

# PROJECT CATALYST

PROJECT CATALYST 2019 – **BACK TO OUR ROOTS - SOIL, WATER AND THE REEF**



**HERBICIDE RESISTANCE**  
*Reducing the financial burden*

**LICENCE TO FARM**  
*Increasing nutrient use efficiency in sugar cane*

**ROAD TO POLYCULTURE**  
*The power of plant diversity*



Image: Project Catchment Canberra Trip - Parliament House Surprise Meeting 24 October 2018

What an amazing, productive and “full-on” year it has been since we were all together at the 2018 Forum in Townsville. We had over 200 people register for the 2018 Forum, making it the biggest event that Project Catalyst has held yet and I think it was a great success. Certainly the feedback we received was very positive.

During the year Project Catalyst has either hosted or participated in 50 events, attended by over 1900 people, including shed meetings, field days, briefing sessions and of course the 2018 Forum. By participating in these events it helps to spread the word and invite participation in innovation, sharing of information and networking of all the growers who are working to improve their farming practices and the environment.

In April 2018 I travelled to Canberra with Andrew Rouse from WWF-Australia (Project Catalyst Partner Organisation) and Kim Kleidon, to update the Department of Environment and Energy (DEE) on Project Catalyst and its activities and achievements. The DEE is responsible for administering the Reef Trust 3 funding from the Federal Government

that we are utilising to run the Project including the 111 current trials. They were incredibly interested in the work that is being done by all of the growers and commented on how much positive activity the project generates.

We were also able to visit Canberra again November 2018 but this time with six of our Project Catalyst Growers from across the three regions. Coca-Cola (a founding partner) organised a celebration breakfast for 10 years of Project Catalyst at Parliament House with around twenty federal politicians and their representatives. The event was very well received and allowed politicians from all parties to interact with North Queensland cane growers and get an insight on some of the challenges for the industry and the importance of projects like Catalyst in bringing about positive change. We also took the opportunity to meet with the Department again but this time some representatives from the Department of Agriculture and Fisheries sat in on the discussion. I believe they all got a lot out of meeting with our growers and being able to talk with them directly about what they do and why.

As we move into the second decade of the Project there are plenty of challenges to think about – productivity, market prices, soil health, water quality, reef regulation, funding and finding the next step change innovations that can secure the industry for the future. We also want to ensure that Catalyst continues to provide a place where innovative growers can network to discuss freely their ideas, wins and losses with positive support and guidance.

I’m excited by the challenges ahead and hope that you all enjoy the activities over the next twelve months. Thank you all for your support of the Project and the people who help to deliver it for you.

**Andrew Campbell**  
General Manager, Catchment Solutions



## FEATURE



### TERRAIN

Changing mindsets



### REEF CATCHMENTS

Managing nutrients and herbicides



### WILMAR

Fertiliser efficiency with Bio-Dunder



### RABOBANK

Global market influences

## CASE STUDIES

12

### WATER TRIALS

Bryan and Paula Langdon investigate groundwater nitrates. Adrian Darveniza explores the difference between early and late plantings for friable (crumbly) soils.

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### SOIL TRIALS

Christofides Family working with soakage maps. George and Kathy Henry improving soil pH at depth.

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### NUTRIENT TRIALS

Richard Kelly compares variable N rates on Q240. Tony Jeppesen investigates whether higher harvester speed reduces yield. Deguara Family explores the advantages of applying Dunder Subsurface. John and Tracy Muscat evaluate nitrogen rate applications. Sergio and Sharon Figuera trials reduced rates of synthetic fertilisers.



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## PROGRAM

SUNDAY, FEBRUARY 24TH

**WELCOME FUNCTION** Thanks to Rabobank Australia  
Pullman Cairns International (Daintree Pool Deck)

17:00 – 20:00	Delegates Check-in (Collect name tag) - join us for drinks and canapes
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MONDAY, FEBRUARY 25TH **GROWER FORUM DAY 1**

Pullman Cairns International (Grand Ballroom)

07:30 – 08:00	Delegates Check-in (Collect name tag)
08:00 – 08:10	Housekeeping and Introductions
08:10 – 08:15	Welcome to Country
08:15 – 09:15	Keynote Speaker 1 – <i>Licence to farm: increasing nutrient use efficiency in sugarcane cropping</i> <b>Dr Nicole Robinson</b>
09:15 – 09:45	Virtual Farm Tours - Improving Soil Health

**09:45 – 10:30 MORNING TEA** Thanks to Reef Catchments

10:30 – 12:00	Trial Presentations – Soil / Fertilisers
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**12:00 – 13:30 LUNCH** Thanks to Wilmar BioEthanol (Australia)

13:30 – 14:30	Breakout Session 1 (Ballroom) Group 1: <i>Soil Health - from Monoculture to Polyculture</i> Group 2: <i>Nutrients - Fertilisers / Bio Fertilisers</i> <b>Dr Nicole Robinson</b>
14:30 – 15:15	Breakout Session 2 (Tully Rooms) Group 1: <i>Nutrients - Fertilisers / Bio Fertilisers</i> <b>Dr Nicole Robinson</b> Group 2: <i>Soil Health - from Monoculture to Polyculture</i>

**15:15 – 15:45 AFTERNOON TEA** Thanks to T.R.A.P. Services

15:45 – 16:45	Keynote Speaker 2 – <i>Succession Planning “How to harvest more profit”</i> <b>David French</b>
16:45 – 17:15	Wrap Day 1 & Preview Day 2 – CLOSE
17:15 – 17:30	Group photo

TUESDAY, FEBRUARY 26TH **GROWER FORUM DAY 2**

Pullman Cairns International (Grand Ballroom)

08:30 – 08:45	Welcome to Day 2 + Day 1 recap
08:45 – 09:30	Keynote Speaker 3 - <i>Herbicide Resistance “Herbicide Resistance in the Grains Industry”</i> <b>Adam Jalaludin</b>
09:30 – 10:00	Virtual Farm Tours – Biological Stimulants

**10:00 – 10:45 MORNING TEA** Thanks to Suncorp

10:45 – 12:15	Trial Presentations – Chemical / Water
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**12:15 – 13:45 LUNCH** Thanks to Vantage

13:45 – 14:45	Breakout Session 3 (Ballroom) <b>Thanks to The Investment Collective</b> Group 1: <i>Precision Agriculture</i> Group 2: <i>Regulations / Record Keeping / GPS Data Recording and using that information</i>
14:45 – 15:30	Breakout Session 4 (Tully Room) <b>Thanks to The Investment Collective</b> Group 1: <i>Regulations / Record Keeping / GPS Data Recording and using that information</i> Group 2: <i>Precision Agriculture</i>

**15:30 – 16:00 AFTERNOON TEA** Thanks to Stoller

16:00 – 16:30	Catalyst Future / Structure – presented by Andrew Rouse
16:30 – 16:45	Wrap Up - Close

**FORUM DINNER** Pullman Cairns International (Grand Ballroom)

18:00 – 18:45	Pre-Dinner Drinks (Ballroom Foyer)
18:45 – 23:00	Formal Dinner

Special guest dinner speaker **Stuart Larsson** *Organic - Soybean Grower, Feeds and Meat Exporter*



**Carole Sweatman**  
Terrain NRM CEO

# Welcome

## to Cairns and the Wet Tropics region

Terrain NRM is excited to be hosting the 2019 Project Catalyst Forum, especially as this year's theme "Back to our Roots – Soil, Water and Reef" closely links with a growing interest in soil health within our region.

Over the next two days, we'll be hearing from growers whose trials are focused on improving soils, farming sustainably and benefitting water quality.

We value our forward-thinking farmers and initiatives like Project Catalyst that support landholders to trial changes. Learning from each other and working in partnerships are great ways for practices to improve across the industry.

Connecting with the entire industry, to encourage wide-scale adoption of proven practices, has always been a challenge. Opportunity often comes from unexpected sources and this year an increase in eye-catching sunflower cover crops sparked huge media and public interest in this region, allowing us to speak about, of all things, the benefits of mycorrhizal fungi in the media!

Soil management has become a hot topic in the Wet Tropics and Terrain NRM has responded with hands-on extension and training programs for growers, and new soil health resources.

Terrain is also working with cane farmers through a number of other programs including the Wet Tropics Sugar Industry Partnership and Wet Tropics Major Integrated Project, a three-year initiative trialling local-scale water monitoring and catchment repair and treatment systems.

This program, which focuses on the Johnstone and Tully catchments and involves farmers from the cane and banana industries, is an opportunity to improve water quality by using a more localised approach. High-efficiency sediment basins, bioreactors and wetlands are among the catchment repair systems that are currently being trialled.

Change starts one paddock at a time until it reaches a tipping point. It is not always easy being at the leading edge but the role of farmers in the Project Catalyst network and in other cutting-edge projects is essential in shifting the industry to those tipping points and creating new industry standards.

We encourage you all to keep innovating so we can work together to build a sustainable future for both sugar cane farming and the Great Barrier Reef.



# Coca-Cola: Celebrating 10 years of collaborative innovation and partnerships

2018 marked 10 years of Project Catalyst – a cause for celebration for the Queensland sugarcane farming community, Coca-Cola, WWF and its partners.

Starting as a local operation with just 19 farmers in 2008, Coca-Cola is incredibly proud to see Project Catalyst continue to achieve impressive milestones year on year, including improving the quality of over 150 billion litres of water flowing into the Great Barrier Reef annually.

This ground-breaking program has long been regarded by The Coca-Cola Company globally as a world-leading ‘golden triangle’ partnership, of cane farmers, industry, government and civil society. In 2007, The Coca-Cola Company

set an ambitious global goal to return to communities the same amount of water it uses in creating its beverages by 2020. Thanks largely to the pioneering work of Project Catalyst, the company was able to achieve this goal five years ahead of schedule; the first Fortune 500 company to do so.

Over 11 years, The Coca-Cola Foundation has invested nearly \$7 million into Project Catalyst to help achieve its long-term success. The Australian Government has also invested in the program throughout the decade, testament to the national scale and importance of the work of Project Catalyst and its value in delivering impact and bettering the quality of the reef.

Sarah Prestwood, Senior Public Affairs and Sustainability Manager at Coca-Cola Australia, reflects on the partnership.

“Our farmers are at the heart of this program and the true heroes of Project Catalyst. What they’ve been able to achieve year on year shows the strength, resilience and commitment they have to making a truly positive impact on the reef.

“We’ve often joked over the years that Project Catalyst is made up of a bunch of strange bedfellows, but what we’ve shown is that with a shared vision, diverse groups can accomplish more together than any one group can do alone.”

## 2018: LOOKING BACK ON A SUCCESSFUL YEAR

Now with over 130 farmers involved, Coca-Cola Australia considered the 10-year milestone the perfect opportunity to showcase the fantastic work being done by Project Catalyst partners to improve the water quality of the Great Barrier Reef.

Coca-Cola Australia invited ‘Flying the Nest’, a young Australian couple with a passion for the environment and social media, on a four-day trip through Northern Queensland in April to raise awareness of Project Catalyst nationally.

Through video content, they highlighted the work, the people and the passion behind Project Catalyst, sharing the stories of Ray Zamora, Tony Jeppesen and Frank Mugica, three Catalyst sugarcane farmers who are adopting new and innovative trials to improve the quality of the reef.

The project received powerful feedback, with many people inspired by the considered effort, fresh thinking and innovative practices being put in place to restore the Great Barrier Reef.

In November 2018, Coca-Cola Australia invited six Catalyst growers, members of Parliament, Coca-Cola and WWF executives and other project partners to attend a breakfast event held at Parliament House in Canberra.

Supported by colleagues across the political spectrum, The Minister for Agriculture and Water, Hon David Littleproud MP delivered an address at the event, commending the program for its success in delivering both sustainable

farming and environmental outcomes. What was evident at the event was the true bipartisan support for the project and the ongoing interest in its sustainable future.

In Canberra, Mackay canegrower Tony Bugeja shared his personal passions and experience as a Project Catalyst farmer, while recently appointed President of Coca-Cola South Pacific Vamsi Mohan met Project Catalyst growers for the first time, hearing more about this program that is regarded by Coca-Cola globally as a world-leading partnership.

To wrap up a successful year for Project Catalyst, Coca-Cola was delighted to hear that four Catalyst growers received deserved recognition at the Reef Alliance’s 2018 Reef Champion Awards, including the Prince of Wales Environmental Leadership Reef Sustainability Award to Gerry Deguara.

## LOOKING AHEAD

Coca-Cola Amatil is the bottler and distributor of the iconic Coca-Cola range in Australia, alongside major brands in water, energy and sports, coffee, tea and alcohol. From 1 July 2018, the company moved to 100% sustainable sugar supply in Australia – a mix of Bonsucro and Smartcane BMP – with contracts in place until 2021.

Sarah Prestwood, Senior Public Affairs Manager at Coca-Cola Australia continued;

“The Coca-Cola Company is committed to giving back to the communities and the planet which has made our products possible. We are extremely proud of all that Project Catalyst has achieved over the past 10 years and look forward to continuing our support for Project Catalyst and seeing the program grow and evolve for many years to come.”



Image: WWF-Australia CEO Dermot O’Gorman, Shadow Minister for Agriculture, Fisheries and Forestry Hon Joel Fitzgibbon MP, Catalyst grower Tony Bugeja, Minister for Agriculture and Water Resources Hon David Littleproud MP and President, Coca-Cola South Pacific Vamsi Mohan at the Project Catalyst 10 year celebration, Australian Parliament House.



Image: Travel bloggers Stephen and Jess Parry-Valentine from ‘Flying the Nest’

# SPEAKER PROFILES



**Sally Jupp**

**MC, Actress, Entrepreneur**

Sally has returned to the Project Catalyst Team this year to join us as our MC and Entertainer. Originally from a seaside town in Tasmania Sally has lived in Townsville for 7 years and is establishing herself on the entertainment and public engagement scene.

Following a successful Townsville City Council Christmas Party, MC Sally had to think on her feet standing in for an absent Auctioneer to auction off some giant inflatables, raising hundreds of dollars for the Mayors Christmas Tree Appeal from unsuspecting Executives with her unorthodox but effective auctioning techniques.

Sally embraces a balance of fun and serious events she hosts and in October was the Key Note Speaker for Safe Work Month Australia, talking about the effects of Mental Health in the Workplace. Drawing on a personal family workplace tragedy as well as many years in the mining industry as a Safety Advisor, she reached out to the audience through her unique storytelling style. On the other end of the scale Sally is right at home on stage at a Burlesque Show called Ho Ho Hoedown!!! You can't get much more contrast than that.

Her long time dream job of being a Jingle Singer on the Radio has recently swung into motion with her completing a radio announcers course and becoming part of the live and local Triple T Community radio station joining the weekend country segment and weeknight sundowner show.

So where does she find time to be half way through writing a book? It's an inspirational and hilarious true story of being a job gypsy and all of the funny stories and life's lessons learned the hard way. With down to earth advice and life hacks on surviving this crazy earth with a glass of bubbles in one hand and an ability to laugh at oneself even in the face of a cruel and crazy world

Sally is grateful to be invited back to the Project Catalyst Annual Forum and excited to share her 'showgirl' with you. An MC with a twist, Sally will not only facilitate the forum but entertain you at dinner with songs and comedy.

"Like the famous proverb says... Life's too short to be serious all the time. So, If you can't laugh at yourself, call me...I'll laugh at you."



**Dr Nicole Robinson**

**Keynote Speaker "Licence to farm: increasing nutrient use efficiency in sugarcane cropping"**

Dr Robinson is a researcher and educator, in the Plant Nutrition and Ecophysiology research group at The University of Queensland, Australia. Her studies include natural, agricultural and silvicultural systems, focussing on how plants, microbes and soil interact. Studying nitrogen use efficiency in crops, for variety improvement related to production and reduction of off-site environmental impacts, organic nutrients for plant nutrition and soil microbial communities.

A major research focus over the last 14 years, has been characterising nitrogen use efficiency in sugarcane and more recently the potential of next-generation fertilisers that repurpose organic wastes and capitalise on biotechnology advances, to tailor nutrient release for crops.

Dr Robinson will present an overview of the progress made in recent years, understanding interactions between soil-microbe-plant in sub-tropical crops and how to optimise nutrient management in future sugarcane cropping.

"What are the new options for fertiliser development and the remaining key knowledge gaps. Ideally, it's a discussion with growers on their insights to what we are missing and barriers to overcome for more efficient sustainable crop nutrient management."

With a potential for nutrient use efficiency and reducing nutrient losses in sugarcane cropping, the key highlights specific to her recent research into sugarcane variety development; understanding plant available nutrients and characterising microbial processes, will provide a background for a discussion with growers on ideas for new directions for nutrient management, potential for recycling and fertiliser development.

"We feel it is important to show an integrated view at a systems level of our understanding of nutrient cycling. This is one of the strengths of our research group and collaborations, pulling together the detailed studies on soil, plants and microbes."



**Adam Jalaludin**

**Keynote Speaker "Herbicide Resistance in the Grains Industry"**

Following 3 years of studies in Biochemistry (2005-2008), Adam continued his education in Biochemistry and Weed Science until 2011, when he was accepted at the University of Western Australia to further his studies of Herbicide Resistance, completing his course in 2015.

During those studies Adam spent 6 months as a Doctoral Candidate with Bayer CropScience in Germany, conducting research on glufosinate metabolism in *Eleusine indica* (Indian goose grass). Developing methods that combined both radio labelled glufosinate and non-radiolabelled glufosinate metabolite standards on HPLC.

He cemented his herbicide expertise as a Research Associate of the University of Western Australia, Australian Herbicide Resistance Initiative. Now working with the QLD Dept. of Agriculture and Fisheries, his published research into glyphosate resistant weed populations, has led him to study herbicide resistance in the Australian grain cropping industry.

"Weeds, especially herbicide resistant weeds, create a huge financial issue for the Australian cropping industry. With no new herbicide mode-of-action foreseeable in the near future, farmers are diversifying their weed management practices to tackle this issue."

According to Adam, integrated weed management tactics ranging from biological, mechanical, chemical and non-chemical weed control are fast becoming the new norm in controlling weeds. "Programs such as the GRDC-funded Herbicide Resistant Weed Survey, allows the industry and its' stakeholders to see how widespread resistant weeds are in the region."

In his presentation he will provide a current outlook of herbicide resistant weeds in the Australian grain cropping industry, along with the survey results, non-chemical weed management practices and research. "Herbicide resistance is a problem for farmers and the industry. I'd like to show farmers what the industry is doing in response to resistance weed issues and catalyse ideas from farmers as they know what works best for their farming systems."



**David French**

**Keynote Speaker "How to harvest more profit"**

With over 25 years' experience in finance and economics, (20 in investment markets) David has been responsible for building The Investment Collective, from humble regional beginnings in Rockhampton to offices in Sydney and Melbourne, managing \$700 million in investments for more than 1,000 clients.

Holding a Bachelor of Economics and a Diploma in Corporate Management, he has completed a range of courses related to the valuation of companies and investments. His passion for community is evident in the regional and rural focus of the business, specialising in business consulting, economic analysis and personal finance.

David wants people to understand the fundamentals of business and the importance of planning, which will be the focus of his presentation. "In my experience, farming and agriculture are commonly family businesses, that are not necessarily run like a business. Financial, economic and succession planning, are the basic tools needed and the audience will walk away with all they need to start a proper plan."

AS a business consultant, David doesn't manage accounting, but it's one thing he feels very strongly about. "Get yourself a good accountant - few accountants are good business consultants or strategists, to get the best result you really need to consider engaging both."

A graduate of the Australian Institute of Company Directors, David is also a past director of Rockhampton Regional Development Limited, the Rockhampton Chamber of Commerce and Home Support Association. Over the years he's seen his fair share of 'failing to plan', working with many passionate business owners who've reached crisis point. "Compared to growing your favourite crop, or selling interesting products, or fabricating machinery this mightn't sound too exciting, but without these disciplines, you won't be getting much joy from anything when the shit does hit the fan."



**Simon Mattsson**

**From Monoculture to Polyculture**

Awarded a prestigious Nuffield Scholarship in 2014 to study the role of biology in a healthy soil, enabled Simon to travel to 12 different countries looking for answers.

"For the last six years I have been trying to answer the question 'Why after ten years of trash blanketing legume fallow crops and reduced tillage are my soil carbon levels still in decline?'"

Simon found that without doubt, the single most important factor enabling biological function was, 'The power of plant diversity, to enable biological diversity, creating healthy soil.'

"Multiple varieties of plant species, living in close proximity to each other (plant diversity), is nature's way of putting trillions of different soil biology close to each other. Even now we are only scratching the surface of understanding how all those interactions may work."

This led to more questions. If we can harness nature's power of biology, can we farm without chemical inputs? Simon believes it's possible, following several intercropping trials over the past three years, with promising results.

"Plant diversity is the key to achieving this. So how do we in the sugar industry grow sugar cane (which is normally grown as a long-term monoculture) as a polyculture?"

"In a research paper published in 2018, 'DNA tests for arbuscular mycorrhizal fungi showed that sugarcane roots associated with sunflower roots were more heavily colonized and supported a more diverse range of these fungi than roots from an adjacent site that was not intercropped'.

During a breakout session on Monday, Simon will present 'My journey from Monoculture to Polyculture' for discussion. "It will be including some science, and a lot of observation. As well as the integration of livestock, how does this work in nature and what are the advantages of including livestock into my polyculture?"



**Stuart Larsson**

**Dinner Speaker "History and future solutions to Sustainable Agriculture and the Environment"**

Stuart has been involved in agriculture since the late 1960s and for the past 30 years, has been working towards organic agriculture and developing the skills to demonstrate methods necessary for success in large scale operations of organic cropping and beef.

The original business Mara Seeds Pty Ltd (the major supplier of organic soybeans to Vitasoy Australia for Soy Milk), is located at Mallanganee, 50 kilometres west of Casino in northern New South Wales and was a successful, pioneer export business to the Middle East for pasture seeds.

Stuart developed an organic fertiliser range incorporating organic hay, natural phosphorus and biochar which has shown very successful results. At present he is doing research towards a special 'Activated Biochar' for further enhancement. "The presentation will basically cover the lifetime of a family business that has converted to SOFTER farming and marketing, one form was converting to Organic Agriculture over 27 years ago."

The use of the organic fertiliser, allowed the production of organic soybean and wheat. Stuart realised an opportunity with Asian countries being very determined to source true organic products, for the health of their people. "Korean customers know the story of our organic farm, which is used in the marketing of organic tofu on the supermarket shelves in Korea."

In 2012 S.O.F.T. Agriculture Pty Ltd launched, with the hope of translating the soil health to a new type of food health - at this stage for animals. Research in this area has taken many years with promising results to date. S.O.F.T. Agriculture Pty Ltd is currently producing and servicing organic stock feeds to the chicken, ruminant, pig & sheep industries with IP Protected products.

Food Grade Hemp is also being grown as a commercial crop following seven years of plot or trial production. A vision Stuart is keen to share, "Our new project: a Carbon Functional Plant capable of producing Activated Phosphorous, Biochar, Syngas to replace LP gas to run Boilers and Power Generation, Hydrogen to run vehicles, CO2 for plant growth and glass house breeding of food grade hemp, is the future of our industry."

## Agricultural Innovation

Soil health and regenerative farming education changing mindsets within the agricultural industry.



The Project Catalyst network is a breeding ground for new ideas and agricultural innovation, and this year we are beginning to see the influence of this network filtering through to the wider industry when it comes to soil health in the Wet Tropics.

A growing interest in, and demand for, soil health and regenerative farming education suggests there are changing mindsets within the agricultural industry.

Soil may not be the 'sexiest' of our natural assets - but breathing new life into our soils is essential for future food production and it also benefits crop yields, profitability, water quality and even climate change.

This year Terrain NRM is running a range of soil management-focused training programs. We have three 'Digging Deeper Plus' programs in progress, several 'Soils Made Simple' workshops for cane growers through the Wet Tropics Sugar Industry Partnership (WTSIP), and a number of other events with a soil focus. The reach of these programs will extend further via a new series of soil health videos that are available to watch online. We invite you to visit [terrain.org.au/projects/digging-deeper/soil-health/](http://terrain.org.au/projects/digging-deeper/soil-health/) for a look.

Project Catalyst has been running for nine years in this region and has become an integral part of Terrain NRM's support for agricultural innovation. The program runs alongside others including the Regional Landcare Facilitator, Reef Trust III and Reef Trust Repeated Tenders.

There is also a closely connected growing interest in experimentation with multi-species cover crops in the fallow period, and it will soon be backed up by a 10-year research project looking into the effects of using different species mixes.

This research came about after Ingham cane growers Lawrence and Hayden Di Bella ran some small plot trials to explore whether greater diversity in the fallow period reduces the need for inorganic nutrient application as well as helping with inorganic nutrient losses and creating a healthier soil profile.

The results were so positive they sparked interest from Soil CRC which will conduct a more in-depth research project to measure the benefits and changes that take place with different mixes over a longer time period.

The Di Bella's mixed species cover-cropping initiative is one of 37 Project Catalyst trials currently underway in the Wet Tropics, thanks to thirty-three landholders. Projects range from trials of sub-surface mill mud and bio-fertiliser to variable rate applications of pre-emergent herbicide.

## 10 years of Project Catalyst

2018 has been a busy year for the project as we celebrate 10 years of Project Catalyst! We couldn't let this milestone pass uncelebrated, so a breakfast event was organised in Canberra on 24 October, and it was most pleasing to witness the bipartisan support for the project.

Dermot O'Gorman, WWF-Australia CEO spoke about the importance of bi-partisanship in addressing issues affecting the Great Barrier Reef. In his speech at the breakfast, The Hon. David Littleproud MP, Minister for Agriculture and Water Resources expressed his appreciation of the efforts of Project Catalyst growers in finding new approaches to farming that are helping to improve water quality for the Reef, and Project Catalyst grower Tony Bugeja spoke about what the project has meant to him and his business. Thank you to growers Ray Zamora, Dennis Pozzebon, Gerry Deguara, Phil Deguara, Willy Lucas and Tony Bugeja for taking the time out of their busy farm commitments to attend the event and talk directly with guests about why they participate in the project.

Over the course of the year, project trial results, grower stories, fact sheets and other resources have been developed, and these are available on the project website. We now have 22 Grower Stories on the website, with recent stories from Frank Mugica, Tony Bugeja and Manuel Muscat. Whether its adoption of water monitoring technology (Frank Mugica), the pathway to adoption of variable rate fertiliser application (Tony Bugeja) or soil mapping and adoption of

GPS technology (Manuel Muscat), each grower story provides insight from a grower on why they have taken steps to change their practices, how they went about it, and how the project has helped them. I encourage you to read the stories if you haven't already. The grower stories are available at: <https://www.projectcatalyst.net.au/project-category/grower-stories/>

Recently uploaded onto the website are Fact Sheets summarising banded mill mud application and variable rate fertiliser application, two practices pioneered by the project that are being more broadly adopted by the industry (see - <https://www.projectcatalyst.net.au/project-category/fact-sheets/>). The banded mill mud applicator, originally trialled and developed by Gerry Deguara, is now widely used across the farms in the Mackay Whitsundays and applies mill mud at 50 wet tonnes per Ha, a 66 percent rate reduction on previous practices.

Project Catalyst has also led the way with evaluation and application of variable rate technology, and the Fact Sheet sets out the steps taken by Tony Bugeja to adopt this practice across his farm. Central to this has been the application of EM and EC soil mapping technology. By better understanding soil-based constraints to yield, growers are able align fertiliser and other input rates to crop demand, thereby reducing inputs whilst maintaining yields. Since Tony Bugeja first trialled EC technology on a block nearly ten years ago, an estimated 66,000 ha of caneland across Queensland has been mapped

using this technology. This is a great success story showcasing the broader application of technology pioneered by the project.

Aggregated data from the Project Catalyst growers in the Mackay Whitsundays highlights how application of variable rate technology is reducing the recommended fertiliser application rates. Between 2009 and 2018, recommended nitrogen application rates have reduced from 106 to 87 kg/ha for plant cane and 176 to 157 kg/ha for ratoon cane, a 18% and 11% reduction respectively. Across the Project Catalyst farms in the Mackay & Plane Creek districts, this translates to a reduction of N applied of 29 tonnes/year for plant cane and 170 tonnes/year for ratoon cane - a win-win for the growers and the environment.

In October, it was a great thrill to see four Project Catalyst growers recognised at the 2018 Reef Champion Awards. Gerry Deguara and Frank Mugica were winner and runner up respectively for the Princes of Wales Environmental Leadership Reef Sustainability Award; Ray Zamora runner-up in the Nutrient Champion Award; Phil Deguara winner of the Pesticide Champion Award; and Frank Mugica runner-up in the Reef Conservation Champion Award. We have many great stories to tell and successes to share, so it is most pleasing to see Project Catalyst growers being recognised for their efforts to improve water quality for the Great Barrier Reef.

Also in October I met with many of you at a series of briefings to update you on project governance, strategic direction and funding. I'd like to thank you for your feedback, and during the course of this year work with you to find ways to deliver further benefits to Project Catalyst growers and place the project on a secure footing into the future.

I look forward to a successful 2019 for the project.

Andrew Rouse  
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## OVERVIEW

**Mill Area**  
Kalamia

**Total Farm Area**  
126ha

**Number of years farming**  
23

**Trial Sub District**  
Airville

**Area Under Cane**  
126ha

**Service Provider Contact**  
Farmacist Burdekin

**Idea**  
Grower led

# BURDEKIN



## BRYAN AND PAULA LANGDON

### *Groundwater Nitrates*

BRYAN AND PAULA LANGDON have been farming together on Paula's family farm for 23 years. The farm is situated in a high groundwater nitrate zone in the Airville region of the Burdekin Delta.

#### BACKGROUND

Nitrate in groundwater is an issue for growers, because the nitrate present in the irrigation water acts as a small hit of fertiliser with each irrigation – this may lead to high yielding sugarcane crops; however, the crop CCS tends to be below average. By applying nitrogen with each irrigation, the crop is encouraged to keep growing biomass and doesn't "ripen" to produce a higher sugar content, like it would in areas without groundwater nitrates. Additionally, the risk with relying on irrigation nitrates to fertilise the crop is that if there is a wet season and the

grower does not need to irrigate, the crop will not receive enough nitrogen to produce a high yield, resulting in productivity losses.

Growers in these high nitrate zones often reduce their fertiliser rates on their own, using the nitrogen in the water as part of their fertiliser budgets; however, there is little information available concerning how the nitrates behave in the underground aquifer, how much nitrate is available to sugarcane through irrigation water and how growers can reduce their fertiliser rates without productivity losses.





## FROM THE LANDHOLDER

"The results from the first year of the trial are encouraging! The monitoring data is helping to determine when the best time to sample during the year to assess the average nitrate level in the groundwater. In the first year of the trial, the crop produced a high cane and sugar yield with each treatment. These results suggest that the nitrogen contained in his irrigation water could play a greater role in his fertiliser budget."



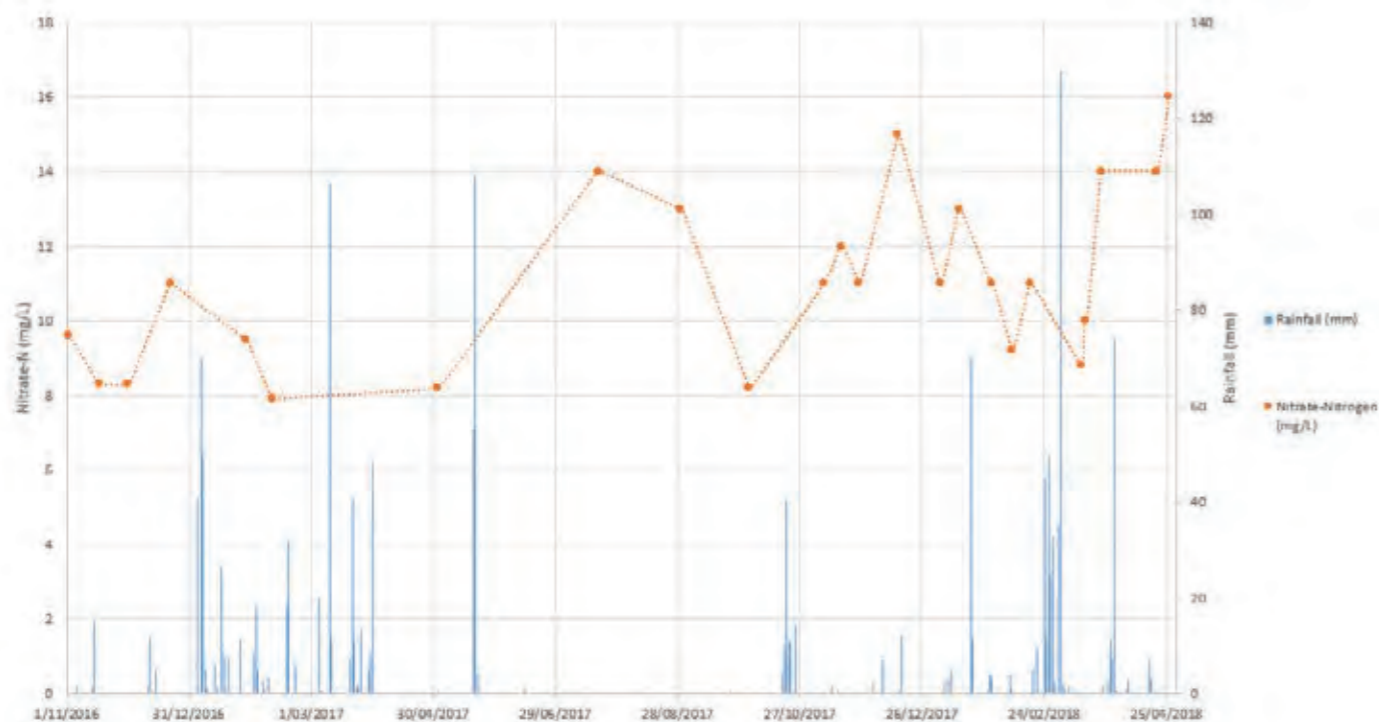
## THE TRIAL

Through Project Catalyst, Bryan has been able to intensively monitor the nitrate levels in one of his bores throughout the year. This has been an eye-opening experience and has provided some very interesting and valuable data! By taking a water sample from nearly every irrigation throughout the year, the behaviour of the nitrates in the underground could be observed.

It appears that throughout the year, the nitrates hold relatively steady; however, the level can spike significantly throughout the year. When the annual rainfall events are compared to the nitrate levels, it appears that significant rainfall events during a fertilising period (planting/ratooning)

can result in spikes in nitrate levels that will drop back down to the "steady" level over time. If large rainfall events occur when fertiliser is not being applied, the nitrate levels do not appear to rise. It also shows that irrigation water does not appear to be pushing nitrate through the soil profile to the underground aquifer.

This data is important in deciding when to take water samples for the purpose of assessing nitrate levels. If the sample is taken following a rainfall event, it may indicate a higher than average nitrate level. The nitrate levels fluctuate throughout the year – to properly assess the amount of nitrate in groundwater, a few samples should be taken throughout the year.



## BENEFITS

Another important aspect of this project is helping to give the grower confidence to use a greater portion of the groundwater nitrates in his irrigation water as part of his fertiliser budget. To help build this confidence, Bryan and Farmacist have implemented a reduced nitrogen-rate fertiliser trial on the farm, comparing his current nitrogen rate to two reduced rates (185N v. 155N v. 125N). The lowest N-rate was a "bottom of the barrel" rate to investigate whether there would be any effect on productivity. The trial also has a 30m zero-N plot which has had the required potassium and sulphur applied by hand. The zero-N section will be biomass sampled in 2019 to assess crop nitrogen uptake. This will help us estimate the amount of nitrogen from the irrigation water that the crop is using. The trial was first applied in 2017 and harvested in 2018. The results from the first year indicate no significant difference between the cane yield, CCS or sugar yield of each treatment ( $P = 0.05$ ). The trial has been reimplemented for harvest in 2019.

Table 1 - Trial Harvest Results

	N Rate (kg/ha)	Cane Yield (tC/ha)	CCS	Sugar Yield (tS/ha)
T1	185	174.81 -	13.64 -	23.84 -
T2	155	178.52 -	13.89 -	24.80 -
T3	125	167.31 -	13.86 -	23.20 -
Prob (F)		0.1227	0.1191	0.1012







## OVERVIEW

### Location

South Johnstone near Innisfail

### Property Size

230 ha

### Number of years farming

Adrian is a fourth-generation cane farmer. He and his father John have been working together on the farm since 2004. Adrian and Tracy now manage the farm with their sons Kai, 14, Sammy, 12, and Hamish, 10, and they have expanded the property by leasing and purchasing neighbouring cane farms.

*“I’m saving my topsoil and getting a better outcome for water quality – that’s an important bonus.”*

## WET TROPICS



# ADRIAN DARVENIZA

## *Measuring the difference between early and late plantings in friable soils.*

In the Wet Tropics most cane farmers plant late to avoid cultivating during the wet season. This trial looks at early planting with minimum to zero tillage.

### THE CHALLENGE

Living in the Wet Tropics, South Johnstone cane farmer Adrian Darveniza knows only too well the effects of heavy rain on both soil and cane.

“We have very friable red soil on a hilly property, and there is a risk it will wash away any time you work it in the wet season,” he says. “A lot of farmers in this district have moved away from planting early and that gives us a 12-month crop at best.”

### THE TRIAL

Adrian is breaking new ground – by doing the exact opposite and trialling zero tillage fallow crops and zero-tillage plant cane. He is comparing late and early plantings as well as zero and minimum tillage.

Adrian didn’t work the ground up at all for his soybean fallow crop last year and he also has zero tillage sections of the plant crop that followed. All the early plant was planted in May 2018, with the control plots being wavy disc cultivated and planted in August.

“We trialled minimum tillage with a wavy disc cultivator for the rest of the crop – going down about 3cm to make it that little bit easier to manage,” he says.

“We planted the early sections when it was really wet. It rained for about two months before a big dry spell, but the soil seems to have retained its moisture better not having been disturbed and the cane pushed through.”



TRIAL SITE



### FROM THE LANDHOLDER

"The friable soils here still give us enough soil-to-cane contact with zero or minimum tillage – the soil crumbles easily and lumps that roll back into the small furrow are squashed with the press wheel," he says. "This wouldn't work for all soil types but it's looking promising in this area and could be explored in other types of soils that aren't compacted and have had a light cultivation."



### TRIAL DESIGN

Treatment 1
Treatment 3
Treatment 2
Treatment 1
Treatment 2
Treatment 4

### TREATMENTS

Treatment 1	Zero Till Early Plant
Treatment 2	Minimum Zonal Till Early Plant
Treatment 3	Minimum Zonal Till Early Plant (2 passes)
Treatment 4	Minimum Till Late Plant

### WATER QUALITY BENEFITS

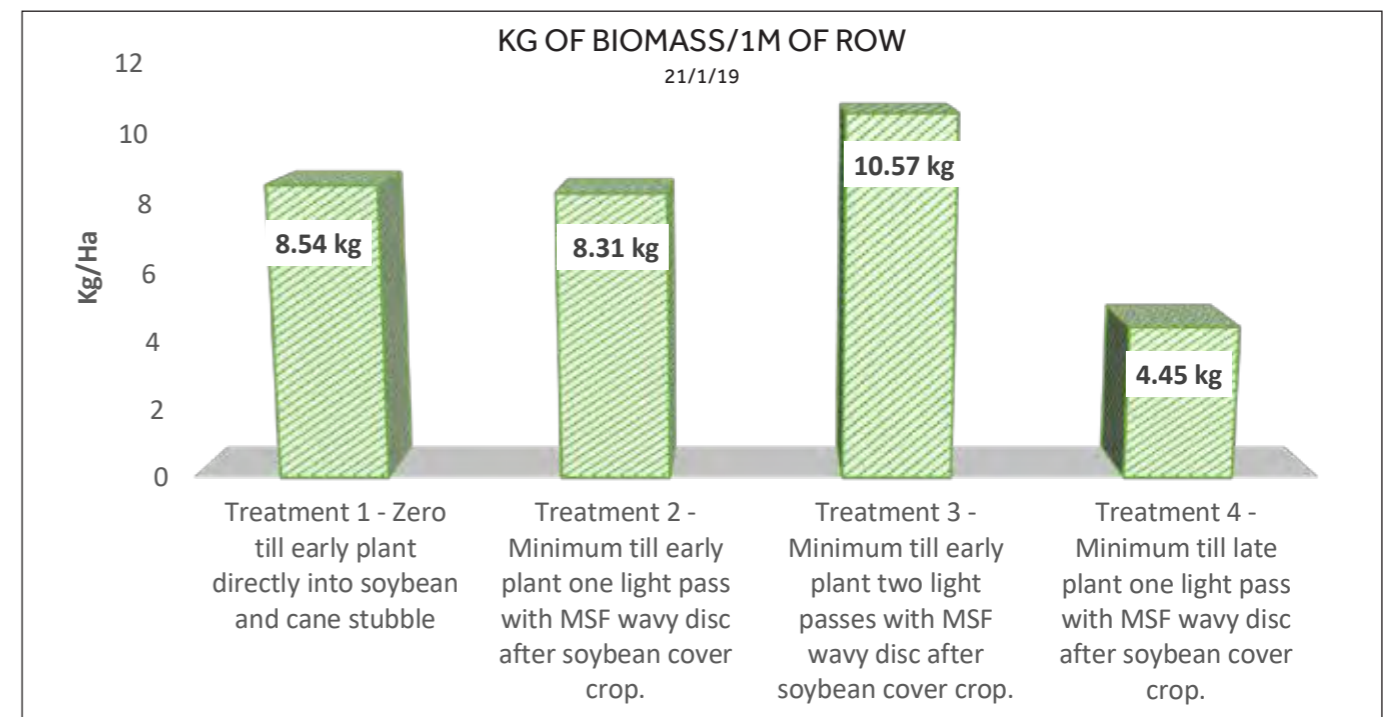
In the Wet Tropics, disturbed soil represents a great risk for soil erosion in paddocks, especially in the wet season, and as a result not many farmers plant early due to the need for cultivation before planting. Farmers feel this is limiting their yields as late plant allows for a 12-month crop at best. The option of zero tillage or very minimal tillage would significantly reduce the potential for soil loss.

### OBSERVATIONS

Adrian is hoping the early planting will result in better yields due to the longer crop cycle. Time and cost-savings are already apparent. He is expecting water quality benefits, with a farm bordering the Johnstone River.

*The trial follows other farming changes on the Darveniza property. These range from cover-cropping and controlled traffic to reducing synthetic nitrogen use in plant crops by 70-90kg/ha through legume cover cropping, and reducing it by 40kg/ha in the rest of the ratoon crop through a sub-surface fertilising system, mill mud application and tailoring nitrogen usage to each block based on the soil and crop needs.*

### OUTCOMES TO DATE



Value while still minimising impact on the environment.



## *Ambitious innovation and sustainability targets*



As a life science company, Bayer has ambitious targets in the areas of innovation and sustainability. These core competencies are also evident as significant achievements from the 10 years of Project Catalyst. A shared goal of improving the sustainability of agriculture in Australia brought Project Catalyst and Bayer together, and a track record of delivering effective solutions to problems on the ground ensures that the partnership will continue into the future.

Over the seven years of partnering with Project Catalyst, the Crop Science division of Bayer has worked with the group's dedicated growers, to address challenges and to capture opportunities necessary to create more efficient and environmentally friendly farming systems. Research and development leaders rely on innovative growers to help identify and communicate opportunities. The growers of Project Catalyst have proven to have a keen eye for gaps and opportunities in the industry as a whole and their involvement in the Project has helped to bring a range of innovations and practice changes in to widespread use.

The effects of lighter soils on herbicide activity were a key area of research, with Balance® Herbicide application rates now flexibly

matched to soil type. Farm specific greyback canegrub treatment plans provided a way to use targeted insecticide applications to efficiently fight the sugarcane industry's biggest pest. To tackle the issue of growing weed resistance, Bayer developed targeted use patterns for an additional broad spectrum herbicide in the sugarcane farming system.

Through collaboration with progressive Project Catalyst growers, Bayer has been able to more effectively identify and address opportunities to improve the sustainability of growing systems throughout the sugarcane industry. The lasting partnerships on the ground have been a key factor in Bayer's continued involvement, with real change in farming practices evident since Project Catalyst's inception.

While Project Catalyst's strength is the real action it inspires, organises and implements, Bayer has been happy to support efforts to improve the sustainability of the sugarcane industry in general. As water quality and environmental issues become a larger part of the discussion around farming, Bayer will continue to support Project Catalyst in its mission to tackle these issues proactively at farm, regional council and government levels.

Looking to the past helps us to plan for the future. Bayer's role in the industry is to drive progress from the front and is proud to work with likeminded stakeholders. The focus of recent trials has been to introduce Australia's first registered biological solution to help manage pineapple disease in plant cane. The recent APVMA registration of Serenade® Prime for the suppression of pineapple disease is the result of Bayer's commitment to finding new solutions to old problems. Bayer knows the growers of Project Catalyst also share this passion.

Bayer looks forward to supporting Project Catalyst, and the wider farming community, as we continue to tackle the issues of sugarcane farming in the spirit of innovation and sustainability, with a focus on collaboration.

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.....



## OVERVIEW

**Mill Area**  
Kalamia

**Number of years farming**  
3rd generation

**Trial Sub District**  
Jarvisfield

**Service Provider Contact**  
Farmacist Burdekin - Alice Warner

**Idea**  
Grower led

# BURDEKIN



## CHRISTOFIDES FAMILY *Soakage Maps*

The Christofides family has been growing sugarcane in the Jarvisfield area of the Burdekin Delta for 3 generations.

All farms are fully irrigated, using a combination of the underground aquifer and channel water

### BACKGROUND

While the Delta is one of the most productive regions in the Burdekin, farmers struggle with getting irrigation water to soak to the centre of the hill, limiting the potential production of the farms.

In dry years, the Christofides have found the soil in certain paddocks will 'seal' over, and infiltration into the hill becomes difficult. Irrigation run times become shorter and the amount of water applied is minimised, leading to crop stress and significant loss of yield. The traditional treatment for paddocks that suffer

from soakage issues is a blanket rate of gypsum. This can be costly and may not target the areas that are most affected.

Christofides catalyst trial was developed in 2018 to explore new technology and alternative methods of managing soakage issues. A paddock of plant cane that showed early signs of soakage problems was selected for the trial. The paddock had been laser-levelled and EC-mapped during the recent fallow period. Throughout the season, a drone was used to map the areas of poor soakage and then the information was used to develop a gypsum prescription to try and remediate the poor areas.



Before Levelling



After Levelling

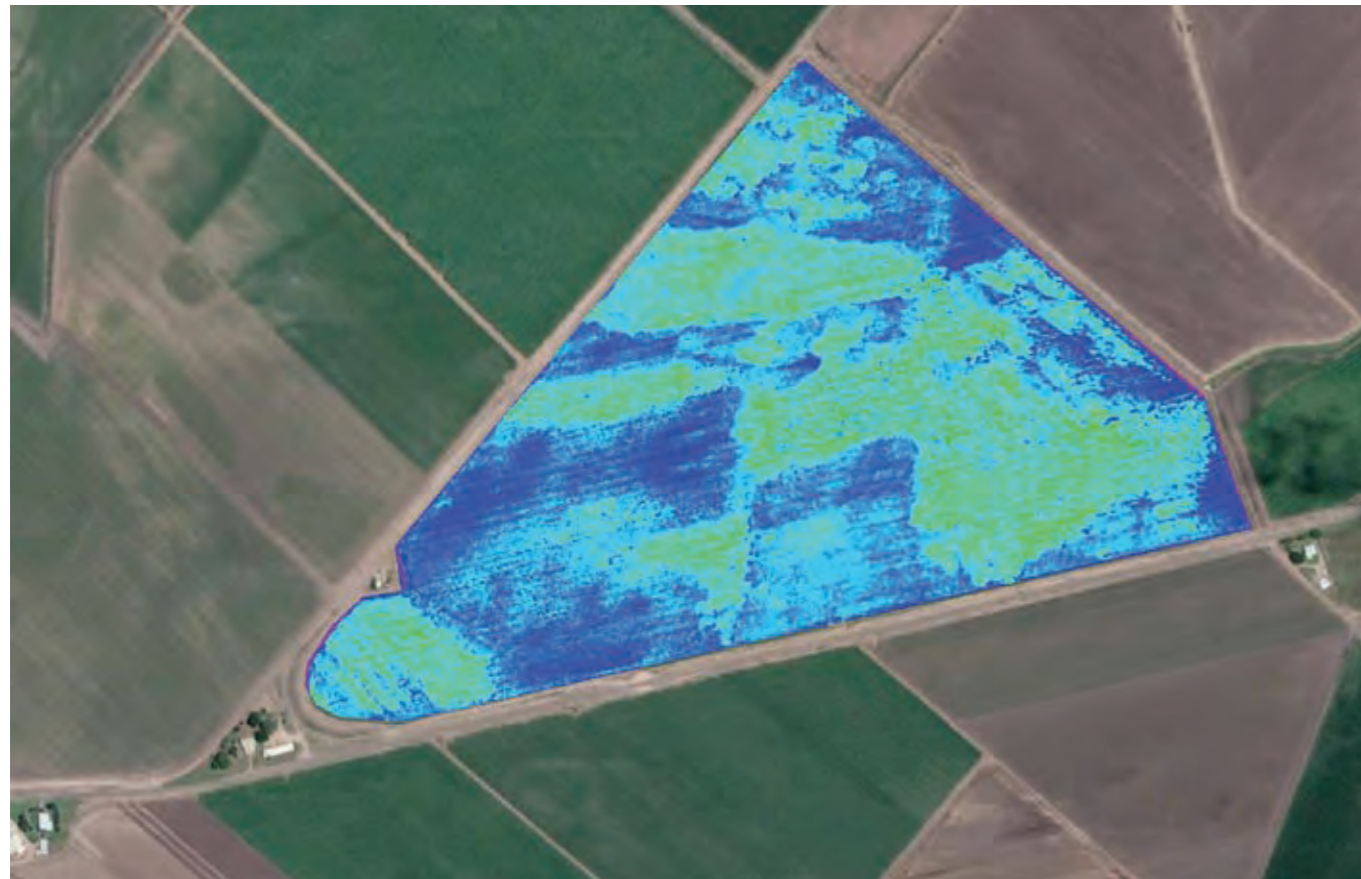


### TRIAL DESIGN

The trial paddock had major laser levelling conducted during the fallow period in 2016, where 7 smaller fields were joined together to make it more efficient for irrigation practices. There was a large amount of soil moved in the levelling work and as a result the subsequent plant crop suffered from severe soakage issues. Whilst using a phantom 4 drone to investigate the extent of the problem, we realised that it was only certain areas of the paddock that were suffering from the issues. We decided to map the 40ha paddock using the Phantom 4 DJI drone fitted with a Parrot Sequoia NDVI camera, which allowed us to spatially map the areas that were experiencing soakage issues, with the aim of applying variable rate gypsum after harvest in 2018.

The drone was able to distinguish areas where the cane was standing and areas that were lodged. It was assumed that the areas standing were limited in yield and those that were lodged, were non-limited. To confirm this, hand samples were taken during harvest, replicated 6 times in areas both low and high yielding areas. It was found that these areas had a yield of 117t/ha and 190t/ha, equalling a potential yield loss of 73t/ha in the worst affected areas. Once the groundtruthing of the NDVI for yield had taken place, soil tests were taken in order to identify any soil constraints that may be contributing to the problems in the paddock.

NIR Image of the paddock, with the darker blue areas highlighting areas of standing cane and the lighter blue/green showing areas of lodged cane.



Lab Sample Id	110100308	110100309	110100351	110100352
GPS Name	Orlandi's soakage 01	Orlandi's soakage 02	Orlandi's soakage 03	Orlandi's soakage 04
Soakage	Poor	Poor	Good	Good

### ANALYTE / ASSAY

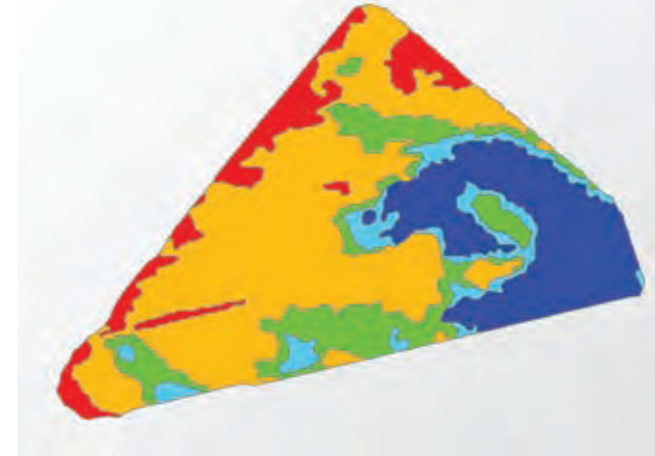
Soil Texture		Medium clay	Medium clay	Medium clay	Sandy clay
pH (1:5 Water)		5.99	6.01	6.66	6.85
pH CaCl		5.72	5.61	6.25	5.91
ECSE	dS/m	6.975	4.2	3.9	1.72
EC (1:5)		0.93	0.56	0.52	0.2
Chloride	mg/kg	44	62	150	53
Cation Exchange Capacity	Meq/100g	19.9	15.5	19.1	15.4
Calcium (Amm-acet.)	Meq/100g	13.32	10.08	11.03	9.08
Calcium %CEC	%	66.98	65.18	57.82	58.97
Sodium (Amm-acet.)	Meq/100g	1.24	0.87	1.51	1.46
Sodium % of Cations (ESP)	%	6.23	5.63	7.91	9.49

No correlation could be found between the areas that had poor soakage when analysing the soil tests, nor did the patterns shown by the sequoia NDVI map match the EC map of the paddock. After further investigation however, we found the NDVI map to be a direct match to the laser levelling that was completed, as shown by the google earth images above. This indicates that it was not a chemical characteristic of the soil that was causing the soakage issues but rather a physical property.

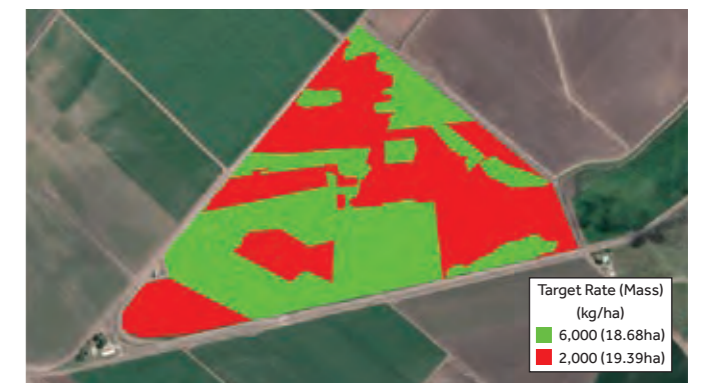
From here, a gypsum prescription was made incorporating 2 different rates, 6t/ha and 2t/ha. The higher rate of gypsum was applied to the areas with poor soakage, and the areas with no soakage issues had a maintenance rate of 2t/ha applied, to help address the sodicity within the paddock. The gypsum was applied using a variable rate gypsum spreader after harvest in June 2018. The hills were then re-formed to help incorporate the gypsum, and then the paddock was irrigated.

### EC MAPPING

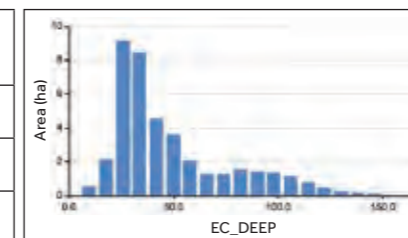
BKN-09092A\_VSEC\_3\_2017\_905



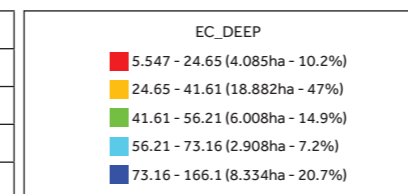
Grower: cons  
Farm: 9082  
Field: 14-1  
Year: 2018  
Operation: Fertilizing Prescription (Dry)  
Crop/Product: Gypsum  
Op. Instance: Instance - 1  
Area: 38.17ha  
Total Amount: 151.25t  
Average Rate: 3,963t/ha  
Minimum Rate: 2,000t/ha  
Maximum Rate: 6,000t/ha  
Count: 283



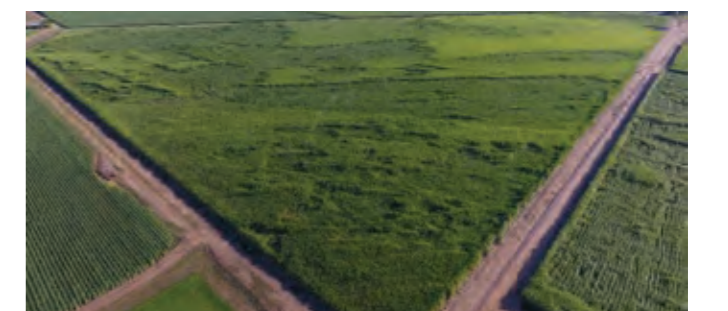
Grower	ORLANDI FARMING COMPANY
Farm	BKN-09092A
Area (ha)	38.8ha
Year	2017



EC_DEEP STATISTICS	
Minimum	5.547
Maximum	166.1
Average	48.91
Standard Deviation	28.82



A capacitance probe was installed in an area of poor soakage and preliminary data shows that soakage has been achieved in that area of the paddock for this year so far. Recent drone imagery shows some variability within the paddock and data will be collected throughout the 2019 harvest to assess this practice.





T.R.A.P. Services was established by Charissa Rixon in 2011 as a consulting and research business, and now also includes field support from husband and business partner Keith Rixon. In 2016, T.R.A.P. Services became involved as a service provider for Project Catalyst. The Project Catalyst journey has been a very interesting one, that has allowed us to help growers evaluate changing farming practices.

Growers aim to farm in a profitable manner and also an environmentally sustainable way as this is the legacy that they can hand down to the next generation. Some of the simplest changes are making big differences.



## Consulting with growers to improve farm practices

Over the past 7 years I have observed young innovative growers Brian, Jamie and Greg Dore of Dore & Co, transitioning from traditional practices, to full use of GPS with RTK for controlled traffic with minimal zonal cultivation, and reduced nutrient inputs to match the crop requirements.

Through these improved soil health initiatives, we have observed the soil pH increasing, (which improves nutrient availability providing better uptake), productivity improving in the older ratoons, and the overall cost of production reducing.

With zonal tillage, the number of passes for seed bed preparation has been greatly reduced, leading us to believe that soil health overall is improving due to the implementation of better farming practices.

Another catalyst grower George Henry has also been an early adopter, with dual row and controlled traffic in 1998 and zero till planting with a modified dual row planter, into sprayed out soybean break crops in 2003.

George and the Dore brothers have both adopted the use of RTK GPS which in combination with zonal tillage has added cost benefits of being able to use smaller tractors. This cost benefit was presented by George at the 2006 ASSCT Conference in Mackay.

George was also the first grower to adopt sub-surface stool splitting fertilizer application in the Tully Region.

Project catalyst has allowed T.R.A.P. Services to assess the benefits that growers may be getting from a mixed species intercrop, and assist growers with reducing synthetic nutrient inputs, with the incorporation of Biofertilizers, mixed species intercrop, compost or mill mud in the farming system.

George Henry is currently trialling the application of mill mud as a low rate subsurface application to address subsurface pH values that can be as low as 4.5, which is his major constraint for growth in certain areas of his farm. It is through the use of EM Mapping that George has been able to identify this constraint in his soil.



Suncorp has a long and proud history supporting the agricultural sector and we're once again delighted to be part of "Project Catalyst" and be involved in the outstanding work its network of cane growers undertakes to support sustainable and productive farming.

We understand the challenges and opportunities the sugar industry is facing, and whether it be in farming, or everyday life, managing your finances can be hard work. Talking about them also can be even more of a challenge.



## Manage your ups and be prepared in case of downs

Suncorp's Relationship Manager David Harding said that Suncorp Bank has a long history of working with sugar producers and we remain 100 per cent committed to the industry.

"Project Catalyst is an ideal forum for our local industry to come together to share best practice, discuss new ideas and opportunities, and celebrate achievements. We are proud to align ourselves with a group of forward thinking farmers who are committed to preserving the future of the sugar industry, Mr Harding said.

We see the work your group is achieving, in improving sustainable and productive farming practices, will present the industry with many opportunities for the years ahead.

As Australia's leading regional bank, Suncorp Bank is proud to support initiatives that contribute long-lasting benefits to regional and rural communities.

Suncorp Bank's local agribusiness specialists are dedicated to understanding the needs of their customers. They understand the critical role a bank plays in supporting regional communities

and they are committed to building in-depth relationships with customers to support them on their journey.

To find out more about how Suncorp can help your business, have a chat to your local Suncorp Agribusiness Specialist at the Project Catalyst Conference or give them a call on the number below.

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# Supporting our cane industry

Reef Catchments continues to be a proud supporter of Project Catalyst and is committed to supporting the cane industry.



### Reef Trust 3

Reef Catchments Reef Trust 3 (RT3) project, funded by the Australian Government, saw 244 growers farming 35,600 hectares get involved to focus on nutrient and herbicide management. Reef Catchments engaged local extension services – Farmacist, Mackay Area Productivity Services (MAPS), Plane Creek Productivity Services Limited, and Soil and Land Surveys - to provide growers with planning and extension support. This strong commitment from our region's growers and service providers, demonstrates a proactive approach toward improving water quality for our catchment and the Great Barrier Reef. Growers involved in RT3 have also had the opportunity to link with Project Catalyst via participation in field days and shed meetings. This provides a pathway for wider industry adoption of practices validated by Catalyst trials.

### Janes Creek project

This year Reef Catchments and MAPS commenced working with eight cane growers, five harvest contractors and five graziers in the Janes Creek sub-catchment in a collaborative approach to reduce runoff of nutrient, pesticide, and sediment. This project is funded by the Queensland Government and represents an integrated whole of system approach to delivering management practice adoption, system repair and water quality improvement. Participating growers are taking the opportunity to conduct water monitoring on their own farms. In addition, this project has given neighbouring farmers the ability to connect with each other, as well as engage with other stakeholders in the catchment such as quarry operators, Department of Transport and Main Roads, and Department of Natural Resources, Mines and Energy. The Janes Creek project represents an opportunity for farmers to be proactively involved in improving and monitoring water quality in their own backyard.

Reef Catchments stands ready to continue assisting the cane industry to be economically and environmentally sustainable. The ethos of programs such as Project Catalyst play a major part in helping achieve these outcomes.



## OVERVIEW

### Location

Murray Upper, south of Tully

### Property Size

160 ha

### Number of years farming

George and Kathy began developing their cane farm in 1996. It was previously grazing land that was part of the Tully River Station. George has been an early-adopter of many changes in the district including controlled traffic, zero-till planting and legume fallow crops. He continues to modify machinery and farming systems to improve both yield and environmental outcomes.

## WET TROPICS



# GEORGE AND KATHY HENRY

## *Improving Soil pH at Depth*

This trial looks at sub-surface application of mill mud and ash as a means to lift the soil's pH and improve soil health.

### THE CHALLENGE

Murray Upper cane farmer George Henry used to spread mill mud to the top of the stool – now he is trialling below-ground application and adding supplements in the root zone.

George says electro-magnetic surveys highlighted the extent of low pH levels in the sub-soil and also revealed there was a lot of aluminium toxicity at sub-surface levels. These surveys were undertaken by Brian Granshaw from BMS LaserSat.

“In some soil types, roots were getting burnt off at 200mm – the pH was root pruning with levels changing from 5.4 to 5.7 in the top 200mm to 4.9pH at 200mm,” he says.

“We have five major soil classifications here, ranging from elevated red soil, to heavy clay at the lower end of slopes. The land is situated in a rain shadow, receiving half the rainfall of Tully, so the challenge is also to improve moisture retention on our driest blocks.”

*“Now the mill mud is under the surface we are starting to see benefits – better vigour and the cane is holding on longer in dry times.”*



## THE TRIAL

George is working with Charissa Rixon from T.R.A.P Services and using a mixture of mill mud and mill ash applied with a modified spreader that services three rows. He drilled down to 200mm for supplement application during the first two years, and is now drilling down to 500mm.

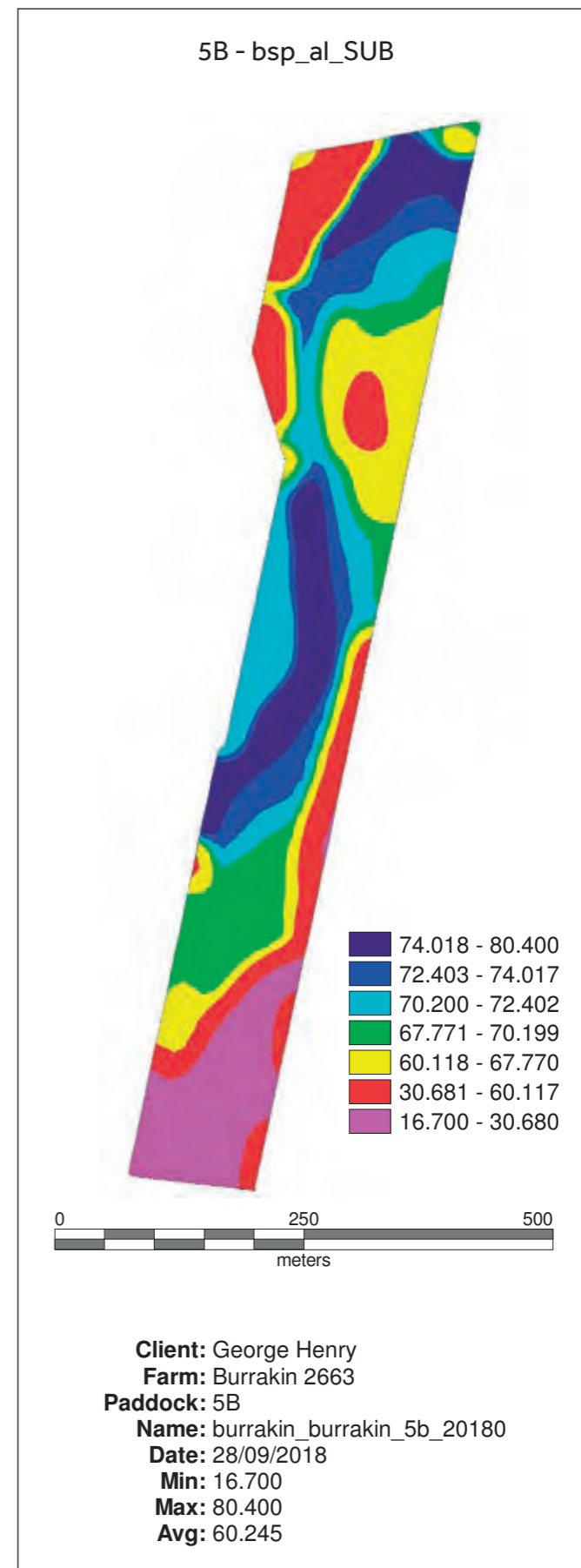
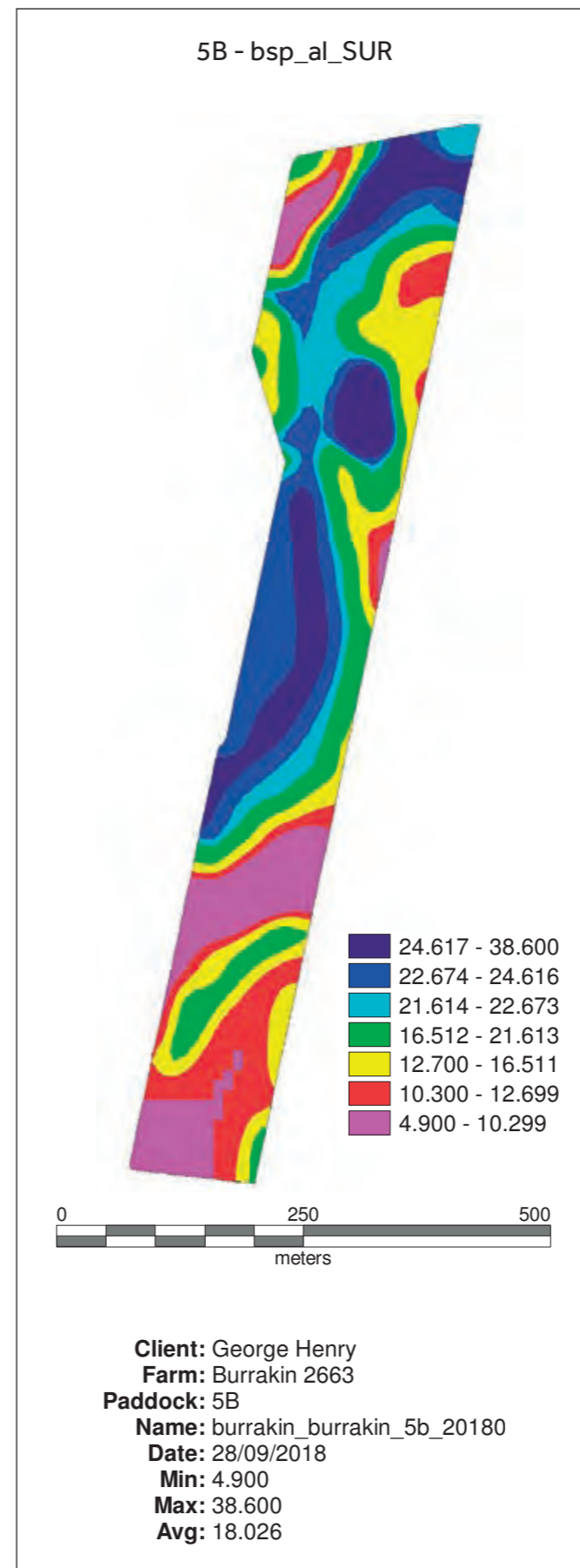
Nine drills on the trial site have lime as their only supplement, while the rest of the paddock receives lime plus 25 tonnes of mill mud per hectare and another 25 of mill ash banded into the furrow. The cane is planted over the top of filled-in trenches.

## RESULTS

George says it is early days in terms of results: "I don't expect significant differences yet, but we are starting to see what appears to be related benefits".

Another desired outcome is encouraging cane roots to go deeper, for moisture during dry periods and to access nutrients as they move down the soil profile, reducing sediment to the Great Barrier Reef.

Results from applying mill mud on top of the stool in past years were not encouraging. Now mill mud is applied under the surface there is better vigour, the cane appears to hold on longer in dry times.



*This trial is one of many changes to farming practices on the Murray Upper property. George was an early adopter of controlled traffic, GPS, zero-till planting and legume fallow crops in the Tully region and he continues to modify machinery and change farming systems to improve both yield and environmental outcomes.*





## OVERVIEW

**Mill Area**  
Pioneer

**Total Farm Area**  
80ha

**Number of years farming**  
4th generation

**Trial Sub District**  
Airville

**Area Under Cane**  
98ha

**Service Provider Contact**  
Farmacist Burdekin - Alice Warner

**Idea**  
Grower led/SRA Working with pre-existing trial site

## BURDEKIN



# RICHARD KELLY

## *Variable N Rates on Q240*

Hoping to increase CCS, fourth generation farmer, Richard Kelly is investigating variable Nitrogen application rates through variety efficiency.

### BACKGROUND

Anecdotal evidence has suggested that Q240 is a more efficient user of Nitrogen (N) when compared to some of the older varieties such as Q183, i.e. has a higher nitrogen use efficiency (NUE). Richard Kelly was interested in implementing a trial that would investigate the possibility for reducing N on Q240 and monitor whether this would provide an increase in CCS and therefore tonnes of sugar per hectare.

The trial was initiated on ratoon cane during the 2016 harvest season in a random strip block trial design with 4 replications. The paddock was a relatively uniform loam in the Mt Kelly region under 1st Ratoon Q240. The N rates that were investigated included the "6-Easy-Steps" rate (T1), as well as two reduced levels of Nitrogen (T2 and T3) as detailed in table 1. The "6-Easy-Steps" rate was guided by soil tests and recommendations based on yield potential for the 2017 harvest.

### TREATMENT

Table 1 - Treatment Nitrogen (N) Rates

Treatment	N Rate (kg/ha) 2017	N Rate (kg/ha) 2018
T1	206	196
T2	164	154
T3	147	136



## FROM THE LANDHOLDER

The result of this project is envisaged to improve N accounting and the capacity of models, to develop specific N-loss abatement strategies for different sugarcane growing regions reducing environmental pollution, mitigating climate change while increasing profitability.



## TRIAL DESIGN

Following trial implementation, monitoring of the cane canopy occurred throughout the 2017 harvest season. Using a drone mounted with a multispectral camera, both NDVI and GNDVI maps were created. Proximal sensors, such as Greenseeker and OptRx, were also used to log NDVI data for identification of growth rates for different N rates within the trial. Once the NDVI data had been captured, plant samples were taken from the paddock and sent away for analysis. No significant difference was found in N content between treatments for the first two years of results. This was also shown by the 2017 and 2018 harvested yield results (see figures 1 and 2) with no significant difference between treatments.

Figure 1 - Yield Results (2017)

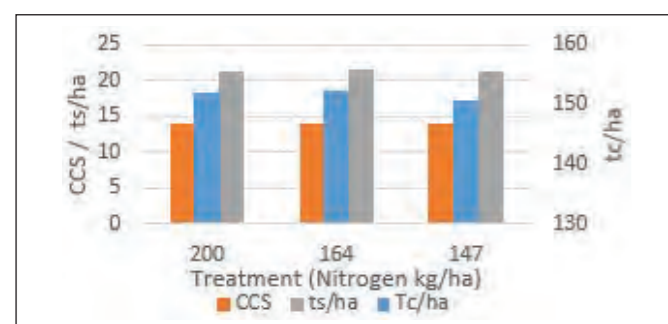
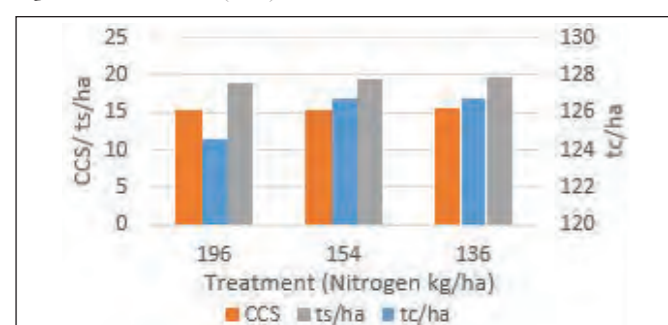


Figure 2 - Yield Results (2018)



The Queensland Department of Agriculture and Fisheries (DAF) completed an economic analysis on both the 2017 and 2018 trial data with gross margin results presented in figures 3 and 4. With similar yields and CCS results between treatments, application of reduced N resulted in higher gross margins. In 2017, the highest gross margin was achieved at 164kg/ha of N. This was \$211 per hectare higher than the 206kg/ha N rate but was not statistically significantly different. For 2018, the highest gross margin was achieved with an N application rate of 136 kg/ha. This was \$355 higher when compared to the 196 kg/ha treatment but also showed no statistically significant difference. Due to no significant difference and based on two years of data, the results may not yet confidently be attributed to the different treatments.

Figure 3 - Gross Margins (2017)

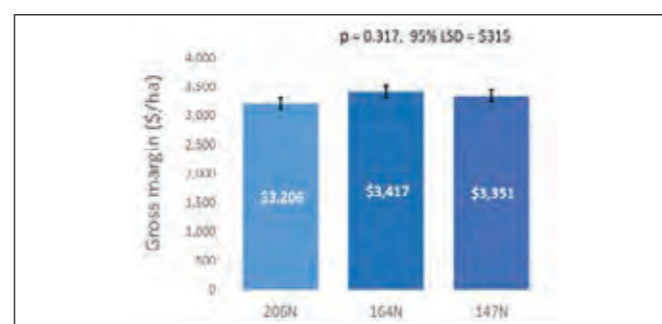
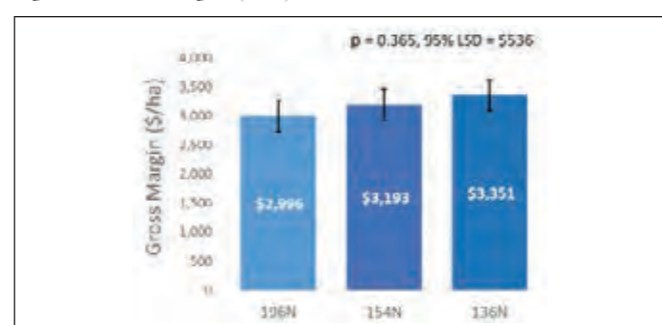


Figure 4 - Gross Margins (2018)



Following the results of the first two years, the trial has been continued for a third year with a slight change in treatment layout, N application rates, as well as additional monitoring methods. The trial is now part of a project conducted by researchers from Queensland University of Technology and is funded by Sugar Research Australia with the title, 'Greenhouse gas emissions from sugarcane soils: strategies for increasing NUE and reducing environmental pollution'.

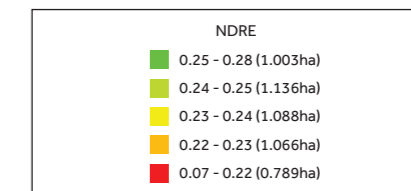
The project has included greenhouse gas (GHG) emissions monitoring from existing sugarcane trial sites to establish a quantitative relationship between NUE, GHG emissions and denitrification losses. At Richard Kelly's site, two fully automated GHG monitoring systems, complete with manual gas sampling chambers, were installed. In addition to the current project (i.e. NUE monitoring), the application of isotopically enriched N fertiliser has enabled the project to quantify total gaseous N loss via denitrification - with dinitrogen (N<sub>2</sub>) as a potential major loss pathway of applied N fertiliser.

## RESULTS

This project is envisaged to improve N accounting and the capacity of models to develop specific N-loss abatement strategies for different sugarcane growing regions reducing environmental pollution, mitigating climate change while increasing profitability.



## OPTRX NDRE REFLECTANCE MAP



For more information on the economic analysis please contact:

Tichaona Pfumayaramba - Ph: (07) 3330 4507  
Email: Tichaona.Pfumayaramba@daf.qld.gov.au



# Maximising fertiliser efficiency with Wilmar Bio Dunder®

For experienced cane farmer Tony Bugeja, the decision to vary his fertiliser rate to increase on-farm efficiency and reduce his environmental impact was an easy one.



After operating a centre pivot on his farm for several years, Tony realised that there was a consistent and significant difference between the yield of the cane within the pivot circle, and the yield of that on the edges. In fact, the variance was so distinct that the step up in cane within the pivot circle was noticeable even in a wet year. Harvest data showed that the yield difference in a plant cane crop averaged a significant 40 tonnes to the hectare.

It was clear that the higher-yielding cane inside the circle required more nutrition, and that the fertiliser rate outside of the less-productive pivot circle (around 8 hectares) could be reduced to more efficiently target the nutrient requirements of the crop. This presented an opportunity for Tony's business to benefit both economically and environmentally.

As a Bio Dunder customer, Tony was able to take advantage of the fertiliser's precision application to make this rate variance possible. After having variable rate application maps prepared, Tony's Bio Dunder contractor was able to upload these to an application computer and apply the fertiliser at varying rates inside or outside of the pivot.

Tony has now used this method for a number of years to successfully maximise his efficiencies on-farm.



Wilmar AgServices is a proud sponsor of Project Catalyst.



As Central Queensland's leading printing and design business, BB Print continues to strive to be at the forefront of Australia's environmental initiatives.

Having maintained a 'Level 2 of Sustainable Green Print' certification for 6 years, BB Print's commitment to the environment and environmental printing practices remains unwavering.

BB Print is the only Sustainable Green Print (SGP) accredited business north of the Sunshine Coast and each year exceeds the strictly monitored environmental audit they are required to undertake.



## Leading the way in environmental printing

Every aspect of waste is weighed and calculated with the SGP system allowing accredited companies to continually improve and reduce their impact on the environment.

Environmentally sound printing is a long term commitment from the printing industry. Environmental initiatives such as recycling and reducing emissions to water, land, and air place an emphasis on continually improving environmental performance.

To qualify for SGP accreditation each staff member must undertake additional training and the company undergoes a strictly monitored independent environmental audit annually.

BB Print won the Queensland wide 'Environmental Management Award for Printing' in both 2013 and 2015. Presented as part of the renowned PICAs - Printing Industry Craftsmanship Awards, it is highly sought after and acknowledges the state's most proactive environmentally sound business within the printing industry. It was a significant achievement for the company, especially as they

competed against some of the state's largest printing companies.

BB Print Partner, Kathy Farren-Price said of the awards, "Environmental practices are a very important part of our business. Having won a state-wide competition twice makes us very proud."

BB Print Partner, Gary Bye said "We care about the environment and so do many of our customers."

"It's a great source of pride for us that we are an environmentally responsible company. Another benefit is that by taking responsibility for the impact we have on the environment we can also focus on improving efficiency. We recycle everything possible, even down to the rags we use, utilising greener chemicals and soy-based inks."

**"We encourage other businesses to think and reap the benefits of thinking green. Environmentally sound practices are the future of the printing industry and we are excited to be a part of that direction."**



## How to harvest profit

According to the ABS - At 30 June 2017 there were 394 million hectares of agricultural land in Australia, the majority of which are family owned farms. Sugarcane cut for crushing is estimated to represent 1.6 billion of the national economy. There has never been a more important time to future proof your business.

The average age of a farmer is 56 and are five times more likely to be working at age 65. Difficulty relinquishing control, ongoing financial reliance on farm support and waning interest of younger farmers to take over the family business, are cited amongst a number of reasons this happens.

When you add family traditions to 'who should inherit the farm', succession planning will often end up pushed aside. Business planning can be overlooked when farms are run as a family necessity rather than as a business. David French, Managing Director of The Investment Collective, works with farmers across NSW and QLD, "In a world of increasing costs, regulations and uncertain markets, it's no longer enough."

While working with clients in rural NSW, David French visited their farm many times because we're not just a voice on the phone, or someone who replies to your emails. We know that relationships with our clients allows us to help them achieve their goals. Whether that means a client coming in to our office or travelling interstate to work with them at their kitchen table.

Our aim is to immerse ourselves in your world, so that our work reflects your reality. We have a business consulting and bookkeeping team dedicated to helping your farm and business thrive, focussed on helping you get results.

The Investment Collective is also invested in local initiatives and smart, sustainable futures. CDIF Solar is owned by the Capricorn Diversified Investment Fund (CDIF) and managed by us.

Solar energy is one of the cleanest, most sustainable and most renewable energy sources in the world. So why don't more people utilise solar energy? Lisa Norris explains.

"We understand that the set up costs can be prohibitive and we decided to help."

In January 2017, CDIF Solar installed a 55kW commercial system of approximately 190 panels at Tropical Pines in Yeppoon, Queensland. With growers from Townsville down to the Sunshine Coast, the business supplies approximately half the fresh pineapples in Australia. The installation supplies approximately 40% of Tropical Pines energy consumption.

Suncorp House in Rockhampton is home to The Investment Collective and a Suncorp Bank's regional office. On the roof, a 40kW commercial system with approximately 170 solar panels has been operating successfully since June 2014, providing power to five tenancies. CDIF Solar supplies approximately 15% of Suncorp House's energy consumption.

**Lisa Norris**  
**General Manager – Clients & Insights**  
**M +61 404 833 307**  
**www.investmentcollective.com.au**



## OVERVIEW

**Trial Farm**  
PSM-01440A

**Mill Area**  
Proserpine

**Total Farm Area**  
280 ha

**Number of years farming**  
Tony worked on the family farm before managing it from 2002. He is a 4th generation farmer.

**Trial Sub District**  
Bloomsbury

**Area Under Cane**  
240 ha

**Service Provider Contact**  
Farmacist

**Idea**  
Grower

## MACKAY / WHITSUNDAY



# TONY JEPPESEN

## *Does higher harvester speed reduce yield*

Tony Jeppesen is a fourth-generation cane farmer and farms 240 hectares in the Bloomsbury district with wife Mandy, and sons Sam and Ben. They supply 20,000 tonnes of cane to the Proserpine Mill and the farm is supplementary irrigated with water supplied from dams and bores.

### GROWER GOAL

To reduce harvester operational time while maintaining daily output to complete harvesting season.

The same trial design was applied to all trials, with three harvester speeds repeated three times. Soil types were sandy loams, loams and clays and all trials used Q242 cane variety.

### BACKGROUND

Tony is a founding member of the O'Connell River Harvesting Group, which is made up of three Bloomsbury farming enterprises. The harvesting group cut 95,000 tonnes annually and with volumes this high, a small reduction in harvesting speed can potentially add days to harvest season.

Each treatment represented a 30-metre strip in a single row, with 20 metres between treatments for the harvester to adjust to correct speed. At each trial the crop was assessed to determine suitable speeds and the harvester would run at 2, 4 & 6 km/h at all three locations.

With the size of harvester groups expanding, the question was asked by the O'Connell River Harvesting Group, "how fast is too fast for a harvester"? To answer this question, two different trials were established in 2016 and 2017, on plant cane blocks Gaps were measured before and after harvest. Trial one and two were cut in 2017 and trial three and four were cut in 2018.

The pre-harvest gap count ranged from 1% to 6% area for 2016 plant cane, but cyclone damaged crops in 2017 used as a plant source caused the strike to be poor and related to increased gaps of 7% to 15%.

Trial 1 in the 2017 had all treatments harvested at a constant speed of 3 km/h, which served as baseline data for the following trials. The gaps count post-harvest had a range of 7% to 17% area.



**FROM THE LANDHOLDER**

Given the size of O'Connell River Harvesting Group, operating at speeds in the 6 km/h range would provide the least gaps while not sustainably reducing tonnes per hour harvested.

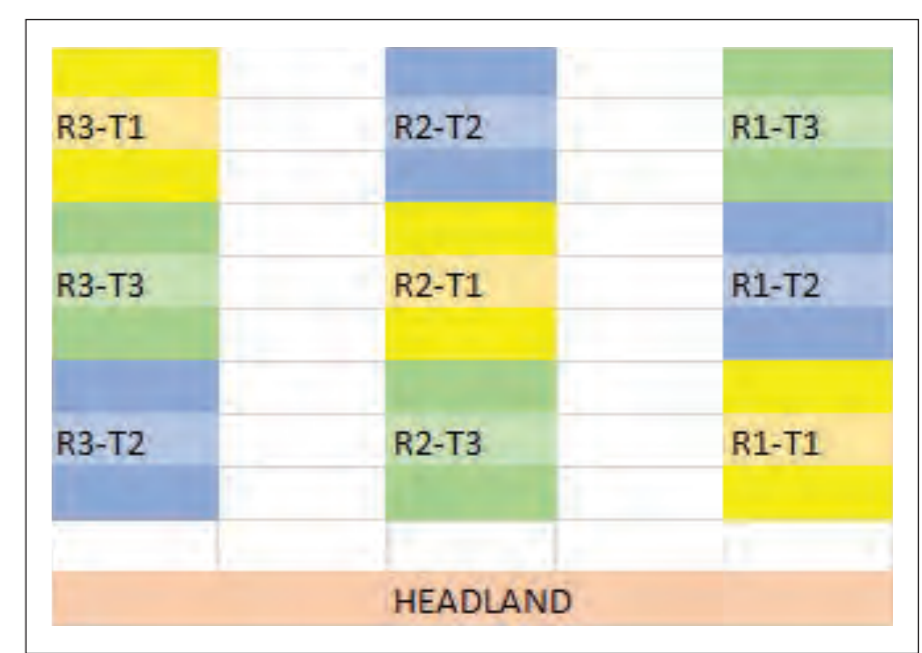
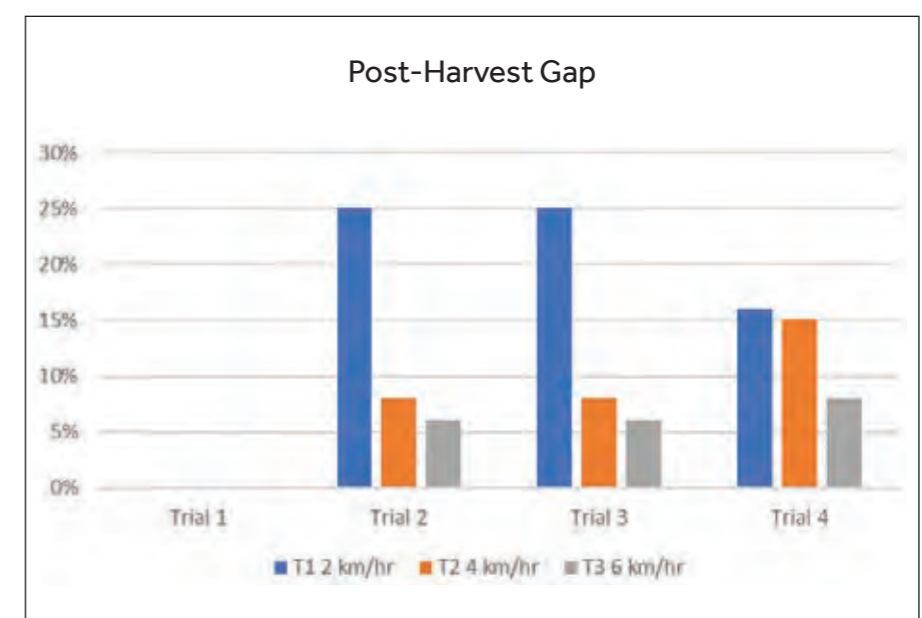
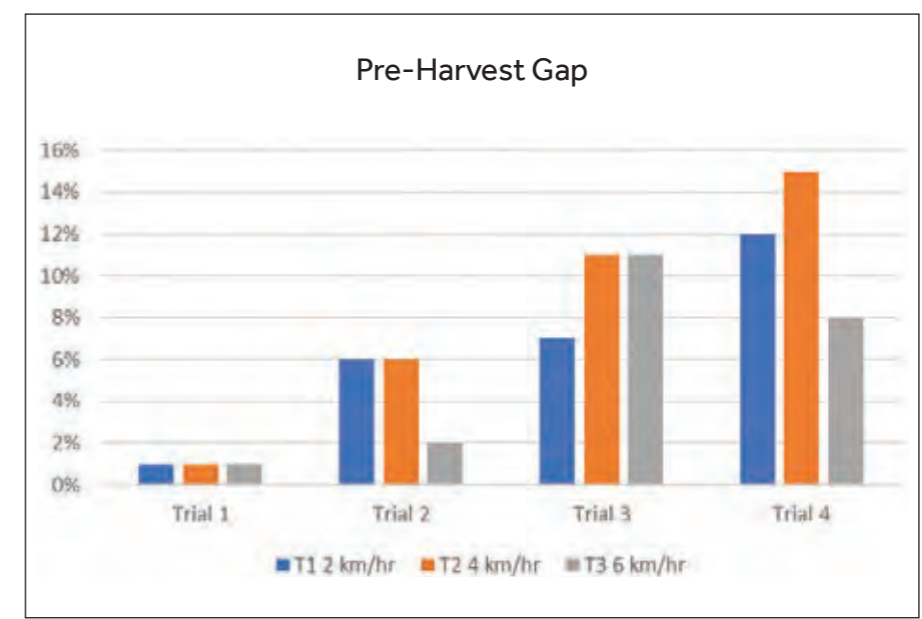
The remaining trials had the three harvest speeds applied and gap analysis conducted two months after harvest, with gaps ranging from 6% to 25% area. The slowest speed of 2 km/h gave the highest gaps, with two trials producing 17% more gaps than 4 km/h treatment. Apart from the two outliers for the slow speed, the remainder of the trials different treatments gaps tended to cluster together.

The large increase in gaps at low harvester speeds is difficult to explain, but it appears that very low speeds can do more harm than good. The constant speed trial had a range of 10% gaps, so a large impact on gaps after harvest is caused by issues other than harvester speed. If how the cane lays at time of harvest, does not force lower speeds, then these trials indicate harvesting speeds around 6 km/h did not cause more gaps than the harvesting at lower speeds.

The cane did have the capacity to reduce the gap count later into the season, with gap counts at 6 months after harvesting, being lower than counts 2 months after harvest. Although the cane did reduce the gap count, there would still be a negative impact on total yield.

There is an optimum harvesting speed for each soil type, variety and cane presentation combination each year, this is difficult to determine prior to harvesting.

*The best harvest results are achieved when the operator monitors conditions and makes adjustment to constantly improve performance.*





## Devices to reduce fish kills in the Gooseponds

They include three sub-surface water circulators, two surface-mounted aerators that disperse water vertically and radially and one surface-mounted fountain that shoots a jet of water skyward.

In December 2018, a fish kill was reported in the second pool at the Gooseponds. This pool is located over 900m downstream from the pool where the aeration devices have been installed.

Cr Karen May said the fact that there had been no fish kills in the upper pool proved the devices were doing their job.

“Oxygen stress has resulted in the death of fish in the Gooseponds to varying degrees over many years,” she said.

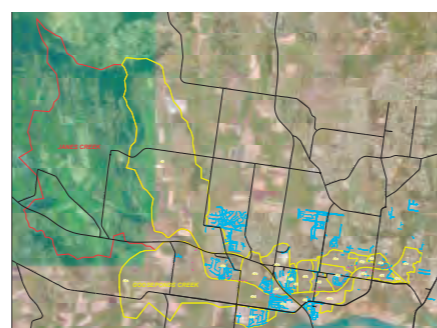
“This is related to early wet season storms washing large amounts of organic matter, soil materials and nutrients into the Gooseponds, which depletes the water of oxygen.

“The pond where the aerating devices have been installed is the first to receive this run-off from the upstream catchment.

“Given that no fish were killed from the run-off that killed 120 fish in the next pond over is evidence that the devices are maintaining oxygen levels in the upper pool to a suitable level.

“This is because the devices only improve oxygen levels in the pond in which they are installed, not the entire Goosepond system.”

The devices have been installed as part of a trial and are hoped to be gradually rolled out across the rest of the Gooseponds depending on the results of the evaluation and future funding.



The Mackay Regional Council is pleased with the effectiveness of devices installed to improve oxygen levels in the Gooseponds waterways.

The devices, designed to reduce the number of fish kills occurring on a seasonal basis, have been installed in the upper pool of the Gooseponds.



## Award winning grower, Wallace Tognola

Wallace planted the cane using a standard base NPK fertiliser and then foliar sprayed over the row after emergence with Stoller's ClearStart15KZ+N @ 30lts/ha + Stoller Action 5 @ 1lt/ha (Now Action 10) and then he side-dressed using 500-600kgs/ha of Mareeba Ratoona subject to his soil tests and following the 6 Easy Steps.

The plant cane in 2015 cut just under 150 tonnes/ha with CCS of just over 13.5 and in 2016 went over 150 tonnes/ha, the crop won him Tableland CANEGROWERS productivity award Champion farm 50-100ha trophy.

Each year since Wallace has foliar sprayed 30lts/ha of the Stoller ClearStart 15KZ+N with Action 10 @ 1lt/ha over the row and side-dresses with the Mareeba Ratooner @ 500-600Kg/ha

Are you happy with the Stoller fertilizer program I asked, and will you continue using it? Well, Wallace said, “we have cut over 3000 tonnes from the two fields with an average of 150+ tonnes/ha each year and without irrigation!

I am extremely happy with the results, “Stoller liquid fertilisers really work and are easy to apply with no weather worries, I would recommend the program to any cane-grower”.

Cane planted 2014 First cut 2015, 1 ratoon 2016, 2nd Ratoon 2017, 3rd Ratoon 2018 Variety - 228 and 208.

**Martin Shaw**  
Stoller Australia Agronomist & FNQ Area Manager  
M +61 418 808 438



Just before Christmas 2018 I caught up with Wallace Tognola a cane grower on the Atherton Tablelands when he was spraying a field ratoon cane with Stoller liquid fertiliser.

Wallace told me he started using the Stoller Australia Advanced Technology liquid fertiliser program on his sugarcane for the first time after he planted the two fields of cane back in 2014 using variety's Q228 and Q208

## 40 years of agricultural solutions

Friends and business partners, Lew Brandon and the late Kevin Muspratt began their association with Trimble Agriculture when they founded their ag tech business, Brandon Muspratt Services (BMS) now Vantage NEA in 1979. Nearly 40 years on and the business has grown into a leader of precision agriculture solutions, distributing machine guidance and data analysis technology that improves farmers' management.

The Burdekin based business, which now operates throughout a large portion of Australia, has recently added a soil analysis system to their toolbox of farm analysis solutions. The Soil Information System (SiS) has had great success and growth for Vantage NEA, with the business more than tripling the acreage they've tested in just 12 months. This rapid growth has been acknowledged by the industry, with Vantage NEA precision agronomist, Bryan Granshaw, being invited to present at the 2018 Trimble Dimensions, a premier gathering of over 4000 Trimble experts and users from 80 countries. Mr Granshaw presented on how Vantage NEA has adapted the SiS to work effectively in Australian conditions and how they're successfully using the extensive data in collaboration with other precision ag technology to help their customers progress.

The system, which consists of a combination of an EM sled, a geo physical soil probe and Data Acquisition and Analysis Software provides highly sophisticated soil data which has been unmatched by other methods of soil testing. It's been making waves with Australian farmers, who have been trying to understand the causes of yield variation in their crops.

The system is different to traditional soil testing methods as it uses multiple technologies and intelligent targeting algorithms, to determine locations within a field that are substantially different from the rest. These points of difference can then be further investigated with the unique soil probe which, after processing, provides extensive, high resolution information about the soil.

Mr Granshaw said the high-resolution data the system provides would become a necessity to farmers wanting to progress their operation and increase their returns.

“Traditional soil testing methods are usually limited, containing one analysis, down to 20cm, which primarily looks at the soil's chemistry,” he said. “SiS is spatially correct, provides about 75



layers of physical and chemical data on soil from a surface and sub surface level down to 1200mm. It gives farmers the information to act and manage their paddocks accurately.”

The proof of SiS' effectiveness has been in improved yields for Vantage NEA customer and Project Catalyst participant Frank Mugica, “Mugica Farms”, Brandon. Mr Mugica had SiS analysis conducted on majority of his cane farm, which pinpointed issues causing variation in his crops. The 75 layers of data provided by SiS showed parts of Mr Mugica's farm was affected by PH imbalances and a lack of organic carbon in his paddocks. Vantage NEA, Mr Mugica and his agronomist were then able to develop an accurate, variable rate prescription map for gypsum and mil mud to treat the issues. 12 months on from treating the affected areas, Mr Mugica said he was producing a tonne of cane more per hectare than what he was previously, earning him roughly \$350/ha more.

“It paid for itself twice over in the first 12 months,” he said.

Mr Granshaw and Mr Mugica also looked over five different SiS data layers relating to plant available water and split the farm into four major zones with differing moisture holding capacity. They then installed a moisture probe into each zone. Mr Mugica is now able to closely monitor his soil's moisture requirements, allowing him to make better irrigation decisions and reduce farm run off. As a Project Catalyst farmer, minimising his environmental footprint has been crucial for Mr Mugica who said he's been able to use less inputs since having SiS analysis conducted.

“It's completely eliminated any guess work,” he said. “I only apply what my soil needs, and I've been able to further reduce my run off and eliminate over irrigation.”

Wilmar Sugar Australia is also progressing towards applying all of its inputs and nutrients via variable rate. The company, which produces more than half of Australia's raw sugar from the eight mills it operates across Northern Queensland, had SiS analysis conducted on parts of its irrigated Burdekin farm. The data developed spurred Wilmar's Agricultural Productivity Manager Peter Larsen to change the flat rate gypsum prescription they were previously using to a VR prescription.

“We don't always see an overall reduction in the quantity of gypsum used on a farm, but we know we're using the product more effectively,” he said. “Treating high sodicity areas improves the soil structure and plant available water. Doing it more effectively has allowed us to maximise our irrigation strategy.”

From there, Mr Larsen used Trimble Ag's new farm software to monitor the success of the VR prescription as well as identify crop issues. The software is a cloud-based solution growers can use to track their on-farm inputs and monitor profitability across their enterprise. It also provides growers with access to regularly updated satellite imagery of their paddocks, allowing them to monitor crop health issues from the sky. Mr Larsen has used the satellite imagery in conjunction with the soil data to review crop variability issues, allowing him to identify and assess poor performing areas.

Wilmar's General Manager Agriculture Ian Davies said the company was also leveraging the Trimble Ag software for recording day-to-day operations.

“By doing this, we can potentially determine both the input costs and yield results of individual paddocks,” Mr Davies said. “This will allow us to monitor our management decisions and individual paddock profitability, while providing an easily accessible platform for reporting,” he said.

The three pillars of Vantage NEA's farm solutions – hardware, software and services – has helped Wilmar and Mugica Farms to better understand their farm's soils and crops, and make management decisions based on high quality information.



## OVERVIEW

**Trial Farm**  
MKY-03134

**Mill Area**  
Mackay Sugar

**Total Farm Area**  
700ha

**Number of years farming**  
More than 40 years. Gerry is 2nd generation. Sam and Joe are 3rd generation.

**Trial Sub District**  
North Eton

**Area Under Cane**  
600 ha

**Service Provider Contact**  
Farmacist

**Idea**  
Grower

## MACKAY / WHITSUNDAY



# GERRY AND BARB DEGUARA WITH SONS JOE AND SAM

## *Advantages of applying Dunder Subsurface*

Their goal is to lift productivity, maximise the benefits of their fertiliser, and to partake in environmentally sustainable practices, that will ensure the farms longevity for future generations.

### BACKGROUND

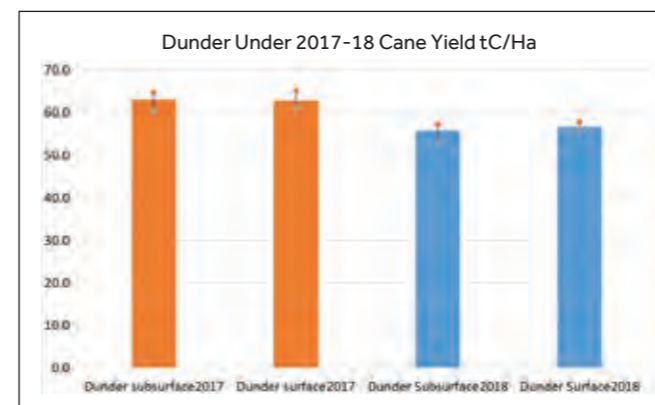
When it comes to early adopters of innovation, the Deguara name is often associated. In 2015 after witnessing a sub-surface Dunder applicator in the Burdekin region and identifying that this method of fertiliser application could be beneficial on their farm, the Deguaras set out to build such an implement. Traditionally all their Dunder is banded on the surface, however research suggests that by applying fertiliser sub surface you reduce the likely hood of nutrient run off during irrigation and weather events.

They retrofitted their current Confidor applicator with a standard variable rate Dunder control system. This meant they could do two jobs at once if required, thus reducing input costs. The implement covers three beds at a time and travels at 8km/hour. The discs open the ground and high pressure angled nozzles apply the Dunder around 100 mm deep, a chain then closes the incision. A small tank that holds 4.5 m<sup>3</sup> of Dunder follows behind.



### FROM THE LANDHOLDER

"The market for subsurface liquid applied fertiliser is growing, due to the environmental benefits and the increased time efficiency, particularly for dryland growers. As contractors we see this as a potential diversification, but we believe to increase the uptake of such an application method, government subsidies would be beneficial, especially in the early days"



A trial was set up in 2016, to evaluate any water quality and yield advantages of this system. Two treatments were evaluated, sub surface dunder and surface applied dunder on a heavy black soil. The trial was harvested in 2017 and 2018.

Results produced no statistically relevant results for an increase in cane and sugar yields from the subsurface application of dunder, however a water quality win was had, with a 50% decrease in dissolved inorganic nitrogen (DIN) in the initial run off sample, and an overall 11% decrease in total nitrogen leaving the paddock in the sub surface treatments.

The Department of Agriculture ran a series of economic analysis's and it was found that over a 40-year investment period, it cost an extra \$2.08 per year to buy a sub-surface applicator.

*The Deguaras continue to work with Farmacist and the Project Catalyst team on this project and aim to see more positive water quality benefits in subsequent years.*





## OVERVIEW

**Trial Farm**  
MKY-04621A

**Mill Area**  
Mackay Sugar

**Total Farm Area**  
48ha

**Number of years farming**  
More than 30 years. John is 2nd generation.

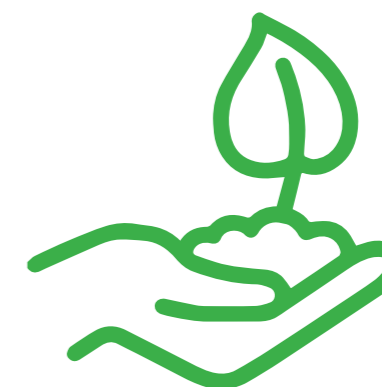
**Trial Sub District**  
Te Kowai

**Area Under Cane**  
216 ha

**Service Provider Contact**  
Farmacist

**Idea**  
Grower

## MACKAY / WHITSUNDAY



# JOHN AND TRACY MUSCAT *Nitrogen Rate Applications*

Improve productivity through increasing sugar content therefore improving tonnes of sugar per hectare and to reduce environmental impacts by applying less nitrogen fertiliser over the crop cycle without compromising high yields.

### TRIAL AIM

To evaluate if staggering nitrogen rate applications will mitigate crop lodging and CCS reduction on high yield potential soils.

### BACKGROUND

Growers producing sugarcane on what was highly productive soils have expressed disappointment in relatively low crop yields and disappointing CCS figures under well-managed, supplementary irrigated farming systems.

Previous nitrogen rate trials have shown that achieving high yields with mill average CCS on productive irrigated soils can be compromised through crop lodging, particularly when nitrogen rates exceed six easy step (6ES) guidelines. Case studies indicate that reducing nitrogen rates below 6ES guidelines on productive well drained, irrigated soils can reduce lodging with improved CCS levels.

However, growers may be reluctant to reduce nitrogen rates as a management practice, due to concerns with potential 'mining' of nitrogen in the organic pool.

This trial is testing the potential of alternating nitrogen rates (6ES and a lower nitrogen rate) in consecutive years over the ratoon cycle to maintain the nitrogen in the organic pool while managing crop lodging and improving CCS. Growers farming these highly productive soils tend to apply nitrogen at above 6ES rates in an attempt to optimise the yield potential of these soils.

These productive alluvial soils are well represented along the Pioneer River system and generally have history of mill mud application due to their proximity to sugarcane mills (Racecourse, Marian and Farleigh mills)



A trial was set up in 2016 at John Muscat's farm. The trial was harvested as 1st ratoon in 2017 and 2nd ratoon in 2018.

### TREATMENT

Five nitrogen treatments were applied to the trial site with 4 replications.

Treatment 1	Nil N
Treatment 2	110 kg N/ha
Treatment 3	110 kg N alternating with 6ES (150N) in consecutive years over the ratoon cycle
Treatment 4	6ES N rates (150N)
Treatment 5	180 kg N/ha

*The potential exists to reduce nitrogen inputs by 16% through the concept of alternating between 110 and 150kg N/ha over a 5-year ratoon phase.*

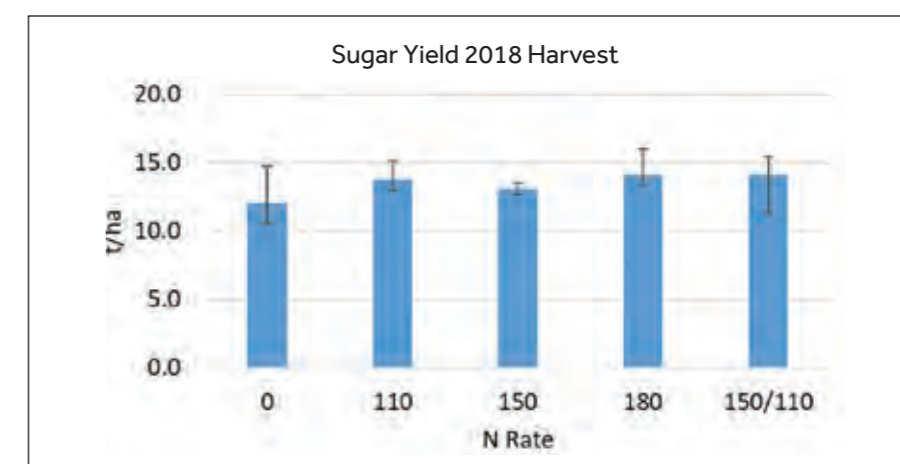
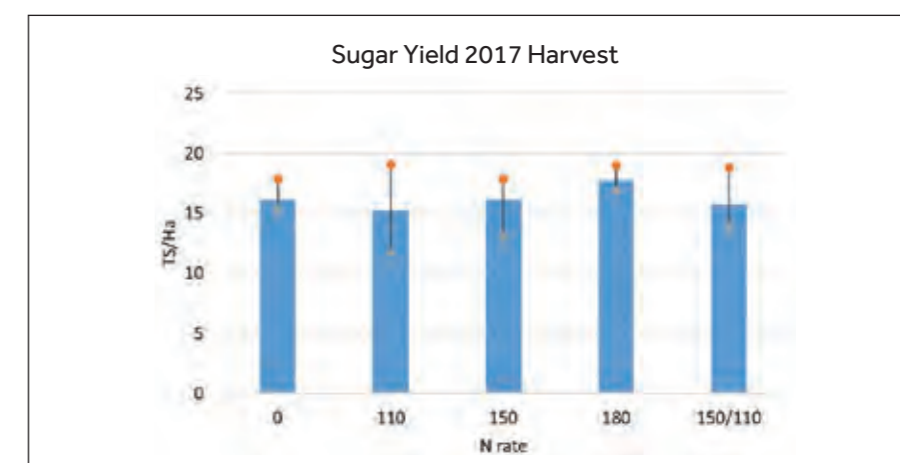
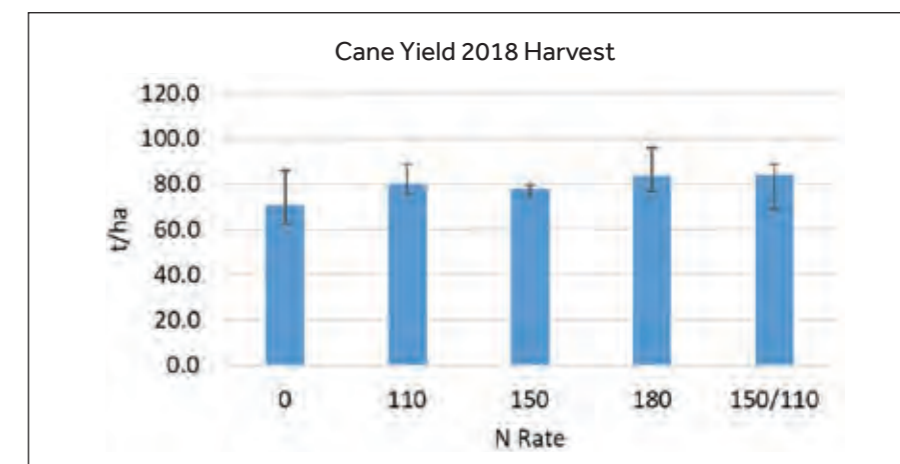
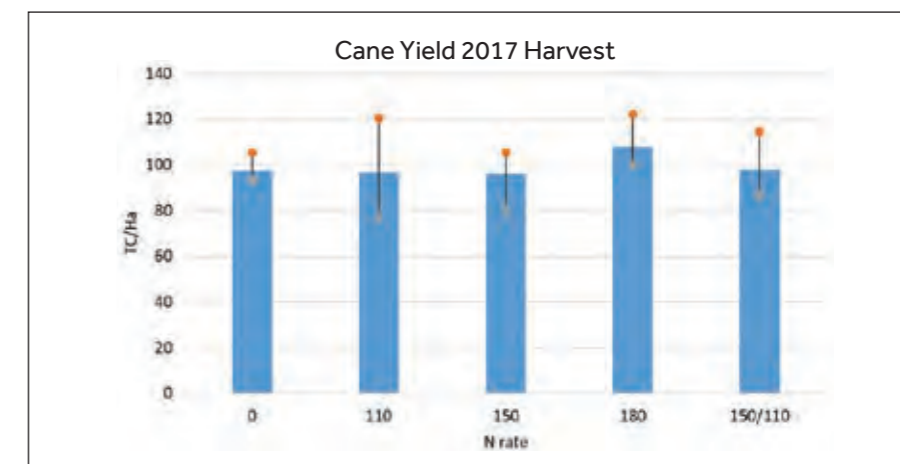
In 2017 cyclone Debbie left the 1st ratoon crop tangled and flattened, which impacted initial results. All strips were heavily lodged with numerous suckers across the site. The cane yield from the no nitrogen applied treatment averaged similar yields to all treatments other than treatment 5 (180kg N/ha) which was on average 10t/ha higher.

Results from 2018 discovered that in general treatment 3 (alternating 110 and 150kg N/ha) performed the best overall when it came to economic viability and yield results. When compared with treatment 5 (180kg N/ha) it produced a higher CCS, the same sugar yield and only 0.3 tonne less cane per hectare, at a lower input cost.

The Department of Agriculture and Fisheries conducted an economic analysis of the 2018 results and found that the average gross margin of the staggered nitrogen rate (\$2,257/ha) was higher than the grower's current practice

(\$2,131/ha). However, the difference in average gross margin cannot confidently be attributed to the different fertiliser rate (treatment) given that the result was not statistically significant. A further economic analysis will be undertaken following the 2019 harvest, which may provide more certainty on the treatments and help to better guide decision-making.

This project was initiated by John Hughes from The Department of Agriculture and Fisheries and through collaboration with Farmacist and Project Catalyst, trial activities were completed. This trial has been reapplied in 2018 and will be harvested in 2019. To date there has been little difference between all nitrogen treatments from 0 to 180kg N/ha, suggesting that there is a lot of nitrogen being mineralised in the system. The full crop cycle will need to be evaluated in order to investigate the true productivity benefit and environmental saving of moving to alternating nitrogen rates in ratoons.



## Growers find success in fine-tuning nutrient applications

Cane farmers across the Reef catchments are part of a success story where reducing nutrient application has proven better for their business.



Optimising fertiliser application rates through whole-of-farm nutrient management plans has given confidence to cane farmers in the Burdekin region, and now growers across other Reef catchments are following suit and adopting the recommended SIX EASY STEPS application rates. Through the development of individually tailored whole-of-farm nutrient management plans, cane farmers are finding the sweet spot in applying the ideal fertiliser rates for their blocks and adjusting farming practices to improve outcomes for their crop and the Great Barrier Reef.

The growers efforts to improve their businesses and reduce run-off to the Great Barrier Reef is no drop in the ocean – collectively they are making a real difference – leading the industry as environmental stewards and protecting our environment for future generations.

Over the last three years, more than 150 Burdekin cane farms have reduced their rate of fertiliser application, with the assistance of locally trusted agronomists from Farmacist,

through RP161 Complete Nutrient Management Planning for Cane Farming project. Growers participating in the project are provided a whole-of-farm nutrient management plan based on their individual farm soil samples and historical data alongside practical on-farm assistance to action that plan.

Due to the exceptional achievements of these farmers, the Australian and Queensland governments provided additional funding to expand the project, encouraging growers across the Reef catchments to join this success story and adjust their farming practices.

The Mackay Whitsundays project has already attracted 57 farms in its first year with Burnett Mary and Herbert to come on board in 2019. While each of the projects will be tailored to local circumstances, there will be consistency across all regions to ensure what has worked previously is offered to all participants. This includes personalised one-on-one extension with farm visits from local agronomists to calculate the appropriate rate of nitrogen for

their individual cane production, creation of a whole-of-farm and tailored nutrient management plans, fertiliser box calibrations and farm decision support throughout the year.

Previous project participants experienced the benefits of varying fertiliser application rates between blocks including significant savings and profitability gains. Growers remarked that having an agronomist working alongside them for a year has helped them feel more confident in testing new practices and has made farming operations simpler.

This project is just one step in achieving the Australian and Queensland Government's Reef 2050 Water Quality Improvement Plan target to reduce the amount of dissolved inorganic nitrogen that flows from rivers into the Reef by up to 70 per cent by 2025.

RP161 project is funded by the Queensland Government through the Queensland Reef Water Quality Program and the Australian Government through Reef Trust.



Rabobank

## Sugar market facing potential structural change

The global sugar market is facing potential structural change in terms of both production and consumption, and this is set to have far-reaching impacts on sugarcane producers internationally and in Australia, according to Rabobank's global sugar strategist Andy Duff.

Brazil-based Mr Duff was in Australia late last year for Rabobank's inaugural Sugar Symposium, presenting his outlook for the sugar sector in front of more than 200 growers and industry representatives.

Mr Duff said while the sugar market would always be cyclical – and at the mercy of weather and currency movements – there were now structural changes contributing to the current imbalance in global sugar markets.

### Consumption slowdown

In terms of global sugar consumption, Mr Duff said, the world was starting to see heightened concerns around the prospect of a slowdown in consumption growth. "Three or four years ago, these concerns didn't really warrant a mention, and even two years ago, many thought this trend could be a 'flash in the pan,'" he said.

"But there is now no doubt that slowing consumption growth is a real prospect, as governments and multi-national companies around the world take steps to reduce sugar and caloric consumption."

Conceding it is difficult to determine the long-term impacts of this shift towards reducing the sugar component in beverages and processed foods, Mr Duff said "you don't need much of a reduction in sugar consumption to have an impact on sugar prices".

"For example, a five to 10 per cent reduction in global industrial sugar use and also household use in advanced economies will generate a significant one-off slowdown, or even a modest shrinkage, in global sugar consumption over the next few years," he said.

"Against that however, we will continue to see sugar consumption increase in emerging economies around the world, as their populations move up the income scale."

Taking into account both of these divergent trends, Mr Duff forecasts global sugar consumption will grow at a slower rate than in the past, at an estimated annual growth rate of 1.8 per cent in the years out to 2030, down from the 2.4 per cent annual growth rate from 2000 to 2015.

### Increasing supply

In terms of the production-side of the equation, Mr Duff said there have also been big structural changes at play, which have seen a significant increase in the capacity of production out of Thailand, and also Brazil and India.

"Sugar is produced in over 100 countries around the world and, in most cases, policy measures are in place to support growers and processors," he said. "When such policies are changed, it often has regional and sometimes global consequences for production and trade flows."

Now the biggest distortion to global trade is taking place in India, Mr Duff said, with "tremendous support for their domestic cane prices" stemming from government support measures.

Introducing measures to encourage excess sugar onto the world market, Mr Duff said the additional five million tonnes had come at a time when prices are already low. That said, it is unlikely that Indian exports will compete directly in Australia's major markets of South Korea and Japan, he said.

"However, it is having an impact on global prices and the world is watching closely just how big the 2019 Indian crop will be," he said, "with Australia recently lodging a notification with the WTO as to whether India is in breach of its obligations."

### Brazil

In light of these possible structural shifts, Mr Duff said there were many measures Brazilian cane growers, like those in Australia, were taking to remain competitive.

"From a production perspective, growers have been focussing on keeping their costs low and adopting methods to keep yields high, such as controlled traffic at harvest, minimising soil compaction and looking at different methods of planting to ensure good germination and crop density," he said.

Mr Duff said with both Australia and Brazil recording minimal productivity gains in recent years, it will be innovations in sugarcane varieties that will be needed to shift the needle in terms of yield advancements.

"Any yield improvements, together with reductions in the cost of production, will help growers mitigate the impact of the cyclical and structural forces at play and capitalise on opportunities when the price cycle starts to turn," he said.





## OVERVIEW

**Location**  
Bambaroo, Ingham district

**Property Size**  
186 ha

**Number of years farming**  
Sergio grew up on the family farm his father purchased in 1966. Both Sergio's mother and father were Italian immigrants. From 15 years of age, his dad worked in fencing and tobacco before buying the property and expanding its cane land. Sergio and Sharon's sons Adam, Damian and Jordan are also involved in the family business.

*“Over the years we’ve done a fair bit of damage to the soils by using fertiliser and chemicals and now it’s time to cut back, steady steady.”*

## WET TROPICS



# SERGIO AND SHARON FIGHERA

## *Bio-fertiliser Application Trials*

Trialling reduced rates of synthetic fertiliser as well as reduced rates of synthetic fertiliser in combination with bio-fertiliser.

### THE CHALLENGE

Cutting synthetic fertiliser back to a level that is more sustainable and profitable: “With input costs a lot higher these days and with pricing volatile in the sugar cane industry we needed to find alternatives”.

The family's move into bio-fertilisers began three years ago when Sharon completed a three-day RegenAG training course and produced their first batch. They haven't looked back.

*“Over the years we’ve done a fair bit of damage to the soils by using fertiliser and chemicals and now it’s time to cut back, steady steady.”*

### THE TRIAL

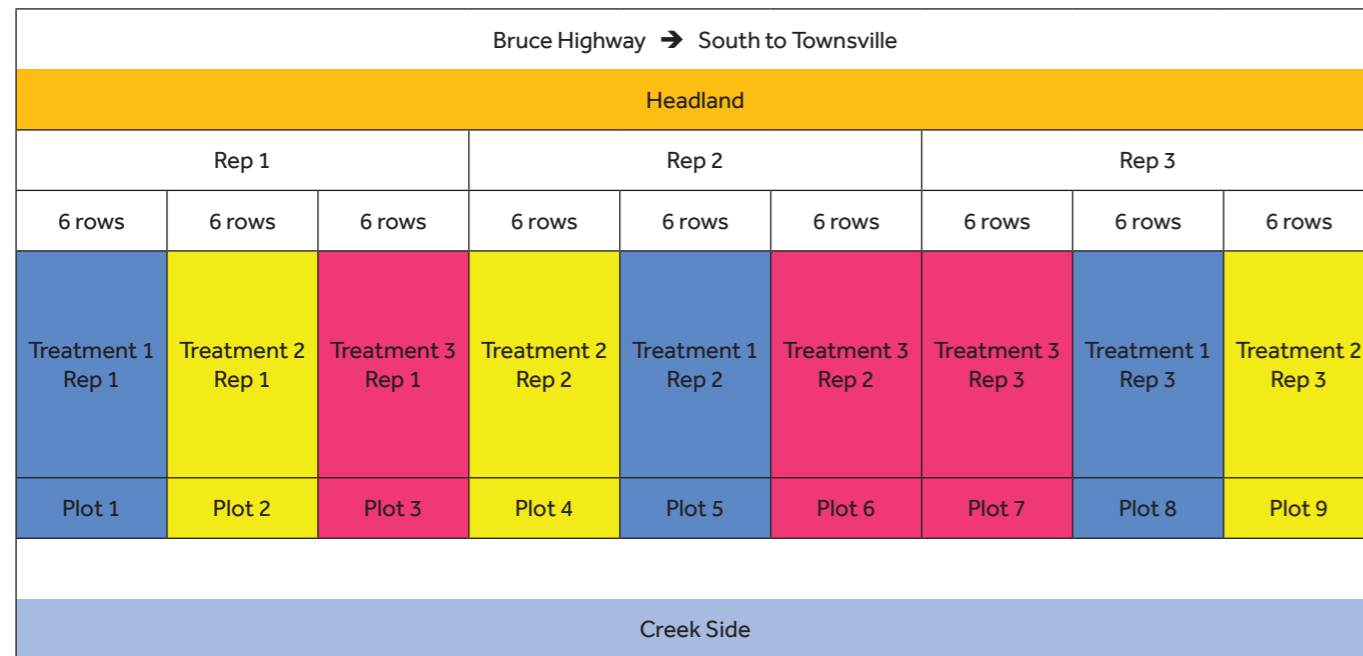
Sergio and Sharon are running trials in sandy soils to compare bio-fertiliser and synthetic fertiliser, as well as reduced rates of each and a reduced combined rate.

They have split one-hectare paddocks into six strips for a three-part trial at three different sites. There are control strips at each site, strips where synthetic fertiliser is reduced by 30% and others where a bio-fertiliser and synthetic fertiliser combination is reduced by 30%.

### TREATMENT

Treatment 1	6ES fert rate
Treatment 2	6ES fert rate reduced by 30%
Treatment 3	6ES fert rate reduced by 30% + RegenAG bio-fertilizer

Figure 1 - Trial Layout



### BIO-FERT PRODUCTION

The Fighera's continue to fine-tune their bio-fertiliser production, a 40-day process involving fermenting, filtering and supplement additions such as fish oil, boron granules, phosphorous sulphate and humates. RegenAG's Kym Kruse has supported and provided technical assistance to Sergio and Sharon throughout the trial work.

Sergio says having a streamlined process and set-up is important.

"It does take a bit of time to produce and we also need to do two passes now rather than one but it gets easier."

### OBSERVATIONS

Outside the trial area, a combination of bio-fertiliser and inorganic fertiliser is being used on all the farm's plant cane and first ratoons. Chemical fertiliser use has been reduced from 150k to 140k of nitrogen per hectare and Sergio plans to drop that to 130k next year.

He expects the change will improve soil health and soil water-holding capacity, and hopes it will also increase yields and ratoons. With the trial in its second year it is still early days but Sergio says soil chromatography tests have shown some soil biology improvements.

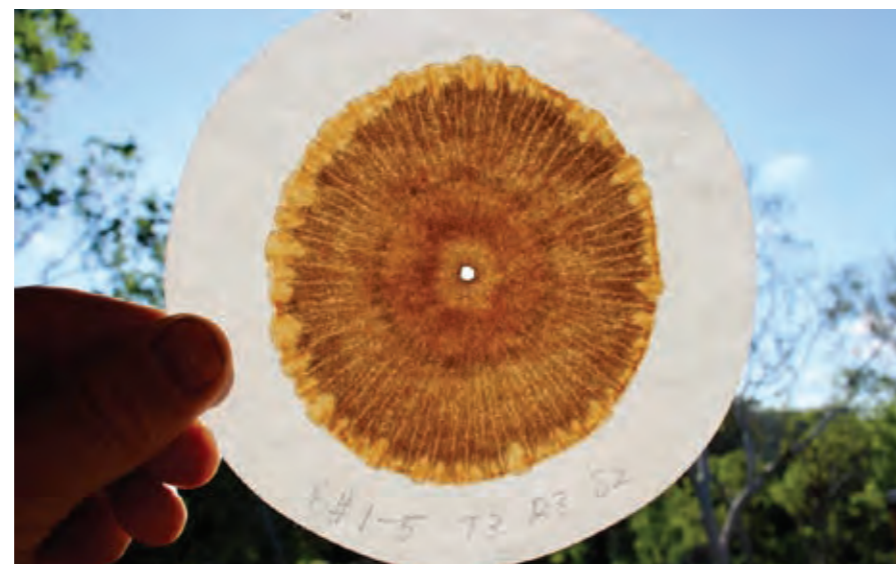
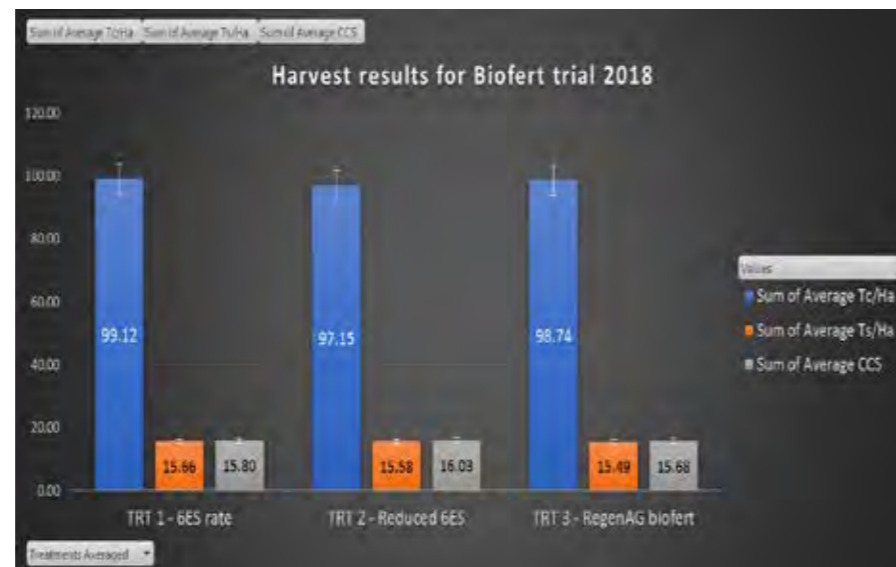
Across the farm, cane yields haven't dropped and he's noticed a greater resilience and cane "hanging in longer".

The trial follows farming changes including controlled traffic, grassing headlands and drains, and planting legume cover crops. Sergio received Reef Trust funding from the Australian Government to manufacture a bean planter and to modify a spray rig for bio-fertiliser use.

"Without this, we probably wouldn't have dropped nitrogen rates as quickly," he says.

### RESULTS TO DATE

Figure 2 - Production Results



Plan	Date	Activities
Stage 1	Establish trial	Baseline nutrient & pachymetra soil samples taken. – 08/05/2017 Trial plan designed Baseline chromatography sample taken & GPS'd – 09/05/2017 Planted Variety Q208 – 19/07/2017 Sidedressed with treatments – 08/09/2017
Stage 2	Sampling 2017/2018	<ul style="list-style-type: none"> <li>1st application of bio-fert brew used as a foliar spray – 08/09/2017</li> <li>2nd application of bio-fert brew foliar sprayed -10/10/2017</li> <li>1st set of 3rd leaf testing – 31/10/2017</li> <li>4mth stalk count – 31/10/2017</li> <li>Chromatography sampling – 1/11/2017</li> <li>2nd set of 3rd leaf testing – 23/05/2018</li> <li>Leaf Silica samples -23/05/2018</li> <li>Chromatography samples – 23/05/2018</li> <li>Trial Harvest for Final yield and CCS – 4/09/2018</li> </ul>
Stage 3	Reapplication	<ul style="list-style-type: none"> <li>Re apply Synthetic Fertiliser</li> <li>1st application of bio-fert brew used as a foliar spray</li> <li>2nd application of bio-fert brew foliar sprayed</li> </ul>
Stage 4	Sampling 2019	<ul style="list-style-type: none"> <li>1st set of 3rd leaf testing –</li> <li>4mth stalk count –</li> <li>2nd set of 3rd leaf testing –</li> <li>Chromatography samples –</li> <li>Trial Harvest for Final yield and CCS –</li> </ul>
Stage 5	Reapplication	<ul style="list-style-type: none"> <li>Re apply Synthetic Fertiliser</li> <li>1st application of bio-fert brew used as a foliar spray</li> <li>2nd application of bio-fert brew foliar sprayed</li> </ul>

### GROSS MARGIN ANALYSIS

The Queensland Department of Agriculture and Fisheries (DAF) completed an economic analysis on Sergio's trial to examine the relative profitability of each treatment. The analysis utilises farm operational and production data collected during the trial. The costs associated with each treatment were calculated and are presented in Figure 3.

The gross margins for each of the treatments were calculated by subtracting the variable costs from the respective gross revenues for each treatment. The gross margin values are presented in Figure 4. With similar yields and CCS results between treatments, application of reduced N lowered costs and thus resulted in higher gross margins for the treatments with less N. The highest average gross margin was achieved by the 30% less N treatment. However, there were no statistically significant differences and therefore the differences cannot be confidently attributed to the different treatments.

Figure 3 - Variable Costs

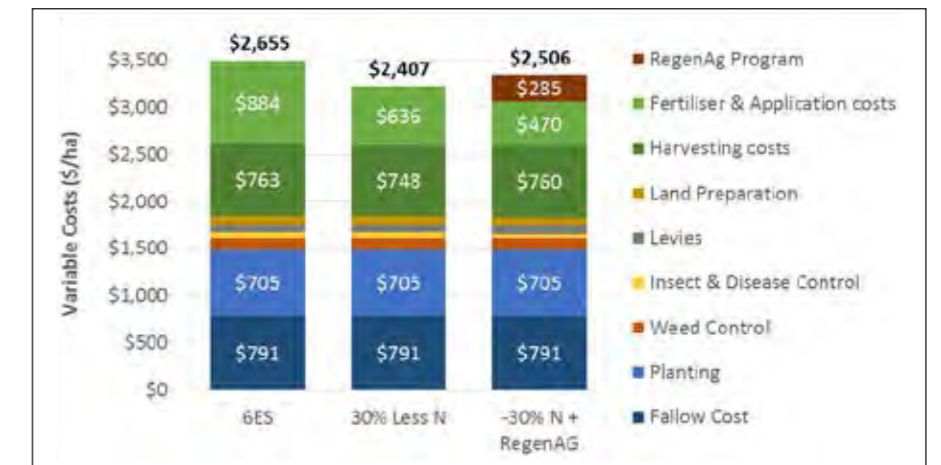
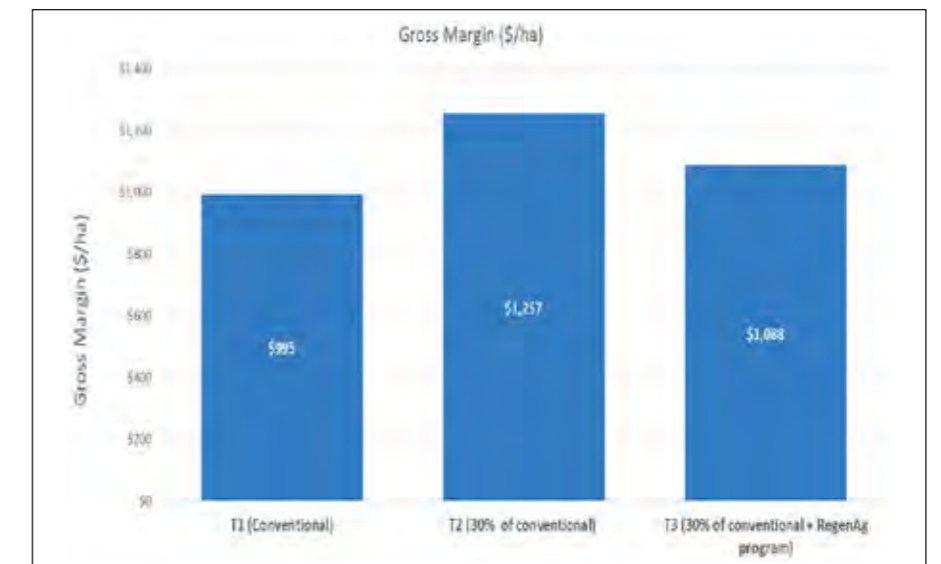


Figure 4 - Gross Margin Analysis





# Can changing farming practices benefit growers, as well as the reef?

Economics helps with some answers for Project Catalyst



Project Catalyst growers are often presented with a number of different farming practices aimed at improving water quality outcomes for the Great Barrier Reef (GBR). Despite the proposed benefits of these alternative practices, some can prove more expensive and may possibly be economically unsustainable. The cost of new technologies, alternative machines, new products and time spent, may be seen as barriers to adoption when held against a backdrop of tightening farm profit margins.

To assist in understanding the economic viability of alternative practices, the Department of Agriculture and Fisheries (DAF) has been working with Project Catalyst growers and service providers for a number of years, helping growers develop a better understanding of the costs and benefits of new farming innovations they are trialling.

Economists working on Project Catalyst have provided insight into the impact of management practice changes on farm profitability and business risk. This work has been critical to understanding the longer-term sustainability in adopting many different practices that could improve reef water quality for a healthier Great Barrier Reef (GBR).

Some of the economic cases include advanced application methods of various forms of fertiliser; more efficient irrigation systems; and the use of technologies for precision application of chemicals and nutrients. Other studies include an analysis of the benefits of enhanced efficiency fertilisers, or the use of nitrogen efficient varieties. All of the economic research has the goal of identify economically viable practices for growers that reduce the impact on reef water quality.

In some instances, economic benefits broke-even where positive environmental outcomes proved significant. As an example, a trial of an alternative sub-surface fertiliser application practice showed the average gross margin remaining relatively stable with little change in the long-term capital cost to the grower, but really good water outcomes for the GBR.

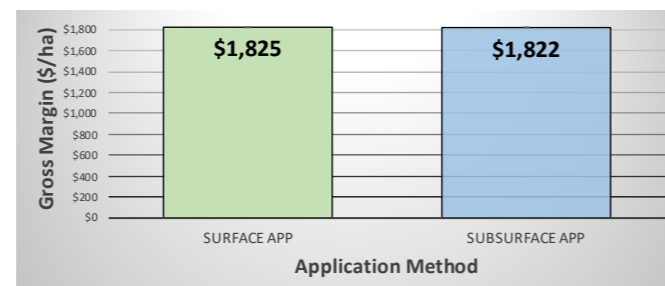


Figure 1: Combined 2017/18 Gross Margin results from Different Application Methods

Economic insight remains a critical tool to help growers understand the financial implications of adopting improved management practices from a GBR perspective. A holistic approach to research outcomes is proving even more important given the financial constraints on the wider grower community.

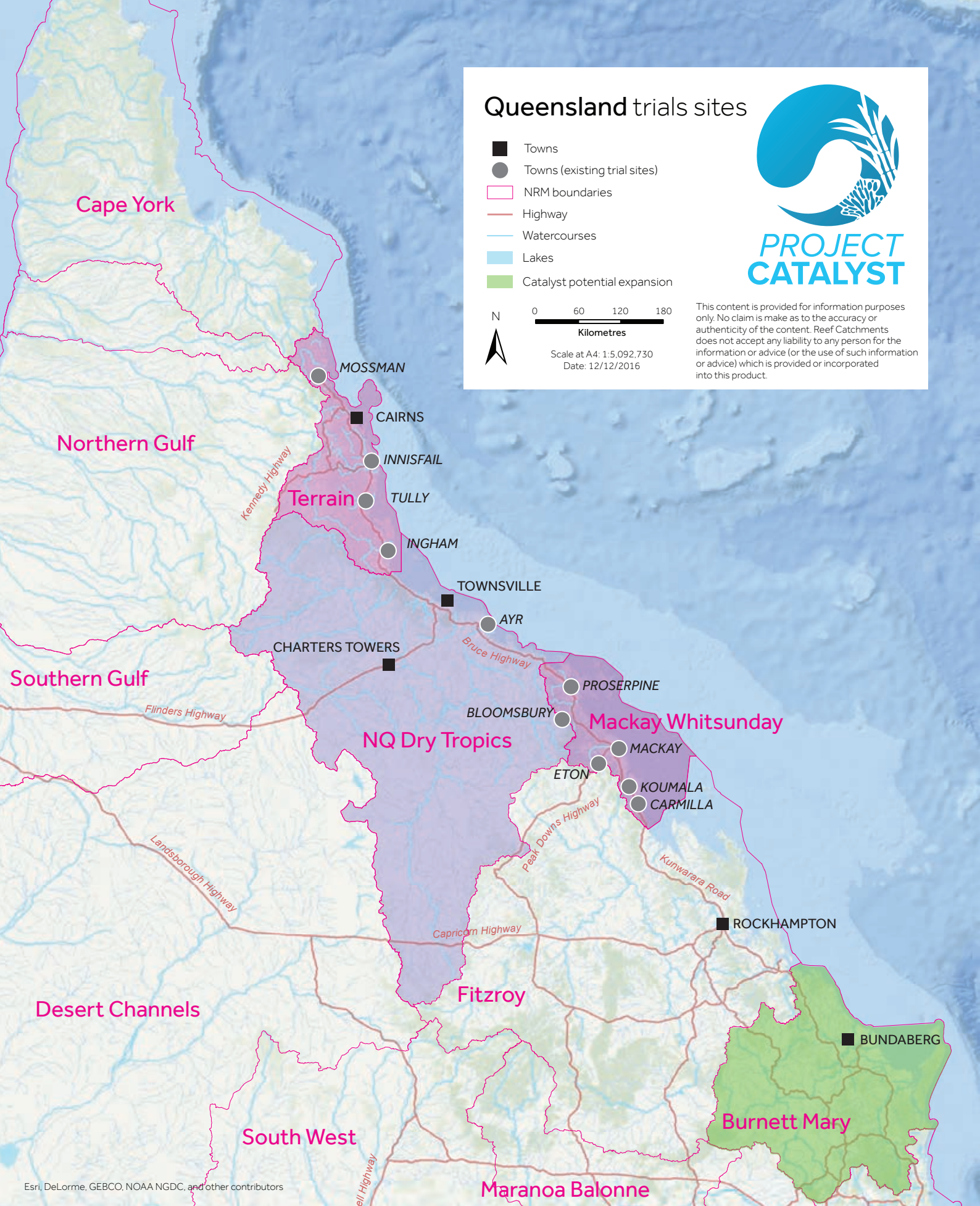
DAF is proud to be a part of the Project Catalyst journey to not only a healthier environment but also a more sustainable and viable farming community in this all important catchment area of the Great Barrier Reef.

To view the full details of this and other case studies, visit the Queensland Government website at: <https://publications.qld.gov.au/dataset/sugarcane-economics>

# Thank You

We could not accomplish our goals without the support, involvement and enthusiasm of our committed supporters.

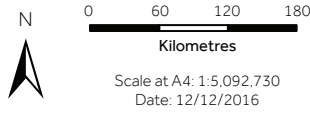




# Queensland trials sites



- Towns
- Towns (existing trial sites)
- NRM boundaries
- Highway
- Watercourses
- Lakes
- Catalyst potential expansion



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