sup>2</sup>	N/A
Actuator control radios x 5	\$15,000
Actuators x 5	\$2,500
Actuator brackets & fitting	\$2,000
End of field radios x 3	\$9,000
Advance sensors x 5	\$2,500
Advance sensor installation <sup>3</sup>	\$6,000
System commissioning <sup>4</sup>	\$5,000

**Footnotes:**

- (1) Gravity fed system, pump controller not required
- (2) Water meter not required
- (3) Advance sensor installation costs cover: trenching 150 m, conduit and cabling for each sensor
- (4) System commission costs cover installation of base station and field radios and checking that all are working correctly.





Steve Attard, AgriTech Solutions, discusses the automation with Aaron Linton.

## Automation: **110** fewer hours per year sitting in the ute

*Automation of furrow irrigation has allowed Aaron Linton to better balance a busy business and family life with farming – and also deliver productivity and efficiency.*

Burdekin farmer Aaron Linton had already seen the benefits of irrigation automation from the work he had done installing a drip system at his Leichhardt farm.

So when the opportunity arose to expand the automation to his furrow irrigation on the same farm, he jumped at the opportunity.

This came about through an SRA-funded project led by the University of Southern Queensland and the National Centre for Engineering in Agriculture, with input from AgriTech Solutions and Burdekin Productivity Services (BPS).

Through the project, Aaron automated 11 irrigation sets over 53 hectares, with water delivered via pump direct from the river. The drip on the rest of the farm was already automated.

The property is 35km from Aaron's home, and with a young family and a hire business on the go, the benefits of the automation were immediate.

"Even if I save three trips per week, this equates to 11,000 km per year, and in reality I was saving a lot more than that without even fully realising it," Aaron said.

"That equates to about 110 hours or a whole month of work for someone in a government job, so that is a lot of time that I can spend on other businesses, my family, my own time, or being able to sleep at night."

He also sees that there will be productivity improvements through yield, which he will only be able to quantify after using the automation for a few more years.

He has learnt that he was often not applying sufficient water for his cane at peak times, which he is rectifying through pulse irrigation.

This involves irrigating one poor soaking set for an hour, changing to a second set for an hour, changing to a third set with better soakage for four hours, and then switching back to the first blocks for another hour each. This appears to be improving the wetting and infiltration on these blocks. "Without the automation you just could not physically do it. Even if you lived on site, it would be a huge job," he said.

He is also able to take advantage of specific cheaper irrigation tariffs, something he said was increasingly important as electricity prices continued to increase year-on-year.



He was previously on a day/night tariff (tariff 65), whereas now he has switched to a weekend tariff (tariff 62) to use the cheaper off-peak hours.

“That of course means irrigating all weekend, but with a young family, that just wasn’t possible before. Now I use the iPad to set up the program and off it goes. If there is problem, it emails me and I can be anywhere, so long as I have internet reception.”

To establish the automation, pump controllers have been installed on both pumps and there are 11 actuators which are controlled by six actuator control radios. The layout of the fields and drainage network allow the system to monitor the runoff from all eleven blocks with three drain sensors.

Pressure transducers have been installed in the pipelines from the pumps to monitor the height of water and to provide a fail-safe should something go wrong.

For example, if a valve fails to open and the pressure increases above a calibrated limit, the system will either shut down or will send Aaron an alert.

Aaron was also interested in monitoring flows, therefore the existing mechanical water meters were replaced with electronic meters that are able to log water usage and are compatible with the WiSA software.

“I’ve gone weeks without going to the farm now in peak irrigation season in situations when I haven’t had to do any other work there. All the sensors and equipment are showing me that there are no problems. So, I’ve just let it run its course and everything’s been perfect, every time.”

He encouraged anyone who was interested in the automation to calculate and value their own time. Through the project, the assumptions were for a 3.5-year payback period at Aaron’s property, and this did not include yield improvements.

“It does seem expensive when you are going to install it, but the benefits are worth it. With electricity, if you miss the changeover for a tariff, the cost can switch from say 17 cents to 48 cents.

“Even for farms that are gravity-fed, water is generally \$50 to \$60 per megalitre, so the cost of over-irrigating can add up. And that’s before you get to the crop benefits of getting water on it when it is needed, or avoiding water logging.”

#### For more information

To see the CaneClip of Aaron’s experience, visit <https://sugarresearch.com.au/sra-information/media/>

#### Aaron Linton

0407 826 270

[aalinton@bigpond.com](mailto:aalinton@bigpond.com)

System costs (approximate)	
Area automated	53 hectares
Total cost	\$68,365
Cost per hectare	\$1,290
Base station, computer & software	\$7,700
Pump controller & installation x 2	\$7,000
Pressure transducer x 2	\$800
Water meter x 2 <sup>1</sup>	\$11,465
Actuator control radios x 6	\$18,000
Actuators x 11	\$5,500
Actuator brackets & fitting x 11	\$4,400
End of field radios x 2	\$6,000
Advance sensors x 3	\$1,500
Advance sensor installation	\$1,000
System commissioning <sup>2</sup>	\$5,000

#### Footnotes:

- (1) Included replacement of SunWater flowmeters, would not be required if existing meter was electronic
- (2) System commission costs cover installation of base station and field radios and checking that all are working correctly.



# Making the most of the SIX EASY STEPS nutrient management program

*The SIX EASY STEPS program is recognised as the basis for best practice nutrient management in the Australian sugar industry. Ongoing learning and continuous improvement are fundamental to the program. By **Bernard Schroeder**, University of Southern Queensland and **Danielle Skocaj**, SRA*

When used as intended, the SIX EASY STEPS allow nutrient management to be improved as we learn more about better ways of managing nutrients. We do this through testing, validation, and implementation. This leads to better insights, identification of opportunities and also helps the industry understand where we need further skills and knowledge. The program is based on sound information and logical reasoning.

## Better nutrient management

There has been much progress over the last few years in getting growers and their advisors familiar with, and using, the SIX EASY STEPS framework. This is especially the case with STEP 3 (Soil testing regularly) and STEP 4 (Adopting soil-specific nutrient management guidelines).

Step 5 (Checking the adequacy of nutrient inputs) and Step 6 (Modifying nutrient inputs when and where necessary) particularly relate to the ongoing learning aspects of the SIX EASY STEPS program. These two steps aim to develop on-farm expertise for further refinement of nutrient management options for specific circumstances. An example is the development and use of on-farm nutrient management plans that include multi-seasonal assessments of nutrient inputs, yield data, and the economic and environmental implications.

The SIX EASY STEPS framework	
Step	Description
1	Knowing and understanding our soils.
2	Understanding and managing nutrient processes and losses.
3	Soil testing regularly
4	Adopting soil-specific nutrient management guidelines
5	Checking on the adequacy of nutrient inputs
6	Keeping good records to interpret trends and modify nutrient inputs when/where necessary





### Nutrient management planning

The SIX EASY STEPS program has always included nutrient management planning. It is aimed at sustainable sugarcane production, which is dependent on adequate and balanced nutrient inputs. Importantly, it assists growers to optimise yields and profit, maintain or improve on-site soil fertility, and minimise off-site impacts.

On-farm nutrient management plans need to consider which nutrient inputs and practices are best for a particular block of cane. Sometimes this can be done by developing the best options for a block of cane as a whole, but if in-field variations exist, then sub-block management may be needed.

Once nutrient requirements have been established, whole-of-farm nutrient management plans may involve some rationalisation to ensure the choice of fertilisers, rates and practices are practical and achievable.

### Position in the landscape to guide nutrient management

Knowledge of position of soils in the landscape provides a very useful basis for managing nutrients more effectively. It enables your management to be tailored to your circumstances by relating chemical properties and physical characteristics (especially texture) to other soil attributes such as drainage and nutrient loss.

Farm-specific knowledge forms the basis for STEP 1 (Knowing and understanding our soils) and STEP 2 (Understanding and managing nutrient processes and losses) of SIX EASY STEPS. However the full SIX EASY STEPS process will ensure additional knowledge and skills are acquired and used for improving and further refining nutrient management for individual blocks or soils. This process is illustrated using an example from Tully (see below).

Soils around Tully can be broadly grouped as igneous or alluvial. The soil mapping undertaken by CSIRO in the 1980s classified soils into soil types that are generally identified by local place names. People become familiar with these names as they use the system and understand the concepts and properties associated with each of the identified soil types.

For instance, Thorpe series soils have dark grey sandy loam topsoils with yellowish brown sandy clay loam subsoils. They are found at the base of the granitic mountains in slightly upland positions. They contain a predominance of coarse sand and gravel, have relatively low CECs, and low organic carbon contents. They are permeable and reasonably well-drained and have low water-holding capacity. Ratoon cane grown on these soils requires about 140 kg nitrogen (N)/ha. Leaching of N is the biggest risk, but runoff can also occur with excessive rainfall. There is little opportunity to reduce N application rates when conventional (non-EEF) fertiliser products are applied to these soils. This is primarily due to the inherent loss pathways and the overall low fertility of these soils.

In contrast, Hewitt series soils are derived from alluvium. They have dark brown to black light clay topsoils with mottled grey and yellow subsoils. They are found in bottomland positions and depressions, and often become saturated in the wet season. The high organic carbon content of the topsoils enables relatively large amounts of potentially mineralisable N. Ratoon cane grown on these soils therefore requires about 100 kg N/ha. Denitrification is the largest potential loss pathway due to the frequent water-logging. Cane grown on these soils is generally unresponsive to applied N during extremely wet seasons. If this type of climatic condition is expected, then further reductions in N rates could possibly be considered.

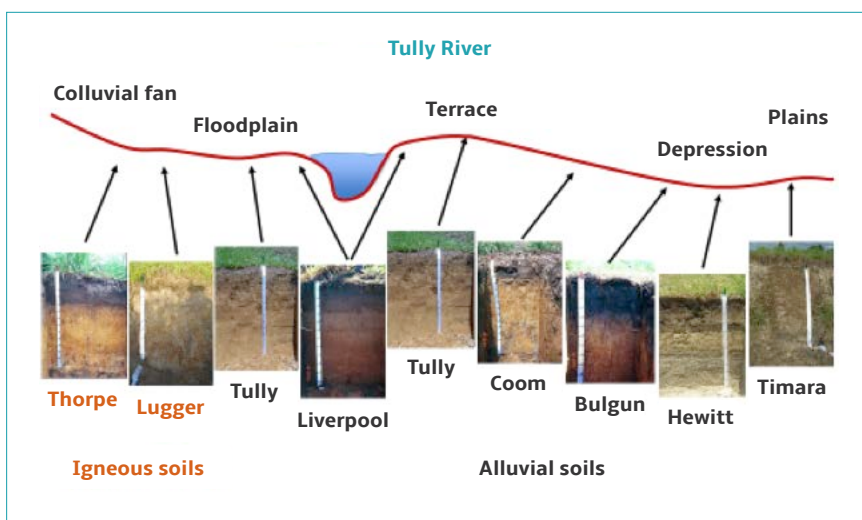
### Take time to understand the soils on your farm

Knowing and understanding your soils and planning your nutrient requirements will give you the right tools to be able to make logical decisions about your fertiliser choices. The associated improvements and learnings from the SIX EASY STEPS process will assist with managing risk and spending your fertiliser budget sensibly.

### For more information

#### Gavin Rodman

grodman@sugarresearch.com.au  
0476 807 355



### The SIX EASY STEPS team

Bernard Schroeder (University of Southern Queensland)  
Barry Salter (SRA, Mackay)  
Danielle Skocaj (SRA, Tully)  
David Calcino (SRA, Meringa)  
John Panitz (SRA, Bundaberg)  
Glen Park (SRA, Ingham)  
Zofia Ostatek-Boczynski (SRA, Indooroopilly)  
Eric Kok (SRA, Mackay)  
Andrew Wood (Consultant, Millaa Millaa)  
Alan Hurney (Consultant, Edmonton)  
Gavin Rodman (SRA, Meringa)  
Nick Hill (SRA, Mackay)

*Pasteuria* bacteria are most likely to multiply when a controlled traffic and minimum till farming system is adopted.

## Beneficial bacteria can help reduce losses from nematode pests

### Project details

#### Key Focus Area

Soil health, nutrient management, and environmental sustainability

#### Project name

Regenerating a soil food web

#### Project number

2014/004

#### Chief investigator

Graham Stirling

Scientists have been studying the biocontrol capacity of an underground bacteria that has the potential to deliver productivity improvements to the Australian sugar industry, with their research also suggesting that it is only likely to be effective when best-practice farming systems are used.

*Soil biologists have dug deeper into their understanding on the interaction between the bacteria *Pasteuria penetrans* and its impact on plant-parasitic nematodes, providing useful information for sugarcane growers and millers.*

The bacteria – called *Pasteuria penetrans* – is a natural parasite of root-knot nematodes, which are microscopic creatures that can damage the roots of sugarcane, resulting in lost production for sugarcane growers and millers.

In new collaborative research conducted at SRA's Woodford pathology research station, scientists have discovered that when there is a high concentration of *Pasteuria* in the root zone of sugarcane plants, the bacteria significantly reduces populations of root-knot nematode, one of the most damaging pests of sugarcane.

Project leader Dr Graham Stirling said that root-knot nematode is widespread in light-textured cane-growing soils and managing the pest is challenging because current sugarcane varieties are susceptible. There are also no economically-effective control measures.

The researchers said that the key message from their research was that the bacteria was most likely to multiply when a controlled traffic and minimum till farming system is adopted. When soil is cultivated, the interaction between *Pasteuria* and its nematode host is disrupted and this prevents the parasite reaching the high densities required to achieve nematode control.

Another important message was that water and nutrient inputs had to be optimised, as this reduced losses from the nematode while the beneficial bacteria were multiplying.

"Importantly, some growers are already using best practice farming systems like this and – provided they are maintained for several sugarcane crop cycles – we would predict that *Pasteuria* will gradually increase to levels that will suppress root-knot nematode," Dr Stirling said.



The research was led by Dr Graham Stirling of Biological Crop Protection as part of the SRA-funded project *Regenerating a soil food capable of improving soil health and reducing losses from soil-borne pests and pathogens of sugarcane*.

The experiments involved collaboration with SRA Leader for Disease Traits, Dr Shamsul Bhuiyan, and Dr Jay Anderson from the University of Queensland.

Soil was collected from a field in Bundaberg where root-knot nematode was heavily-infested with *Pasteuria*. When it was used in a pot experiment at SRA's Woodford glasshouse,

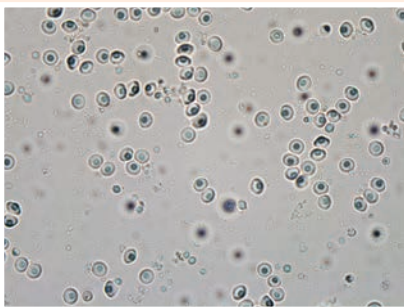
the results showed that the parasite was having a major impact on root-knot nematode populations. The nematode was inoculated into *Pasteuria*-infested and *Pasteuria*-free soil and when nematode populations were checked 19 and 37 weeks later, 96 percent and 99 percent fewer root-knot nematodes were recovered from the naturally-infested field soil than from the soil that did not have *Pasteuria*.

In another experiment, sugarcane was grown in sand containing a range of spore concentrations and the effects of *Pasteuria* were assessed after 6, 13 and 20 months. The results showed that the severity of root galling and

the number of nematode eggs produced per plant decreased as the spore concentration increased. At the highest spore concentration (50,000 spores/gram soil), root-knot nematode populations were reduced by more than 80 percent.

Dr Stirling said that, collectively, these results show that *Pasteuria* is a useful biocontrol agent, as it can markedly reduce populations of root-knot nematode in cane-growing soils.

"*Pasteuria* has the potential to provide significant economic benefits, as nematodes are costing the sugar industry more than \$80 million per year in lost production," he said.



*Pasteuria* spores – after the spores germinate, the parasite spreads through the nematode's body, preventing reproduction.



**Above:** Root-knot nematode.



**Above:** Nematode infected with the *Pasteuria* bacteria.

## What is *Pasteuria penetrans*?

- *Pasteuria* are specialised parasites of nematodes. Spores of the bacteria attach to the nematode as it moves through soil. After the spores germinate, the parasite spreads through the body of the nematode and prevents it from reproducing.
- The bacterial genus *Pasteuria* contains hundreds of nematode-attacking strains that are relatively specific to particular hosts. The bacteria infects all important nematode pests and because it prevents its host from reproducing and its endospores are resistant to environmental stresses such as heat and dryness, it is one of the most useful biological control agents of plant-parasitic nematodes.
- A recent survey of sugar production areas in Australia showed that *Pasteuria* was present in more than half the fields sampled, with spores being seen on root-knot (right), root-lesion, stunt, and spiral nematode. In most cases infestation levels were relatively low, with less than 5 percent of the nematodes having spores attached. However, several sites had relatively high infestation levels, indicating that when appropriate management practices are used, *Pasteuria* will multiply and provide some control of nematode pests.



Roots with galling from root-knot nematode.



## Research assesses the impact of legume companion cropping

*Troy Apps has been investigating the role of a legume companion crop with his sugarcane.*

Sunshine Coast farmer Troy Apps is keen to experiment to help improve productivity and sustainability.

Farming in a region with relatively low growing costs— but with no local mill since the closure of the Moreton Mill in 2003 – innovation has been at the heart of ensuring his business can remain viable.

That is why he has been a keen investigator of legume companion cropping to see if it could improve his input efficiency and soil health.

Troy has also been involved in work with UQ, which was funded by the Australian Government Department of Agriculture and Water Resources, and which provided him the opportunity to obtain a custom-made legume planter and learn more of the science behind the on-farm experimentation he had already been doing.

The project was led by UQ researchers Susanne Schmidt and Richard Brackin with the collaboration of Herbert Cane Productivity Services Limited and BBIFMAC in the Burdekin. They worked with Troy and Herbert growers Stephen and Brenden Accornero and Burdekin growers Bryan and Terry Granshaw, and Don Salter.

The project aimed to discover if legumes could be grown simultaneously with sugarcane and deliver biologically-generated legume nitrogen (N) to the sugarcane crop.

The results pointed to the need for further research. In a paper presented to the International Nitrogen Conference 2016, the research team said there was a need to further investigate companion cropping across regions, fertiliser rates and planting times to optimise the system.

“Similar to previous studies (in other crops) that detected neutral or negative impacts, the success of intercropping is determined by factors including legume planting time, nitrogen fixing capacity, and water availability,” the researchers said.

They also identified that growers could also be interested in the potential for companion crops or intercrops to reduce soil biological constraints.

This project was funded by the Australian Government Department of Agriculture and Water Resources *Action on the Ground* program.

The research was not funded by SRA, but there are a number of SRA-funded projects currently investigating efficient nutrient use in sugarcane, including systems that better synchronise nutrient application to the crop’s requirements to help farmers continue to improve efficiency, and selecting and breeding more N efficient sugarcane varieties.



**Far left:** The soybean planter purchased as part of companion cropping research at Troy Apps's property.

**Left:** Sunshine Coast farmer Troy Apps continues to investigate new approaches for efficiency and to improve soil health.

There has also been research underway as part of the SRA-funded project led by Dr Graham Stirling: *Regenerating a soil food web capable of improving soil health and reducing losses from soil-borne pests and pathogens of sugarcane.*

Dr Stirling's work investigated intercropping and companion cropping along with many other aspects of the modern farming system, building on the work of the Sugar Yield Decline Joint Venture (SYDJV).

It worked with growers included Simon Matsson at Marian to look at the impact of companion crops and inter-cropping (fallow cropping) on the soil micro-biological community.

While the benefits of fallow cropping are widely appreciated and understood, Dr Stirling said that intercropping sugarcane with various plant species continued to be the subject of investigation, although to date the benefits to the health of sugarcane soils had rarely been assessed.

"There is also need for long-term trials so that data can be collected from plots that have been intercropped for at least one sugarcane crop cycle," he said.

Dr Stirling also investigated whether intercropping increased damage nematodes in sugarcane soils, as had been observed in some overseas studies.

While the small number of trials did not see a marked increase in nematodes, this is another issue that requires further investigation.

Dr Stirling has presented some of this work at Soil Health Masterclasses that occurred in 2017, with more events planned for 2018. Keep an eye on the SRA website for more details.

**For more information on soil health and nematodes**

See previous story on page 18-19

**Image this page**

Companion cropping in the field.



# On level ground

Mastering your soils for greater productivity and profitability

*A grower stands in a fallow block, grabs a fistful of earth and lets it run through his fingers. "God's country," he says.*

Not all farms are on what are considered to be the best soils, but all farmers can make the best of the soils they have by implementing an improved farming system that promotes good soil health.

We know that the soil is the foundation on which a healthy and productive sugarcane crop is grown, and is one of the first things considered when planning farming activities. And yet there is still much to be understood when it comes to soil health.

The Sugar Yield Decline Joint Venture was a long running project that investigated the causes of yield decline in the sugar industry and then went on to develop a series of science-based recommendations. Although the learnings from this project are vast and complex, improving soil health was the focus and an improved farming system was identified that would, over time, restore the health of sugarcane soils. The improved farming system involves the implementation of four main practices:

1. Fallow rotation crops and continuous cropping
2. Zonal tillage
3. Controlled traffic
4. Crop residue/organic matter retention

*The term soil health has been defined in various ways, but here, is referred to as:*

***A measure of soil physical, chemical and biological condition that reflects the capacity of a given soil to support a profitable and sustainable farming enterprise.***

SRA has identified poor soil health as an impediment to productivity and profitability and is investing in a number of areas that aim to improve the quality of our soils.

This investment ranges from building on the work of the Sugar Yield Decline Joint Venture, to developing and benchmarking a standardised, industry specific, soil health or soil quality measurement test, building soil management capacity within the industry and further investigating the science around soil biology and the root system.



## Soil Science

Research is continuing within the area of soil health. To build on the science that has previously been conducted, focus is shifting to soil biology and the root system.

An example is the work to study the efficacy of a bacterial biocontrol agent for controlling root-knot nematodes. You can read about the project in the story on page 18-19.

**Below:** Masterclass held in Ballina, March 2017. Feedback from participants included: "Very good workshop with excellent information that was well presented. Format with theory followed by 'hands on' opportunities was also excellent."

## Extending the science

A major development and extension project was launched this year to provide industry with standardised soil health measuring tools and tests for the field and the lab.

With collaboration from growers, productivity services, millers, harvester operators, university researchers and SRA, this project brings experts from various fields together to determine what chemical, physical and biological indicators are the most relevant to our soils and crop.

The project aims to benchmark soil health based on specific regional conditions. In other words, determine soil health targets based on what is achievable on a specific paddock, which may have duplex sodic soils versus down the road on deep alluvial riverbank.

The field trials comparing long-term improved, conventional, and transitioning farming systems will form the baseline to also demonstrate and extend the implication of farming practices on soil health, profitability and productivity over time.

## Capacity Building

The Soil Biology and Soil Health Masterclasses are designed to impart knowledge through practical masterclasses that focus on how the knowledge gained through science can be implemented on farm to improve productivity and profitability.

Practical examples from growers who have implemented the new farming system brings the science and practice together.

The masterclasses have so far been delivered to growers and advisors in Ingham, Mackay and NSW and will be delivered in the Far North, Burdekin and Bundaberg regions in 2018.





## Diversification and innovation help ride the industry ups and downs

*The Puglisi family at Mossman have plenty of irons in the fire with their diversified business, but at the heart of their operation is ensuring their business is productive and profitable. By Brad Pfeffer*

The shift from a rotary hoe to a wavy disc cultivator is hoped to deliver soil health benefits and reduce costs for the Puglisi family in Far North Queensland.

Farming 188 hectares north side of Mossman, Angelo and Gerard Puglisi bought the new cultivator in 2016 from Hudson Engineering in the Burdekin.

They had already been working in recent years to move to zonal tillage with a rotary hoe, as well as to introduce other farm improvements such as GPS guidance and fallow legume crops such as cowpeas or soybean (green manure).

Gerard said that the wavy disc was another step toward less cultivation, which he hoped would continue to improve soil health over the long-term, and also reduce farm costs.

"It will mean fewer passes and less fuel, as we know that we need to keep getting our costs down in order to handle the ups and downs of the industry," he said.

While the rotary hoe was a high-wear implement that had to be run with high revs, the wavy disc machine is much lower impact and costs less to run. Gerard has made some refinements by adding weight to ensure it penetrates to the right depth and he is working toward it being a one-pass machine to form his beds.

In the future, he may also look to use it to incorporate liquid fertiliser.

He chose a one-row implement due to width restraints from a local bridge that would have meant a three-row implement would have been too wide.

Nonetheless, at a travel speed of 10-11km per hour, he said this was amply sufficient for getting plenty of work done.

Innovations – whether big or small – are familiar to Gerard, as he also has a role with NextGen that sees him travel across the industry.

"Farmers are incredible innovators, and that is one of the great things about NextGen," he said. "It brings people together from different regions to talk about different ideas and how to put them to practice.

"The cane harvester is a good example. They all come off the factory floor the same, but I've never seen two cane harvesters that are set up the same once you get them inside the farm gate.



“Everyone is looking over the headland to see what their neighbours are doing.”

Gerard is also always on the lookout for innovations to improve productivity and efficiency.

With a number of other ventures occupying the family, time is a precious commodity for the Puglisis.

As well as the cane, they also have 2ha of cocoa, a farm tour business called Sweet Farm Tours, an on-farm shop to accompany the tours, and a newly planted area of eucalypt trees to grow koala food.

The cocoa production consumes the time of four people for about four hours every two weeks, from April right through to the end of the year. This work has to be balanced with the main activity of the sugarcane season.

The 1.4ha of koala food (eucalyptus) has been planted in partnership with Hartley’s Crocodile Adventures, to ensure food for the koalas that they also have there. This area of the farm, along with the cocoa, was a way of getting an income from flood-prone blocks that were not high performers with sugarcane.

An example of another innovation that the Puglisis are looking at is skip-row fallowing, where the fallowing of a block is spread over two years.

This has already been investigated by some in the sugar industry, including former Grower Group Innovation Projects. It is hoped that spreading the fallow period over two years is a way of improving productivity from the block.

“For example, if we can grow 60 percent of the crop from 50 percent of the area, that is of course a big advantage for us,” Gerard said.

This pattern could work by following three rows, leaving three, and then repeating across the paddock. This will allow them to synchronise the three-row fertiliser box with the pattern.

“There will be a lot of things to work out and get right, but we are looking forward to having a look at it,” he said.

This year’s harvest started on June 5 and is estimated to be about 17,500t, back from the 20,000t harvested in 2016.

Q208<sup>®</sup> remains their major variety, and they also have increasing amounts of Q240<sup>®</sup> and Q183<sup>®</sup> that are so far performing well. They are also trying out Q251<sup>®</sup> and Q252<sup>®</sup>, and in the process of propagating SRA6<sup>®</sup> for a commercial area to be planted later this year.

#### For more information

**Gerard Puglisi**

0428 988 136

[gtpuglisifarming@bigpond.com](mailto:gtpuglisifarming@bigpond.com)



**Left:** Gerard Puglisi with the Hudson-built wavy disc cultivator.



**Below:** Close-up of the discs on the cultivator.





## Talking to you: Grower survey provides valuable industry insights

*The results of the 2017 SRA grower survey are in, revealing industry trends with the adoption of farming practices and an assessment of SRA's performance.*

### *What is the aim of the survey?*

The aim of this survey was **to hear directly from grower members** about on-farm practices, which will **help SRA to invest** in areas of importance for industry. The survey results are valuable in informing and guiding SRA research and adoption programs.

### *How many growers were surveyed?*

SRA conducted a survey of a random sample of **400** of our members in May 2017.

### *SRA's goals*

As an industry-owned company, SRA exists to serve our members in delivering our four goals, which are:

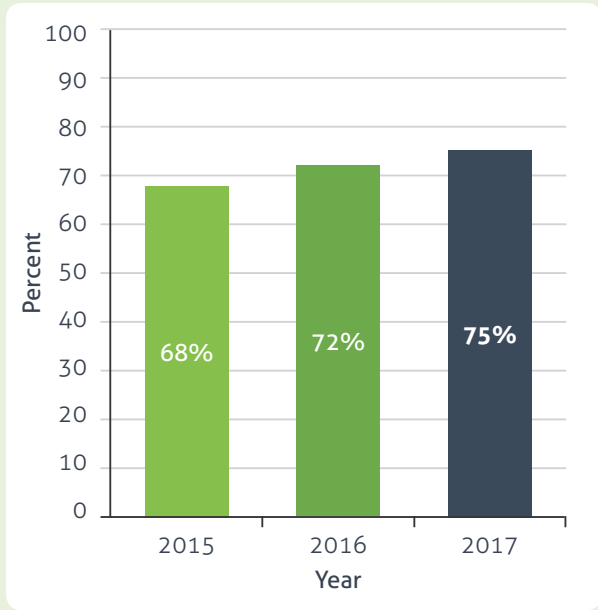
#### Overarching goals

- 1. Drive profitability**  
Through innovation-led productivity gains, step-change and value-adding
- 2. Improve sustainability**  
Through evidence-based research and sustainable production, biosecurity and environmental management
- 3. Enhance capability**  
Through strengthened research and industry partnerships, capability development programs and collaborative knowledge transfer and adoption mechanisms
- 4. Strengthen organisational excellence**  
Through enhanced RD&A investment management, best practice organisational governance and a positive performance-focused organisational culture



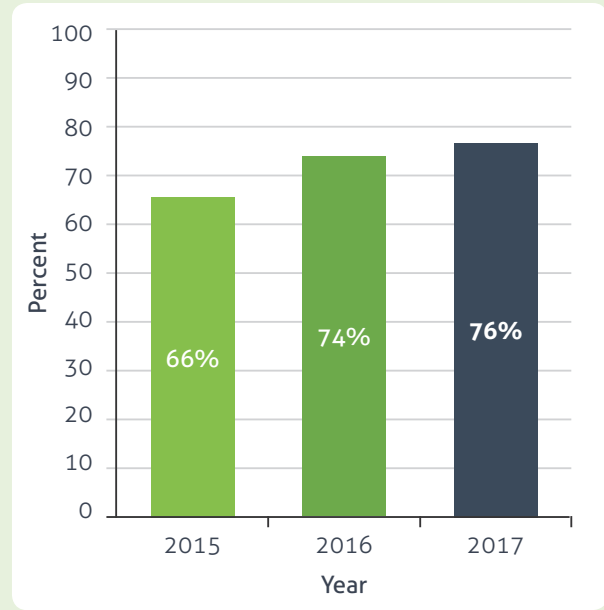
**How much do you currently know about what SRA actually does?**

Respondents who responded with "a considerable amount" or a "fair amount"

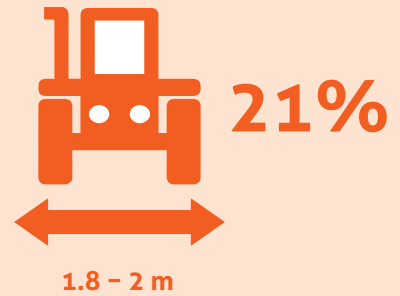
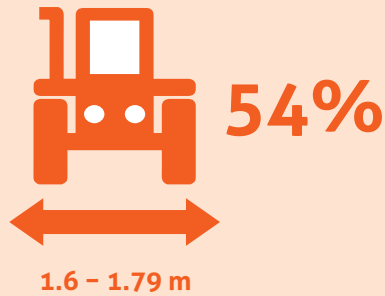
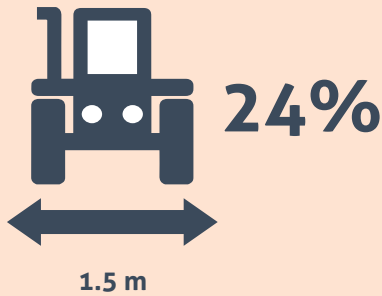


**Overall, how would you rate the performance of SRA as investors in cane research?**

Respondents who gave a *high* performance rating



**Row spacing:**

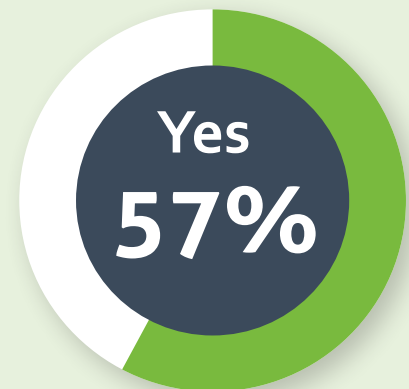


**Number of ratoons cut:**



Ratoons	Percentage
2	2%
3	14%
4	43%
5	28%

**Do you usually grow fallow crops?**



# Total Research Investment

*Sugar Research Australia aims to invest in projects that will deliver real benefits on key issues for its investors.*

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>				
Improving the accuracy of selection in sugarcane breeding trials through accounting for site variability	2012/351	SRA	Xianming Wei	02/06/2018
Applying the genome sequence for variety improvement: validation and implementation	2013/030	CSIRO	Karen Aitken	01/08/2018
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	01/08/2018
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	01/08/2018
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	01/07/2019
Optimising productivity, variety recommendations and mill operations through analysis of mill data	2016/032	SRA	Jo Stringer	01/02/2021
New approaches to identify and integrate Pachymetra resistance genes from Erianthus into the SRA breeding program	2016/039	SRA	Nathalie Piperidis	31/12/2019
Licence to Farm: Nitrogen use efficient varieties to meet the future environmental targets	2016/044	SRA	Prakash Lakshmanan	01/07/2019
Reviewing and extending knowledge of fibre quality assessment and effects of cane varieties	2017/001	QUT	Geoff Kent	01/09/2018
Implementing and validating genomic selection in SRA breeding programs to accelerate improvements in yield, commercial cane sugar, and other key traits	2017/002	UQ	Ben Hayes	01/07/2022
Genetic control and genomic selection for important traits in sugarcane (funding through: Australia-India Strategic Research Fund)	2016803	SRA, Sugarcane Breeding Institute, Coimbatore	Prakash Lakshmanan	01/05/2019



Project Title	Project Number	Principal R&D Provider	Chief Investigator	End Date
<b>Key Focus Area 2 (Soil health, nutrient management and environmental sustainability)</b>				
Strategies to manage soil-borne fungi and mitigate sugarcane yield decline	2013/101	CSIRO	Paul Harvey	01/06/2018
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	15/07/2017
Role of controlled release fertiliser in Australian sugarcane systems	2014/011	CSIRO	Kirsten Verburg	15/07/2017
Boosting N-use efficiency in sugarcane through temporal and spatial management options	2014/045	USQ	Bernard Schroeder	01/10/2017
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
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	30/06/2019
Waste to revenue: Novel Fertilisers and feeds (Rural R&D for Profit)	2015/905	APL	Janine Price	30/06/2018
More profit from nitrogen	2015/907	CRDC	Felice Driver	30/06/2020
Master classes in soil health and soil biology for the sugar industry	2016/025	SRA	Andrea Evers	30/07/2018
Molecular assay of major soil-borne pathogens for better exploitation of commercial varieties	2016/047	SRA	Rob Magarey	01/07/2018
SIX EASY STEPS – continuing perspectives in time and space	2017/004	USQ	Bernard Schroeder	31/12/2021
Measuring soil health, setting benchmarks and driving practice change in the sugar industry	2017/005	SRA	Dave Olsen	30/06/2022
Unravelling the impact of climate and harvest time on nitrogen fertiliser requirements	2017/009	SRA	Danielle Skocaj	01/02/2022
<b>Key Focus Area 3 (Pest, disease and weed management)</b>				
Solving yellow canopy syndrome	2014/049	SRA	Dave Olsen	30/06/2018
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	30/06/2018
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	01/09/2017
Delivery of remote sensing technology to combat canegrubs in Queensland cane fields	2015/038	SRA	Andrew Ward	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	01/01/2020
You can't manage what you can't identify – Managing threat from exotic moth borers through accurate identification	2016/041	SRA	Andrew Ward	01/07/2018
Molecular assay of major soil-borne pathogens for better exploitation of commercial varieties	2016/047	SRA	Rob Magarey	01/07/2018
Investigation of biotic causes of yellow canopy syndrome	2016/064	UQ	Andrew Geering	01/12/2019
Keeping chemicals in their place – in the field	2017/008	SRA	Emilie Fillols	30/06/2020
Delivering solutions for chlorotic streak disease	2017/010	SRA	Kathy Braithwaite	30/06/2020
Integrated disease management of sugarcane streak mosaic in Indonesia (ACIAR-funded project)	HORT/2012/083	SRA	Rob Magarey	31/12/2018

Project Title	Project Number	Principal R&D Provider	Chief Investigator	End Date
<b>Key Focus Area 4 (Farming systems and harvesting)</b>				
A non-pneumatic cane cleaning system with no cane loss	2014/035	QUT	Floren Plaza	20/12/2017
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	Joseph Bonassi	01/05/2019
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
Assessment of new management strategies for marginal soils	2015/007	SRA	Barry Salter	31/12/2019
Bio-prospecting for beneficial endophytes of sugarcane	2015/051	AgResearch	Stuart Card	01/02/2019
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	2016/062	UNE	Andrew Robson	01/01/2020
Understanding interactions between basecutters and other forward – feed components with the cane stalk, and determining practical strategies to minimise damage as harvester speed increases (Rural R&D for Profit)	2016/952	Norris ECT	Chris Norris, Phil Hobson	01/04/2020
Commercial scale economic evaluation of post-harvest cane cleaning to maximise the returns to the supply chain (Rural R&D for Profit)	2016/953	QDAF	Stephen Ginns	30/06/2019
Southern Sugar Solutions	2017/012	DAFQ	Neil Halpin	31/12/2020
Seeing is believing: managing soil variability, improving crop yield and minimising off-site impacts in cane using digital soil mapping	2017/014	UNSW	John Triantafyllis	30/06/2020
Cane Farmer Trials of Enhanced Efficiency Fertiliser in the Catchments of the Great Barrier Reef ( <b>Funding provider:</b> Commonwealth Department of Environment and Energy and Queensland Government Great Barrier Reef Innovation Fund (Reef Trust 4))	2016/807	CANEGROWERS and SRA	Barry Salter	01/05/2021
<b>Key Focus Area 5 (Milling efficiency and technology)</b>				
Reducing the maintenance costs of mill rolls	2013/060	QUT	Geoff Kent	01/08/2019
Real time harvest and transport system	2014/037	QUT	Geoff Kent	01/05/2018
Improving mill efficiency through rapid analysis methodologies	2014/051	SRA	Eloise Keeffe	01/09/2017
Managing aspects of raw sugar quality in the Australian sugar industry	2014/052	SRA	Eloise Keeffe	01/08/2017
Investigation into modifying pan boiling techniques to improve sugar quality	2015/013	QUT	David Moller	30/06/2018
Increasing capacity to undertake cane preparation research through modelling and experimentation	2015/018	QUT	Geoff Kent	01/05/2018
Develop a blueprint for the introduction of new processing technologies for Australian factories	2015/043	QUT	Ross Broadfoot	01/09/2017
Online analysis systems to measure the available nutrients in mill mud	2016/019	SRA	Eloise Keeffe	01/03/2020
Reducing boiler maintenance costs and deferring capital expenditure through improved technology	2016/020	QUT	Floren Plaza	01/07/2019
Evaporator liquor brix sensor	2017/003	Wilmar	Robert Stobie	31/12/2018
Managing aspects of raw sugar quality in the Australian sugar industry – Part II	2017/006	Griffith University	Chris Davis	30/06/2019
Investigations to mitigate the effects of sucrose degradation and acid formation in factory evaporators on sugar recovery and quality, corrosion and effluent loadings	2017/007	QUT	Darryn Rackemann	01/12/2020



Project Title	Project Number	Principal R&D Provider	Chief Investigator	End Date
<b>Key Focus Area 6 (Product diversification and value addition)</b>				
Process for making bagasse paper pulp	2012/053	QUT	Thomas Rainey	01/05/2018
A profitable future for Australian agriculture: biorefineries for higher-value animal feeds, chemicals and fuels (Rural R&D for Profit)	2015/902	QUT	Ian O'Hara	01/03/2019
<b>Key Focus Area 7 (Knowledge and technology transfer and adoption)</b>				
Increasing farm business intelligence within the sugar industry	2014/001	AgProfit	Matthew Bryant	01/09/2017
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
Sugar industry productivity and data recording spatial data hub for research and extension	2015/045	Agtrix	Robert Crossley	28/02/2018
Stimulating private sector extension in Australian agriculture to increase returns from R&D (Rural R&D for Profit)	2015/906	Dairy Australia	Neil Webster	30/06/2019
Protecting our chemicals for the future through accelerated adoption of best management practice	2016/002	SRA	Belinda Billing	01/08/2019
Master classes in soil health/soil biology for the sugar industry	2016/025	SRA	Andrea Evers	30/06/2018
Development of an intelligent tool to allow real time evaluation of harvesting practices as part of a framework for improved harvester payment systems (Rural R&D for Profit)	2016/951	Norris ECT	Stuart Norris, Rob Crossley	30/06/2019
Adoption of practices to mitigate harvest losses (Rural R&D for Profit)	2016/955	SRA	Phil Patane	30/06/2019
Productivity improvements through energy innovation in the Australian sugar industry	2017/011	Ag Analytics	Jon Welsh	30/06/2020
<b>Key Focus Area 8 (Collaboration and capability development)</b>				
Enhancing sugarcane for decreased water content and increased sugar content at harvest	2011/072	QUT	Anthony Brinnin Mark Kinkema	01/05/2018
Production of furanics and chemicals from bagasse and molasses	2012/074	QUT	Joshua Howard William Doherty	01/06/2017
Effect of organic nutrients on sugarcane growth, microbial activity and greenhouse gas emissions	2013/078	UQ	Susanne Schmidt	01/06/2018
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	30/06/2018
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	01/06/2018
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	01/02/2019
Delivering a novel DNA-based diagnostic for root health to the sugar industry	2015/402	CSIRO	Johann Pierre	01/12/2017
A boiler simulator for improved operator training	2016/001	QUT	Anthony Mann	01/07/2018
Integrated standardised competency based training for sugar milling operators	2017/013	QUT	David Moller	01/12/2019

**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** 07 3331 3333  
**Fax** 07 3871 0383  
**Email** [sra@sugarresearch.com.au](mailto:sra@sugarresearch.com.au)  
**Web** [sugarresearch.com.au](http://sugarresearch.com.au)

