

PROJECT CATALYST

PROJECT CATALYST 2018 – **THE EVOLUTION OF INNOVATION – HARVESTING IDEAS IN SUGAR**



**TEN YEARS
HARVESTING
IDEAS**



FOSTERING INNOVATION
*Catalyst growers inspiring
next gen*

CORAL & CANDY
*The innovation challenge
to 2030*

EMBRACING TECHNOLOGY
Why farmers need data



Image: Jeppesen Farm visit with Coca-Cola, WWF and Catalyst growers Mackay.

TEN YEARS

As we meet again for Project Catalyst Forum 2018, we reflect on 10 years since a group of forward thinking growers and representatives from Reef Catchments, WWF and Coca-Cola got together to form what is now a highly regarded and successful sugar cane innovation program.

I never cease to be amazed at how Project Catalyst has grown over the 10 years to cover the three regions and involve more than 100 growers, making real changes to their farm practices resulting in improvements to Great Barrier Reef water quality. But why has Project Catalyst been so successful? What makes Project Catalyst so different?

They say it takes a village to raise a child well I think it takes a community to deliver a program like Project Catalyst. We are a diverse community of growers across multiple mill areas / growing regions, with partners from industry and government as well as service providers and supporters. There is a commitment to our community's brand just like there is for a sporting team and there will always be highs and lows, but by working together collaboratively we have grown and protected our community. Our community has not been bought and cannot be sold – it is held together by the passion and belief in the common values and goal to improve Great Barrier Reef water quality.

In 2017 our community faced challenges but showed the connection between growers built through Project Catalyst, offered a level of support when needed. Ideas and conversations

flow freely across mill and regional boundaries – this is part of the glue that holds our community together. The other is that like-minded growers share a bond through the trials and forums that strengthens the community. Growers are able to talk to each other all year because of these connections.

2017 was another year of media exposure for Project Catalyst highlighted by the September ABC Landline segment on the Cyclone Debbie recovery faced by 2 Project Catalyst Growers in the Proserpine region. The Jeppesen and Raiteri families opened their farms and told their story of how this cyclone affected them and how long it would be before family life would return to normal. I would like to thank both families for telling their stories and making such an effort not long after the cyclone to host the ABC crew. The ABC opportunity came on the back of the





FEATURE



NQ DRY TROPICS

Working closely with industry, government and community



TERRAIN

One step closer to on farm monitoring



REEF CATCHMENTS

Promising results out of the latest harvest



GROWER SERENADE TRIAL

Protecting surface and groundwater quality are cornerstones of the responsible use of water as a natural resource.

insight by Kim Kleidon to capture footage of the impacts immediately after the cyclone passed through which then was connected with the ABC by DecPR – a wonderful team effort that received a lot of positive feedback.

Project Catalyst – our community – relies on many active growers, supporters, partners and service providers to be successful and remain vibrant in the sugar cane industry. I thank all of you for your efforts in 2017 and look to the growth and success of Project Catalyst in 2018 and beyond.

Craig Davenport
Project Coordinator Catchment Solutions



CASE STUDIES

12

WATER TRIAL

Robert Zandonadi Managing irrigation with limited water.

34

SOIL TRIALS

Alan, Karen and Grant Matsen comparing crop nutrient uptake and run off.

62

NUTRIENT TRIALS

Mark Savina home-produced microbial product potential replacement for inorganic nitrogen.



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PROGRAM

SUNDAY, FEBRUARY 18TH

WELCOME FUNCTION Thanks to Wilmar Bio Dunder and Coca-Cola Amatil
Mercure Townsville (Lawns near the Lake)

17:00 – 19:30	Delegates Check-in (Collect name tag & delegate pack)
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MONDAY, FEBRUARY 19TH **GROWER FORUM DAY 1**

Mercure Townsville (Ballroom)

08:00 – 08:30	Delegates Check-in (Collect name tag & delegate pack)
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08:30 – 08:35	Housekeeping and Introductions
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08:35 – 08:40	Welcome to Country
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08:40 – 08:50	Welcome Address
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08:50 – 09:10	Keynote 1 – <i>Embracing technology and deciphering data</i> Bryan Granshaw
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09:10 – 09:40	A Year in Review – Panel Discussion
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09:40 – 10:00	Keynote 2 – <i>Candy and coral in a time of climate change</i> Dr Ken Anthony
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10:00 – 10:15	Virtual Farm Tour – Succession & the Future
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10:15 – 10:45 MORNING TEA Thanks to Stoller

10:45 – 10:50 OVERVIEW OF SESSION Thanks to NETAFIM

10:50 – 12:30	Grower presentations - Water
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12:30 – 13:15 LUNCH Thanks to ALS Environmental

13:15 – 13:20	Getting settled – Overview of Session
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13:20 – 15:00	Grower presentations - Nutrient
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15:00 – 15:30 AFTERNOON TEA Thanks to Suncorp

15:30 – 15:35	Getting settled – Overview of Session
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15:35 – 15:50	Virtual Farm Tour - Water & Irrigation
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15:50 – 16:05	A regional approach to keeping score on the health of our waterway - Emma Carlos
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16:05 – 16:35	A Regional Approach to Keeping Score on the Health of our Waterways
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16:35 – 16:50	Wrap Day 1 & Preview Day 2 – CLOSE
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16:50 – 17:00	Group photo (using a drone)
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FORUM DINNER Thanks to Bayer CropScience Mercure Townsville (Ballroom)

18:00 – 18:45	Pre-Dinner drinks
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18:45 – to late	Formal Dinner to celebrate 10 years
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TUESDAY, FEBRUARY 20TH **GROWER FORUM DAY 2**

Mercure Townsville (Ballroom)

08:00 – 08:05	Getting settled – Overview of Session
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08:05 – 09:55	Grower presentations – Chemical
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9:55 – 10:25 MORNING TEA Thanks to Mackay Regional Council

10:25 – 10:30	Getting settled – Overview of Session
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10:30 – 11:20	Workshops: Group A - The Future Direction, Group B - Succession and Business Planning, Group C - Friends of Catalyst - Objectives & Continuous Improvement
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11:20 – 12:10	Workshops: Group D - Innovation Incubator, Group E - Record Keeping for Farm Management, Group F - Friends of Catalyst - Involvement in Trials & Adoption
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12:10 – 12:35	Workshops: Panel Wraps
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12:35 – 13:35 LUNCH Thanks to ANZ

13:35 – 13:40	Getting settled – Overview of Session
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13:40 – 13:55	Coca-Cola Update
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13:55 – 14:15	Global Standards & Sustainable Sugar
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14:15 – 14:45	Project Catalyst & Sustainable Sugar Discussion
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14.45 – 15:15 AFTERNOON TEA Thanks to Mackay Sugar Limited

15:15 – 16:00	Group Discussion of Trial Outcomes and Future Directions
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16:00 – 16:30	Field Trips, Shed Meetings and Tours in 2018
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16:30 – 16:45	Close – Terrain host in the Wet Tropics in 2019
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Catchment Solutions



Looking to the future

Project Catalyst and its partners are particularly focused on what the next 10 years might look like

Twelve months ago, I attended my first Project Catalyst Forum with very little understanding of how important the project is to the Queensland Cane Growing community. I had access to the trial data, the case studies and previous publications for Project Catalyst but until you are able to interact with 180 or so people that are invested in the idea of sharing information, looking for innovative technologies and growing practices while at the same time supporting each other as they tackle the challenges of

running a farming business, it's hard to gauge what an impact something like this project is having. I thoroughly enjoyed the 2017 Forum and within days of it finishing was diving into the conversations with my colleagues on what we can do with the next event. There are not many opportunities in any business where people from different regions can all come together to openly discuss their ideas, successes and failures without fear of unhelpful criticism but rather feel a sense of community and energy at taking on the next new idea with their business.

Cyclone Debbie was devastating for many families in the region, some who are still recovering nearly one year on. We were fortunate to be able to develop some audio-visual material highlighting the damage recovery for two of our Project Catalyst growers that was picked up by National Media. Outside of North Queensland I am not sure if the broader population really understands how fierce Cyclones can be and it was good to get these stories out to them. Coca-Cola senior management, as one of the Projects major supporters, visited the region during the year to see firsthand the after effects of the Cyclone and also invited some Project Catalyst Growers to visit their production facilities in Sydney. This was timed nicely with the State of Origin match that they all attended. Go Queensland!!

Project Catalyst and its partners are particularly focused on what the next 10 years might look like for the project, what the funding opportunities are and of course looking to expand into other regions where innovative synergies can be shared and communicated across all of the growers. The website is up and running but in continuous development to improve its accessibility and upload relevant information so that it becomes a "can't do without" tool for the Project Catalyst group. I encourage you all to make use of it more and more as the information you can access increases over time.

Thank you for all of your support and I hope that the next twelve months is as interesting and productive as the last twelve.

Andrew Campbell
General Manager, Catchment Solutions

NQ Dry Tropics



Supporting innovation in sugar

A quick glance at some of the issues facing Queensland's cane industry may give the impression that little has changed in recent decades. Increased input costs, fluctuating sugar prices and concerns about downstream impacts still echo in the media and dominate scientific discussions. These issues still influence the wellbeing and productivity of our cane growing regions. But if you dig a little deeper you will see that the industry has done more than its fair

share to meet these challenges in a strategic, coordinated and meaningful way. Getting out and visiting farmers involved in Project Catalyst and their supportive extension organisations reveals deeper insights into what drives the industry to improve its performance and meet its sustainability objectives.

The evolution of the sugar cane industry and how it meets its challenges is akin to a large supertanker 'ploughing' treacherous waters. The ship's size and momentum must be taken into account before contemplating any change of course, and any unplanned deviation can be risky and costly. From a distance everything looks relatively calm on the ships bridge, but below deck a team of organised specialists are busily ensuring every task is carried out with the end in mind.

In much the same way, the cane industry has navigated the last decade with a clear destination in mind – productive, profitable and sustainable cane production. Necessary deviations to industry strategies have been implemented at a rate that has maintained the security, stability and sustainability of the industry and all its members. Research, monitoring and extension services have adapted to provide the scientific basis to support change. Perhaps most significantly, the growers have busily focused on the job at hand – none more so than Project Catalyst growers. Through innovation

and early adoption, they are continually improving their practices to meet industry challenges.

NQ Dry Tropics has been working with agronomy and extension provider Farmacist, and Department of Agriculture and Fisheries supporting sugar innovation in the Burdekin cane industry for 10 years. Funding from the Federal and State Governments and Project Catalyst continues to provide fertile ground for innovators to test and eventually implement improved practices on an industry scale. Just like steering the supertanker, innovation takes time and practice, and there will inevitably be some mistakes along the way. But despite the occasional setback, the industry is undoubtedly on the right track. Innovation is the key to testing growers' ideas when the best way forward is not readily apparent. Innovation relies on growers' willingness to change, but also demonstrates an extraordinary level of trust from the project's investors to fund and support trials and extension.

Project Catalyst continues to flourish and now with Friends of Catalyst supports over 80 Burdekin growers, and there has never been a better time for cane farmers, industry and the community to get behind this initiative and others like it.

Rob Hunt
Sustainable Ag Program Manager

BB Print leads the way in Environmental Printing



Making a strong, long-term commitment to the environment and environmental printing practices, BB Print, is proudly the only Sustainable Green Print (SGP) accredited business north of the Sunshine Coast. The SGP environmental accreditation is an undertaking to protect the environment and the accreditation process is closely monitored.

As Central Queensland's leading printing and design business, BB Print, set themselves apart with their SGP accreditation successfully gaining 'Level 2 of Sustainable Green Print' certification for 5 years in a row. Each year they exceeded the strictly monitored environmental audit they are required to undertake.

The guidelines are strict and companies are audited yearly. Every aspect of waste is weighed and calculated. The SGP system allows BB Print to continually improve and reduce their impact on the environment.

In both 2013 and 2015, BB Print won the Queensland wide 'Environmental Management Award for Printing'. This highly sought after award recognises the state's most proactive environmentally sound business within the printing industry. The environmental award is presented as part of the prestigious PICAs - Printing Industry Craftsmanship Awards. It was

a significant achievement for the company as they competed against some of the state's biggest printing companies for recognition.

BB Print Partner, Kathy Farren-Price said of the awards, "We at BB Print are extremely proud to have won the state-wide competition. We pride ourselves on our environmental practices. We have only been able to achieve this because of a very strong team effort."

To keep certification each staff member undertakes additional training and the company undergoes an independent environmental audit each year.

BB Print worked alongside Printing Industries Australia to exceed the full environmental audit proudly gaining 'Level 2 of Sustainable Green Print' certification back in 2013 and retaining every year since.

BB Print Partner, Gary Bye said "Environmentally sound practices are the future of the printing industry and they ensure that we are not only doing our bit for the environment but also attracting clients who choose to work alongside an environmentally responsible company.

"We take our commitment to protecting the environment seriously and strive every day to

better ourselves as a company. It's not just good for the environment but it is also good business. By taking responsibility for the impact we have on the environment we can also improve efficiency. We recycle everything possible even down to the rags we use, utilising greener chemicals and soy-based.

"Environmentally sound businesses are really the way of the future in our industry. We are pleased with the way staff embraced the latest environmental practices and proud the company is thinking green."

The printing industry has a long history of undertaking environmental initiatives such as recycling and reducing emissions to water, land, and air. The emphasis is on continually improving environmental performance.

... **BB Print is striving to be at the forefront of Australia's environmental initiatives.** ...

Rural Production Innovation

Water Quality Services

Environmental Impact Assessment and Approvals

Fisheries and Aquatic Ecosystems

Environmental Systems Rehabilitation and Repair

Environmental Management Systems

SPEAKER PROFILES



Richard Kinnon

Grazier, Entrepreneur, Storyteller, Outback Pioneer

Richard Kinnon's passion for all things outback and all things Australian drives his award-winning Outback Pioneers tourism business in Longreach, Queensland.

From a family of graziers, Richard runs two cattle and sheep stations and breeds horses, as well as managing the tourism business. He founded the business with his wife, Marisse, in 2006 to help the family ride out the tough times of outback drought. It has now taken on a vibrant life of its own and welcomes over 25,000 visitors each year.

With his family, Richard developed the Cobb & Co Stagecoach Experience, the hilarious Harry Redford Old Time Tent Show, the Starlight's Cruise Experience, Nogo Station Experience and Winton Discovery Experience

plus the unique, heritage-inspired Outback Accommodation with its deluxe Homestead Stables and Pioneer Slab Huts.

The venture has received multiple awards including the prestigious Queensland Tourism Awards Gold Award for Cultural Tourism in 2016 and 2017.

With a passion to put outback Queensland tourism on the map so the life on the land can be preserved, Richard continues to develop the facilities in Longreach.

Richard believes we all have much to learn from the ingenuity, adaptability and resilience of the men and women who pioneered the outback.

Although always more at home in the bush, Richard now travels around Australia part of the time to talk to community and travel groups about Outback Pioneers and the outback way of life. He is one of the outback's most genuine spokespeople, inspiring listeners with his story



Sally Jupp

MC, Actress, Entrepreneur

Sally was raised in Tasmania until she was 18 and decided to travel the country experiencing life as both a city gal and country chick, working many jobs in a variety of industries, including the rural sector. Experiencing life on a dairy farm as a farm hand milking cows, learning the ins and outs of land management, even driving tractors and various farming equipment – a skill that would prove useful. What she really enjoyed was spending time with the old farmers wives on the back of a spud harvester and specialising in sampling the product of the dairy industry – Cadbury's chocolate!

It was when Sally moved to Cobar and began a career in mining, starting as an Underground Truck Driver that she discovered her work life passion as a Workplace Health and Safety Advisor. During this time, she invested in land out the back of Burke (during massive drought) buying into 18,000 acres of luscious red dirt..... not a blade of grass to be found, being innovative required smart farming and thinking outside the box – So goat farming passed the time while dams were dug and drains were cut.

Sally's real passion is performing and public speaking. A natural gift from a young age she performed in musical theatre at every opportunity, but the mining industry limited her opportunities to participate in musicals due to travel, living in remote areas and the FIFO lifestyle.

After hanging up the Mining hard hat, moving to Townsville in 2012 (although she has no family there), Sally has made the city her home, embracing hand-picked family along the way. She lives the dream with a work life balance fulfilling both work and personal passion of performing in musicals, hosting functions and events and the greatest gift of all, making a difference in other people's lives even if it's just in a moment.

Sally doesn't really sleep, juggling a job with Townsville City Council as a Safety and Health Advisor, rehearsing for a local musical called Nonsense, running her own online Health and Wellness business and has just started a business partnership as an entertainment duo and MC events host. Living the single life in a City of acceptance, endless opportunity, adventure and fun, Sally is grateful to be part of this innovative event and hopes to bring smiles, (and a belly laugh or two) to make this extraordinary event with new and old faces a memorable networking opportunity.

.....
***Raised in Tasmania,
Sally has worked in a
vareity of industries
including rural but her
passion is performing.***
.....



Bryan Granshaw

Keynote Speaker “Embracing technology, deciphering data”

Having been a Nuffield Scholar and farmer who used technology, Bryan understands how daunting the process of making sense of technology is. “Sound farming principles are still the foundation of implementing technology, technology simply allows more information to be collected more quickly.”

As a Precision Ag Agronomist, Bryan is determined to ensure that data is easily understood. “The information itself is of no value unless people have confidence in the way it was collected, and there is independent assessment to what is the biggest bang for the farmers buck. Sometimes this is not an easy fix, however the worst case is that “ok now we know “lets come up with a management plan to meet the potential of the area in the farm. “

From the late ‘90’s the aim for Granshaw Farming was to develop a farming system that was truly sustainable in the long term. For the family, this meant taking a triple bottom line approach.

Granshaw Farming have incorporated a number of concepts, such as green cane trash blanketing, reduced tillage, legume fallows, intercropping, and controlled traffic to develop a farming system that is sustainable into the future. Soil health forms the foundation of their farming system.

Each part of the management system described above has benefits in its own right. However, when they are all pulled together the benefits are magnified. Another way of stating this is that the benefit of the whole system far outweighs the sum of the benefits of the individual parts.

While specific management will vary due to differences in farms, Granshaw’s believe the general philosophy and a holistic approach does apply to all in the sugar industry.

Bryan knows the Granshaw Farming philosophy, ‘to do more with less’, can be applied to the whole sugar industry.

Bryan’s presentation will focus on deciphering the mountains of data that is being collected, and generated in today’s agricultural environment. Technology is moving at a rapid rate and there is a tendency to move to the next “shiny” bit of tech, without really getting the most benefit from what we already have. Bryan will present a systematic, practical way to use technology to understand the “what, where and why”.

.....
*‘To do more with less’,
can be applied to the
whole sugar industry.*
.....



Dr Ken Anthony

Keynote Speaker “Candy and coral in a time of climate change”

Dr Ken Anthony is a Principal Research Scientist at the Australian Institute of Marine Science, in Townsville. Ken’s current research focuses on how we can improve the condition of the Great Barrier Reef and keep it safe into the future.

Ken grew up on a farm in Denmark and started his career as an engineer. After his first coral reef encounter in the Seychelles in 1986 he shifted to marine biology and never looked back. Diving reefs around the world for a decade, he fell in love with the Great Barrier Reef in 1995.

After his PhD in 2000, Ken lectured for a few years at James Cook University and then developed a research program at University of Queensland. In 2011-2015 he took up the position as manager of GBR science teams at AIMS.

Ken is now back in research to pursue his calling in life: to use science to help marine ecosystems survive climate change and other pressures from

nature and mankind. He works with a diversity of people and institutions to find and communicate solutions that can work for reefs, society and economics. The challenge is huge, but the reward is even bigger.

Growers will gravitate to his positivity and encouraging approach “To save the reef in this time of climate change, the community must come together and think outside the box to find solutions (the innovation challenge).”

Ken understands it will take forward thinking from all industries, “Nutrients from cane farming is only one of many pressures on the Reef. But finding ways to take that pressure off the Reef while also supporting farmers is the big challenge.”

In the presentation, the audience and Ken will have the opportunity to explore innovative ideas together, test them, and discuss which ones are likely to work best for all: people and Reef.

.....
*“Nutrients from cane
farming is only one of
many pressures on the
Reef.”*
.....



N of DRY TROPICS



Innovation is crucial for the future of agriculture.

2017 was an outstanding year with 34 growers actively involved in trials and monitoring, and another 50 'friends of Catalyst' implementing practices tested through previous trials.

NQ Dry Tropics has over 15 years of experience as the peak natural resource management body in the Burdekin Dry Tropics region. We work closely with industry, government and community organisations to encourage land management practices that enhance profitability, improve water quality and benefit the regional environment.

The success of Project Catalyst stems from the grass roots development of innovative ideas, supported by trials and extension activities that provide meaningful results available to the entire industry. Project Catalyst growers strive to be innovative, profitable and sustainable, in order to meet the ever increasing challenges of intensive farming adjacent to the Great Barrier Reef.

In the Burdekin region, NQ Dry Tropics has joined forces with Farmacist, a local agronomic solutions provider, to support Project Catalyst growers. Once again 2017 was an outstanding year with 34 growers actively involved in trials and monitoring, and another 50 'friends of Catalyst' implementing practices tested through previous trials.

As an added benefit, many of these trials are helping to deliver regional priorities for nitrogen and irrigation efficiency. Burdekin cane growers are investigating a range of innovative practices

such as nitrogen release patterns from legume crops; banded mill mud; efficient nitrogen use; water quality, groundwater and pesticide monitoring; and alternate row irrigation.

NQ Dry Tropics' Sugar Cane Team Leader, Luke Malan said the results from these trials have the potential to improve farm profitability and environmental outcomes.

"Farmers are continually looking at ways to fine tune fertiliser, pesticide and irrigation practices which decrease input costs and can reduce losses through deep drainage and run-off – a win-win for all parties", he said.

"Implementing new practices can help farmers improve their livelihoods, soil quality, and the regional economy", he added.

Many of the trials incorporate a comprehensive analysis of yield, water quality and economics to provide a whole of system perspective.

NQ Dry Tropics looks forward to continuing its support for Project Catalyst, to ensure the benefits are shared across the entire industry.

Burdekin cane farmer Paul Willis is growing mung beans to investigate whether rotating legume crops with sugarcane increases available nitrogen. The results will show whether this practice can be a viable alternative to applying nitrogen fertilisers, without affecting productivity. Mr Willis is hoping the trial will help him better understand where nitrogen goes and when it's available to the following sugarcane crop.

He has also trialled:

- broadcasting mill mud and compost on fallow rotations to improve soil health and reduce nutrient inputs;
- adopting technology such as Electromagnetic Soil Mapping to determine soil variations across his farming operation; and
- improving minimum tillage systems.

"I'm taking part in the Catalyst project because it's an opportunity to improve productivity and long term sustainability." Mr Willis



OVERVIEW

Farm area

112 ha

Region

Airville area of the Burdekin Delta

Number of years farming

31 years (second generation)

This trial focuses on:

- *Alternate row irrigation to improve irrigation management.*
- *Yield differences between practices.*
- *Economic comparisons between conventional and alternate row irrigation.*



ROBERT ZANDONADI

Alternate Row Irrigation

ROBERT ZANDONADI is a second generation sugarcane farmer, with 31 years of farming experience. Robert farms 112 hectares in the Airville area of the Burdekin Delta, producing roughly 40 000 tonnes of cane per year.

Robert's farm is fully irrigated from an underground aquifer, with reasonably consistent soil types across the various paddocks. The farm is regularly soil tested to identify any soil constraints that may be present, however Robert finds the biggest limiting factor for production is water availability.

In times of low rainfall and high demand on the aquifer, Robert's pumping capacity is restricted leaving him unable to irrigate his cane in a timely manner. As a result, there is a significant risk of yield loss unless rainfall is consistent throughout the season.

Robert's catalyst trial was developed to explore the best way to manage irrigations with the limited water available, without reducing yield and impacting electricity costs. A paddock was selected to investigate the use of alternate row irrigation where he could have water running down every second furrow instead of all furrows. EC Mapping was undertaken to reduce soil type variables in the trial prior to establishment. Sixteen soil moisture monitoring devices were installed as part of a Plexus system by MEA allowing the site to be monitored remotely for the duration of the trial.

FOCUS ON

- Alternate row irrigation to improve irrigation management
- Yield differences between practices
- Economic comparisons between conventional and alternate row irrigation

STORY

Robert joined Project Catalyst in 2016 to conduct an alternate row irrigation trial on his farm. Robert had already been using an alternate row irrigation system as a result of low water availability from his bores and believed a comparison between the two systems would give him insight into whether or not this practice was impacting on potential yield. There are a few growers in the Burdekin that use this method at certain times of the year when water availability is tight however there was a lack of data comparing the two systems and the potential impact it was having on production and the growers bottom line. The trial was designed with two treatments,

T1	Conventional Irrigation
T2	Alternate Row Irrigation



FROM THE LANDHOLDER

"The results from the 2017 harvest have been surprisingly positive, giving me the confidence to continue the trial for the remaining two years of the crop cycle and expand it across additional farming area."

"I have implemented the skip row irrigation method to an additional block on the farm that has issues with getting water to the end of the drills after watering for twenty-four hours. If all goes well, I hope to see significant improvement in water use efficiency while maintaining yield."

"I have been monitoring the trial areas through aerial drone footage and the crop is showing no signs of stress or yellowing of leaves. The support from Farmacist, NQ Dry Tropics and Project Catalyst has been great and I am eager to see the results from the 2018 harvest."

The paddock was designed as a split plot trial where the block was split in half, with each treatment replicated 6 times within the management area. The soil type is a heavy alluvial with a moderately deep clay loam overlaying a red-brown clay subsoil.

All treatments were fertilised, sprayed and cultivated before the trial was implemented with the whole paddock watered three times before the treatments were applied. This ensured even establishment after harvest, a consistent soil moisture baseline, and allowed for ease of irrigating in future events. Once the treatments were implemented, Robert recorded irrigation events allowing us to calculate the volume of water that was applied and the associated electricity costs.

Plexus Moisture Sensors were then installed in various locations throughout the hill profile to assess soakage across the hill profile and furrow to monitor soakage patterns across the hill under both management practices. We needed to ensure that the alternate row treatment was still maintaining soakage to the centre of the hill.

Throughout the 2016/17 crop season a DJI Phantom 4 drone mounted with a Parrot Sequoia Multispectral Camera was used to assess the crop for differences in growth. While natural variability throughout the paddock was present, no differences between treatments could be identified.

The treatments were maintained until harvest in 2017 and the trial is continuing over the 2018 season.

OUTCOMES TO DATE

Results shown in the table below are means of the 6 replicates that were harvested. No statistical difference was present throughout the trial.

Results from the 2017 season indicated that there was no determinable yield impact from irrigating every second row instead of all rows. This has given Robert confidence that this practice is not affecting his potential cane yield.

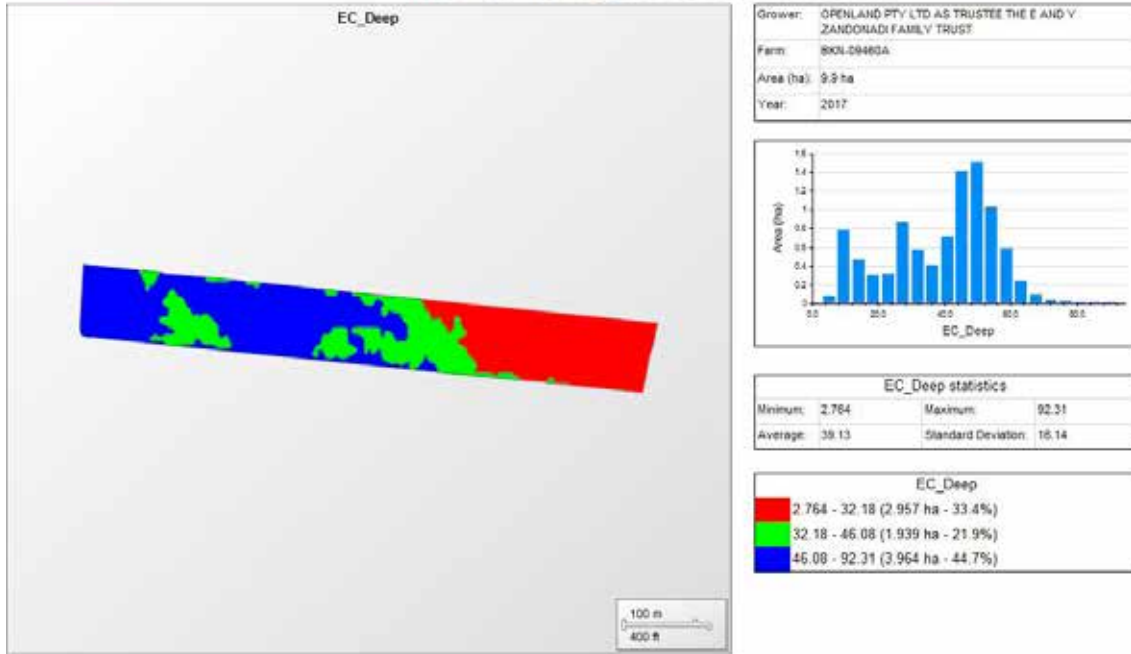
The total amount of water applied from each treatment is also not statistically different. This suggests that even though the alternate row was only watered down every second row, the water was able to sufficiently

soak through the hill and fill the profile. This is supported by the data from the Plexus Moisture monitoring units.

Irrigation records showed little difference in irrigation run times between the conventional and alternate row systems with total pumping hours at 105 hrs and 98 hrs respectively. The total estimated ML/ha applied over the trial was also very similar. In terms of profitability, there was very little difference between the two treatments. Net revenue was derived by calculating grower revenue and subtracting the key costs that differed between the two systems including irrigation costs (electricity, water, labour and R & M), harvesting costs and levies. The average net revenue of the conventional irrigation was \$3736 compared to \$3735 for the alternate row treatment.

KEY POINTS

- Irrigating every second row on this particular soil type was found to have had no determinable impact on cane yield. The change in practice allowed the grower to irrigate his whole farm more effectively with the limited water he had available.
- There was no major difference in water use or profitability between the two systems.



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Economic results - Revenue net of irrigation costs, harvest costs & levies

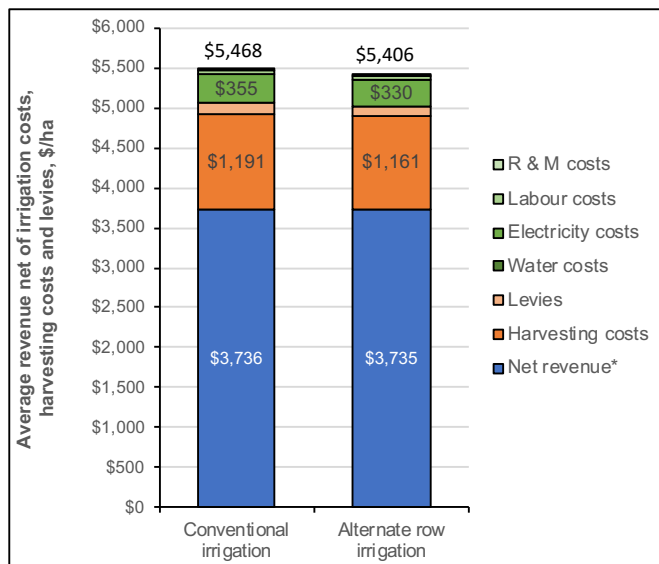
	CONVENTIONAL	ALTERNATE ROW
R1	\$3,473	\$3,622
R2	\$3,714	\$3,777
R3	\$3,664	\$3,736
R4	\$4,002	\$3,752
R5	\$3,558	\$3,687
R6	\$4,006	\$3,835
Mean	\$3,736	\$3,735

Economic analysis provided by Matt Thompson, Senior Agricultural Economist with the Department of Agriculture and Fisheries.

Average revenue and costs that vary between the treatments

	CONVENTIONAL	ALTERNATE ROW
Gross revenue	\$5,468	\$5,406
Harvesting costs	\$1,191	\$1,161
Levies	\$132	\$129
Irrigation costs - variable costs only (\$/ha)		
Water costs	\$0	\$0
Electricity costs	\$355	\$330
Labour costs	\$46	\$45
R & M costs	\$7	\$7
Total	\$408	\$381
Net revenue*	\$3,736	\$3,735

*Revenue net of variable irrigation costs, harvest costs & levies





THE
Coca-Cola®
FOUNDATION

Image: Lou and Gary Raiteri featured in an ABC Landline segment in 2017.



Image: Coca-Cola executives visited farmers impacted by Cyclone Debbie



Image: Coca-Cola Australia invited Project Catalyst farmers to Sydney for a little rugby rivalry



Image: Gary Raiteri featured in an ABC Landline segment in 2017



Coca-Cola: A reflection and the year ahead



Image: In August 2017, Coca-Cola invited ABC Landline to film an in-depth segment on two Project Catalyst farmers.

As a founding partner of Project Catalyst, alongside Natural Resource Management (NRM) groups, the Australian Government and WWF, Coca-Cola Australia is extremely proud to have watched this groundbreaking initiative grow from just 19 farmers in 2009, to over 132 in 2018.

With growers spanning more than 25,000 hectares, this program has enabled The Coca-Cola Company to achieve its ambitious water sustainability goals and become the first Fortune 500 Company globally to claim replenishment of all water use.

Sarah Prestwood, Senior Public Affairs Manager at Coca-Cola Australia said, "It has been a year of success, opportunity, and hardship for Project Catalyst, and our growers have shown nothing but dedication and positivity – even in the face of adversity.

"We are proud to partner with such strong, innovative and passionate sugarcane farmers for Project Catalyst, who have made a truly positive impact on the Great Barrier Reef."

"Over the next few years, Project Catalyst will continue to play a significant role in developing and progressing sustainable farming practices that will improve the quality of water flowing into the Great Barrier Reef. We look forward to supporting this initiative and to continue watching it evolve – in 2018, and beyond."

A reflection on the last 12 months

From growing the community to progressing groundbreaking trials, the last year has seen many achievements.

Project Catalyst has welcomed more than 45 new farmers to the program over the last 12 months, bringing not only greater adoption of existing trials, but new innovations and fresh thinking.

The project as a whole has seen great success across nutrient, soil and water management trials, which continue to reduce the impact of nutrient pollution and runoff on the Great Barrier Reef.

However, these achievements did not come without challenges.

On 28 March 2017, one of Australia's strongest tropical cyclones, Cyclone Debbie, hit Queensland homes, businesses, infrastructure and farms.

The past year has been a difficult time for some Project Catalyst farmers as they respond to the effects of these storms on their farms, from sugarcane fields, sheds and equipment to harvest.

A year on from Cyclone Debbie, many growers are still counting the costs.

In September 2017, then Coca-Cola Australia Business Unit President, Roberto Mercadé, and Coca-Cola Amatil Group Managing Director Alison Watkins travelled to Far North Queensland to visit Project Catalyst growers affected by Cyclone Debbie. With the aim of supporting impacted growers and their families, the trip was an opportunity for Coca-Cola to understand first-hand the devastation the cyclone had caused.

In August 2017, Coca-Cola Australia invited ABC Landline to film an in-depth segment on two Project Catalyst farmers. Bringing Project Catalyst into the spotlight across Australia, Gary Raiteri and Tony Jeppesen, spoke to ABC Landline to build awareness of the challenges brought by the cyclone, as well as the impact on Project Catalyst farmers and the wider industry.

Discussing the impact Cyclone Debbie had on the Raiteri and Jeppesen farms, the segment showcased the value of like-minded networking through Project Catalyst that helped them bounce back from the damage of the cyclone.

Given the ongoing impact the cyclone has had on several Project Catalyst farmers, Coca-Cola is extremely proud to have supported the growers with ABC to deliver this story, and to see Project Catalyst presented in this way. The piece is testament to the fantastic work Project Catalyst growers do every day.

The year ahead

The outlook for 2018 is optimistic, with plans by Coca-Cola Australia to support Project Catalyst growers to become accredited in sustainable sugar.

Coca-Cola Australia will also unveil some exciting partnerships to help raise broader awareness of the work done as part of Project Catalyst – watch this space.

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. The company has tendered for a 100% sustainable sugar supply in Australia, out to 2020.



OVERVIEW

Trial Farm

MKY-03091A

Mill Area

Mackay Sugar - Marian

Property size

700 ha

Number of years farming

50 years (Four generations)

Trial Subdistrict

Eton

Area under Cane

560 ha

Service provider contact

Farmacist

Where did this idea come from?

Grower-led





JOHN, HELEN AND DEAN PASTEGA

Pastega Holdings

Improving water use efficiency while aiming to maximise yield potential by matching irrigation rates to crop and soil water needs.

THE CHALLENGE

John Pastega and son Dean, cane farmers with 50 years' experience between them, wanted to develop a water management system that was:

- Sustainable and efficient
- Only targeted desired areas
- Considered paddock soil variations
- Able to maximise fertigation efficiency
- Reduced labor requirements

In most current farming systems, centre pivots covers a large expanse of ground, including some areas that require no irrigation (eg headlands, drains and fallow fields). There can also be variations to soil type along the span of the centre pivot, with each soil type suited to a different rate of water application.

Centre pivots apply a set application rate along the span. However, due to the outside moving faster than the centre, these nozzles apply the set application rate at a faster volume at the ends. Modifying the centre pivot with technology to apply different application rates along the span, while also taking into account the speed of the machine walking, is intensive and expensive. This is a major reason only a handful of machines are currently set up this way, despite the benefits.

THE TRIAL

The Pastega's concluded to meet their goals, a variable rate pivot would be required. John and Dean approached Farmacist to help them gather and interpret the spatial data of their property, to justify the outlay of the technology.

After reviewing spatial data maps, the Pastega's purchased a pivot in 2016 and in the same year installed the variable rate technology on it. This season will be the first real opportunity to irrigate with it.

From here a trial was set up to develop the technology in a cost effective and efficient manner, fine-tuning the use of the technology.

The paddock chosen for this trial has a combination of light and heavy soil. Parts of the paddock are high yielding, but require large amounts of water. At the same time, other areas are waterlogged, causing significant yield losses. This paddock is ideal for the trial, as a flat rate of irrigation will always limit the paddock's yield potential.

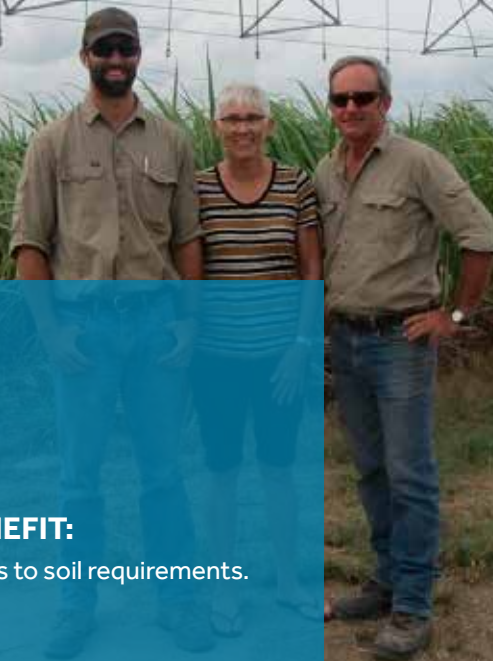


POTENTIAL WATER QUALITY BENEFIT:

Reduced runoff by matching irrigation rates to soil requirements.

EXPECTED OUTCOME OF TRIAL:

- Lower water use
- Decreased run off
- Reduced waterlogging



TRIAL DETAILS

Trial Crop: Sugar cane

Variety: Mixed

Trial Block: MKY-03091A – all paddocks under the pivot

Trial Block Size: 67 ha

Soil Type: Vertosol – deep clay soil (black earth/grey clay)

TRIAL STAGES

	Date	Activities
Stage 1	October 2016	Installed variable technology on a pivot bought earlier in the year (Zero headlands, normal rate on paddocks).
Stage 2	November/ December 2016	Perform irrigation event.
Stage 3	December 2016	Assess location and rates of water applied and accuracy of emitter control to map.
Stage 4	February 2017	Adjust pivot and maps accordingly and add in variable rate according to soil type.
Stage 5	March 2017	Perform irrigation event (subject to weather events).
Stage 6	December 2017	NDVI map the paddock with a drone.
Stage 7	January 2018	Commence 3 x weekly growth measurements. Commence infiltration tests. Slake and disperse soil cores. Chemical analysis of soil cores.
Stage 8	February 2018	Discuss and design a working variable rate map for the 2018-19 season.

TRIAL DESIGN

No official trial design has been drawn up yet, but below (Figure 1) is an example of a variable rate irrigation map, drawn up by Farmacist during the preliminary feasibility stage, this map is then converted to a VRI prescription using Valley software and loaded into the control panel of the pivot.

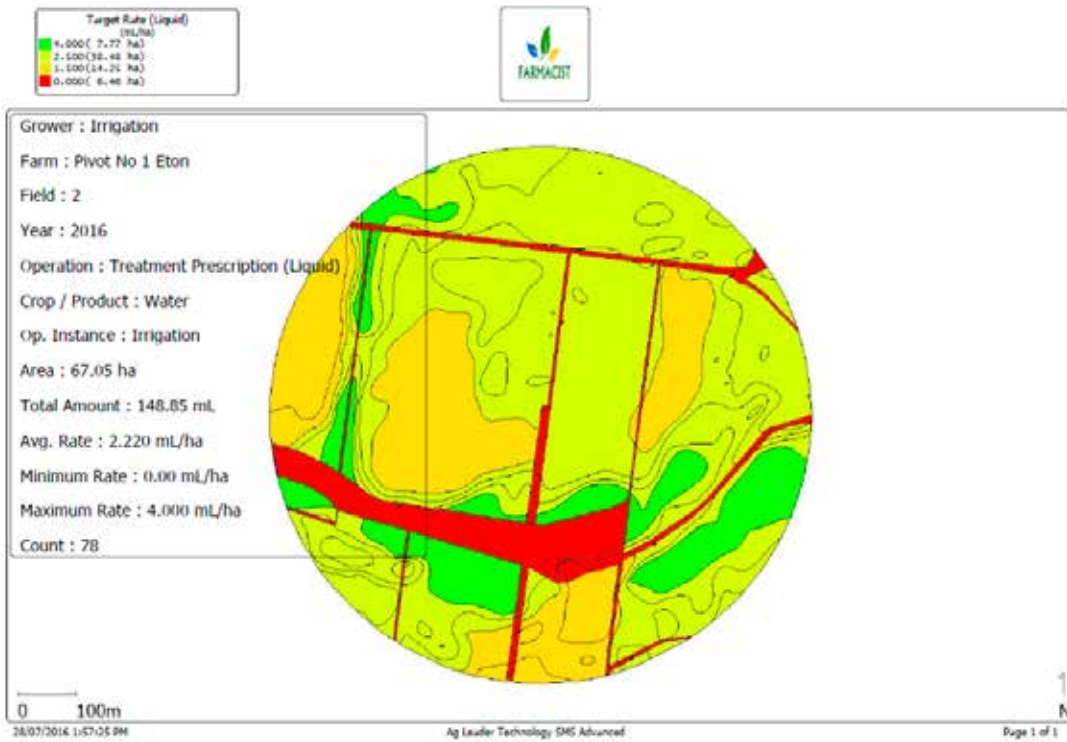
TREATMENTS

T1	4ML/Ha on light soil
T2	2,5ML/Ha on medium soil
T3	1,5ML/Ha on heavy soil
T4	0ML/Ha on headlands

The trial site was EC mapped (Figure 2) to determine the location of soil boundaries. With zone 1 having the lowest reading and zone 3 having the highest. High EC readings are often associated with soils that are heavier in texture and can have drainage issues, while lower EC values often indicate lighter textured soils with good drainage properties. In the high EC area's, the paddock has had low yields and incidence of waterlogging.

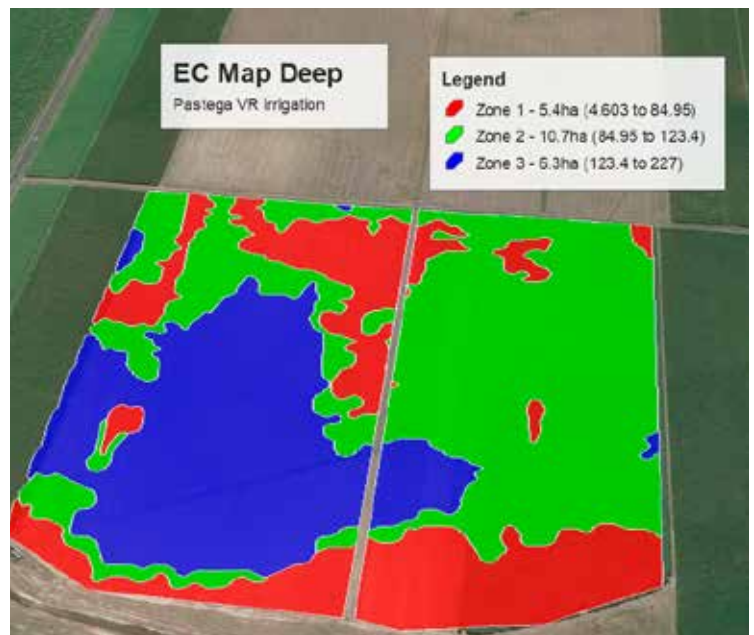
COMPLETED WORK

1. Centre pivot purchased in 2016 was retro fitted with individual emitter controlled solenoids and the variable rate software.
2. Background knowledge and paddock information gathered to utilise the technology, i.e. paddock boundaries.
3. Operated the pivot with selected nozzles off, however this created too great a reduction in flow, which triggered the pumps safety high pressure cut out. This led to further fine tuning of the load sharing between the two variable frequency pumps.
4. Identified zones (3) within the paddock using a combination of EM map, Elevation map, crop GNDVI map and crop observations.



ONGOING WORK

1. Identify soil parameters:
 - infiltration
 - bulk density
 - SRA penetrometer
 - slaking & dispersion
 - Photos of cores to 900mm
 - Laboratory analysis
 - Water holding capacity
2. Identify plant parameters
 - 3-month yield biomass
 - At harvest yield biomass
 - Crop growth measurements – three times weekly
 - Gdot measurements at 3 depths – three times weekly
3. Create a VR map for in field changes – 2018-2019 season



**We believe we have a genuine
role to play in environmental
sustainability.**





AgTech – the future of sustainable farming

Digital disruption and technology are reshaping the world's industries and Australian agriculture has not been immune with 62 per cent of the sector's productivity growth since 1995-96 a result of technological advancements.

This is expected to continue over the next twenty years, with unprecedented shifts throughout the entire supply chain driven largely by the development and investment in new technologies.

At present, uptake in technology related capital in Australian agriculture including electronic equipment, industrial machinery, computers and intellectual property is growing at a faster rate (2,5 per cent) than the increase in general capital such as sheds, silos or transport machinery (0,5 per cent).

Today, increasingly refined on-farm technologies are playing a role in helping Australian farmers' access higher levels of productivity, profitability and importantly, sustainability.

One example is the work of WaterSave in helping farmers to lessen the environmental impact of irrigation through an automated irrigation system which uses a variety of on-farm sensors to reduce power and water consumption. Once installed, the system has the capacity to fully automate the irrigation process and farmers can be alerted the moment a paddock is sufficiently irrigated.

Ongoing investment in new technologies is critical to ensuring continued productivity and environmental mitigation and to encourage the adoption of AgTech, it's important that innovations also provide a cost benefit.

The \$150 million ANZ Energy Efficient Asset Finance program offers our business customers the opportunity to cut their energy costs through innovation. Through the program, eligible assets are financed at a 0,7 per cent p.a. discount to the standard asset finance rate, making it easier for businesses to invest in energy-efficient and renewable energy technologies that will help reduce their energy and fuel costs.

The program is part of ANZ's broader commitment to facilitate investment of at least \$15 billion by 2020 to support its customers to transition to a low carbon economy. This target demonstrates our commitment to help drive investment in the low carbon transition and environmental sustainability more broadly.

The impacts of AgTech across the agricultural supply chain are seemingly boundless. While some of the benefits such as productivity and cost efficiencies are well known, more attention must be paid to technology's ability to provide significant environmental benefits on farm and to communities throughout regional Australia.

At ANZ we believe we have a genuine role to play in environmental sustainability. This aligns with our purpose, business strategy and sustainability framework, and we look forward to continuing to work with our customers to help further improve sustainable farming practices through innovation and the investment in new technologies.

- Mark Bennett, Head of Agribusiness, Australia, ANZ



OVERVIEW

Farm area

100 ha

Region

Hinchinbrook

Number of years farming

Fourth generation cane farmer

“We implemented controlled traffic 14 years ago and we have seen numerous benefits. Hayden and I want to continue to improve soil health and carbon levels on farm. We believe that mixed fallow cropping is the next step and is a relatively simple way of achieving some of our goals”



LAWRENCE AND HAYDEN DIBELLA

Mixed Fallow Cropping

Lawrence is a fourth generation cane farmer who manages 100 hectares of sugarcane with his wife Anna, and children Hayden, Nicholas and Gemma in the Hinchinbrook region.

WHO

Lawrence is a 4th generation cane farmer who manages 100 hectares of sugarcane with his wife Anna, and children Hayden, Nicholas and Gemma in the Hinchinbrook region. Lawrence is interested in soil biodiversity to improve cane yield, increase ratoon longevity and to keep agricultural soils sustainable. He has been working in the industry for 28 years.

Hayden is starting grade 12 in 2018 at Gilroy Santa Maria College, Ingham. Hayden is interested in farming and agriculture and hopes to become a farmer after he graduates from school.

PROJECT OVERVIEW

Lawrence and Hayden's Project Catalyst trial is assessing the many benefits of having a mixture of species as a fallow rotation crop.

What Lawrence and Hayden would like to see from the trial is: Which species mix is the best at improving soil health and bio-diversity, which in turn will hopefully show to improve cane yield, increase ratoon longevity and to maintain sustainable healthy soils.

The various plants assessed in 2016/17 were:

- Cowpea (cv. Ebony), Canola, Sunflower (cv. White stripe), Lablab (cv. Rongai), Lablab (cv.527), Desmanthus (cv.Sugarbush), Soybean (cv. Leichardt), Pigeon pea, Sunn hemp and a combinations of these species.
- Mix 1 - Soybean (cv. Leichardt), Desmanthus (cv. Sugarbush), Cowpea (cv. Ebony).
- Mix 2 - Soybean (cv. Leichardt), Cowpea (cv. Ebony), Sunn Hemp
- Mix 3 - Soybean (cv. Leichardt), Cowpea (cv. Ebony), Lablab (cv. Rongai)
- Mix 4 - Soybean (cv. Leichardt), Cowpea (cv. Ebony), Canola
- Mix 5 - Lablab (cv. 527), Lablab (cv. Rongai), Soybean (cv. Leichardt)

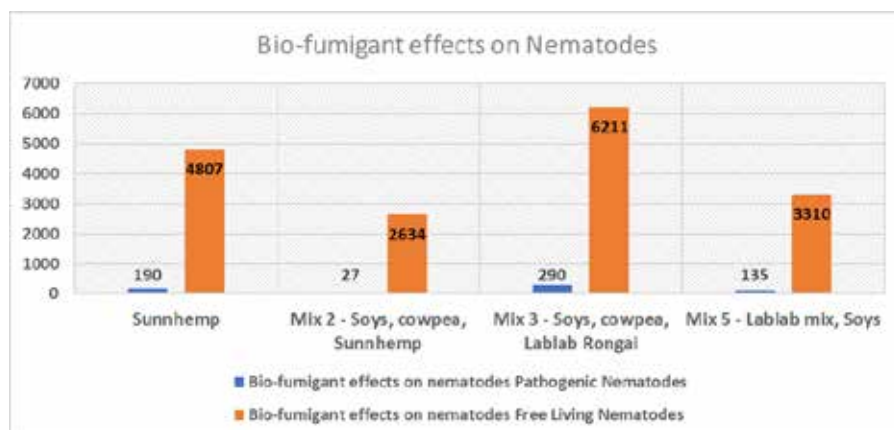
KEY FINDINGS TO DATE

SOIL HEALTH BENEFITS

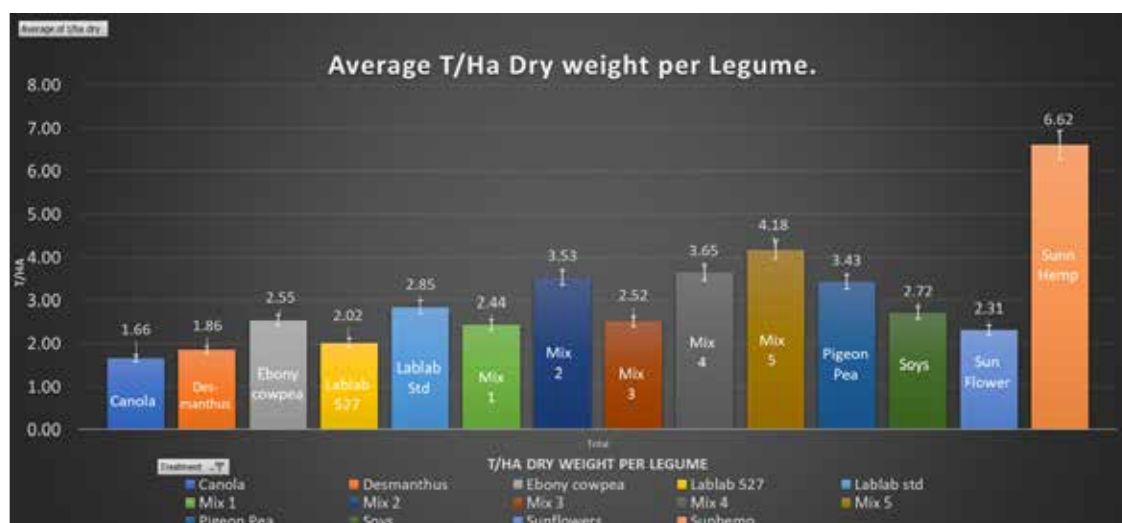
1. Visible fungal hyphae and mushrooms in some plots which is a positive for soil health
2. Good moisture retention in mixed plots (because of the deep layer of organic matter)
3. Nitrogen fixing by legumes- see below:

Total Potential Mineralisable N kg/ha	
Species	14 days incubated
Mix 1 - Soys, desmanthus, cowpea	153.5 kg/ha
Mix 2 - Soys, cowpea, sunhemp	140 kg/ha
Soybean (cv.Leichardt)	119.5 kg/ha
Sunnhemp	141.4 kg/ha
Desmanthus (cv.Sugarbush)	138 kg/ha

4. Bio-fumigant effects. See below:



5. Symbiosis affects with some mixed spp. like mix 5. This mix consisted of the two lablab spp and soybean. This mixed performed better than its single species comparisons: in biomass, potential mineralised N and nematode ratio's.
6. Dry matter results. See below:



(Mix1= Soys, Desmanthus, Ebony. Mix 2= Soys, Ebony, Sunhemp. Mix 3= Soys, Ebony, Lablab std. Mix 4= Soys, Canola, Ebony. Mix 5= Lablab std, Lablab 527, Soys.)



7. Some plant species can break compaction layers such as: Desmanthus (cv.Sugarbush), Sunflowers and Pigeon Pea.

OBSERVATIONS FROM SOIL PATHOGEN MEASUREMENTS

1. Root-knot nematode increased on most of the rotation crops but not to the same extent as sunflower. Interestingly the counts were zero on all the mixes.
2. Free-living bacterivore numbers were high across all treatments. These nematodes will be multiplying on the bacteria that are decomposing the roots and above-ground material. During this process, N and other nutrients are being mineralised for use by plants.
3. Mix 3 (Soys, Ebony and Lablab Rongai) is looking to be the best for nematode ratios; This resulted in a relatively small number of pathogenic nematodes. The Nematode Channel Ratio for this treatment is 0.58, ie. 58% bacterivores and 42% are fungivores. This ratio indicates that there is a good balance between bacterial and fungi feeders. It also had good numbers of omnivores and predators.

THE PRO'S AND THE CON'S: THE PRO'S

Having the right mixed cover crop is looking like it has the potential to save in chemical inputs and improve soil life and health by:

- Retaining moisture in the soil profile,
- Controlling weeds with a thick bed of organic matter
- Increasing organic carbon levels
- Promoting fungal hyphae, which has great symbiosis with plants and root rhizospheres
- Balancing nematode populations
- Organic mineralisation of nutrients. (become available to the plant and following cane crop)
- Reduce compaction
- Improved soil bio-diversity

THE CON'S

- Cost of some seeds are expensive.
- Seed size maybe an issue at planting.
- Some plant species may create issues (like root knot nematodes).

- Cultivation will reduce the benefits of a fallow cover crops. Heavy tillage will diminish microbial populations and carbon accumulation very quickly.

In Conclusion:

- It can reduce pathogenic nematodes and build free-living nematode ratios which are indicators of good soil health.
- The quality and quantity of soil life can be improved immensely within a few months.
- By providing the right environment to live in, these organisms make an inordinate contribution to the physical and chemical properties of all soils and influence plant growth.



OVERVIEW

Farm area

100 ha

Region

Hinchinbrook

Number of years farming

Fourth generation cane farmer





WILMAR SUGAR

Sub-surface Application of Mill By-products Trial

Wilmar Sugar owns and operates eight sugar mills in North and Central Queensland

WHO

Wilmar Sugar owns and operates eight sugar mills in North and Central Queensland and crush about 15 million tonnes of cane annually to produce more than two million tonnes of raw sugar. In addition, Wilmar Sugar owns and operates 6600 ha of agricultural land and produces more than 500,000 tonnes of cane per annum. One of these farms, The Orient, is located at Helens Hill in the Herbert sugar growing region.

AIM:

This project aims to investigate the use of mill mud and ash banded under the cane plant to determine if it is economically viable when the farm is outside the traditional transportation area for these products.

BACKGROUND:

Mill mud & ash are widely recognised as soil ameliorants that improve soil water holding capacity and as a valuable source of nutrients. Traditionally, mill mud/ash is broadcast at rates greater than 200 t/ha in areas that are relatively close to the sugar mill. There is concern that the broadcast application of these products at

these high rates could result in poor runoff water quality. Sub-surface application of mill mud/ash at lower rates under the cane plant will localise the nutritional benefits to the root growing zone in the soil and not subject the mud/ash to loss in run off during heavy rainfall events. Furthermore, sub-surface application of the mill mud at low rates means that less is required to be transported and this will reduce costs associated with transporting mill mud to areas outside the usual transportation haul distance of these products.

OBJECTIVES:

To establish if using low rates of mill mud/ash will have a positive impact on productivity and grower gross margin, while improving runoff water quality compared to broadcast application at higher rates.

KEY FINDINGS:

- 2017 plant cane results show there was no difference in grower gross margin for the 2 tonnes of lime per hectare treatment and the banding of 50t/ha of mud or ash treatments.



- The 50t/ha banded treatments had slightly better cane yield and sugar yield than the lime treatment.
- Application of mud or ash at any rate resulted in a reduction in CCS.
- Although the application of mud/ash at rates equal to or greater than 100 t/ha resulted in greater increases in cane yield than the low rates of these products, they had a negative impact on grower gross margin due to the application costs and a greater reduction in CCS.
- ESP has reduced since the application of mill by-products.
- Available K has increased where ash was applied between plant and 1st ratoon soil tests.

BIOMASS SAMPLING DATA

- pH has increased across the block from plant to 1st ratoon soil tests, future data will show us whether mill by-product hold pH values better than conventional practices.
- It should be noted that this data is from plant cane and it is unknown how long the impact of the mud/ash will last into the ratoon cycle and hence the trial will run over a five-year trial period.

Treatment	Plant part	N (% dry matter)	P (% dry matter)	K (% dry matter)
Control	Stalks	0.30	0.07	0.59
Mud (average)	Stalks	0.48 ↑↑	0.11 ↑	0.74 ↑
Ash (average)	Stalks	0.34 ↑	0.08	0.96 ↑↑
Control	Tops	0.99	0.15	1.44
Mud (average)	Tops	1.29 ↑↑	0.20 ↑	1.78 ↑
Ash (average)	Tops	1.14 ↑	0.18 ↑	2.31 ↑↑



SUMMARY:

Banding and burying mud and ash at low rates in the soil prior to planting resulted in:

- An improvement in runoff water quality compared to broadcast application of mud at 200 t/ha.
- Increased plant cane yield compared to application of lime at recommended rates.
- Higher grower gross margin compared to traditional high broadcast rates and higher banded rates.
- The same gross margin as the 2 tonnes per ha application of lime that would have been a standard soil amelioration treatment for this site.

WATER QUALITY DATA:

- The water quality monitoring that took place at the trial indicates that there was a positive improvement in water quality runoff from the subsurface banded treatments when compared to traditional methods of broadcasting mill mud and ash.
- Banding of mill mud reduced the total N and phosphorus in runoff water compared to the broadcast treatment.
- The lower the rate of mud applied to the soil the lower the quantity of total N and phosphorus in the runoff water.

CHALLENGES:

- Although banding and subsurface application of the product improved the quality of runoff water compared to broadcast application, there is potential to improve this further by developing application methods to get the product deeper under the soil.
- Although the application of mud or ash resulted in an increase in cane yield there was a decrease in CCS. Additional work is required to determine if fertiliser can be manipulated so that these yield increases are maintained and CCS maximised or not reduced.
- The trial will monitor the long term impact of the banded treatments on cane yield and grower gross margin over the crop cycle to assist in developing a guideline for using mud/ash products.

RESULTS TO DATE:

Orient Plant Harvest Summary: 2017

Treatment	Average TCH	Average TSH	Average CCS	Average \$/Hectare
Control	101.0	16.9	16.8	\$ 3,532
Mud banded 50t/ha	102.9	17.0	16.5	\$ 3,488
Mud banded 100t/ha	105.5	16.9	16.0	\$ 3,144
Mud broadcast 200t/ha	112.5	16.3	14.5	\$ 2,262
Ash banded 50t/ha	106.4	17.4	16.3	\$ 3,543
Ash banded 100t/ha	105.3	16.9	16.1	\$ 3,147
Ash banded 200t/ha	108.9	16.8	15.5	\$ 2,538

Mackay farmers enjoy market success

Images below: (Left) Deb McLucas from Freckle Farm shows off some of the produce available at the Greater Whitsunday Farmers Market. (Right) Rosmarie Fornaro-Widmer from the Grasstree Beach Mango Farm with some chutneys and jams at the Farmers Market.





Mackay Regional Council

The Greater Whitsunday Farmers Market in Mackay, is part of a global consumer trend to connect directly with farmers and their food.

The market, run by the Greater Whitsunday Food Network (GWFN) and supported by Mackay Regional Council, has gained a strong following since its launch in June last year.

“Starting up a market from scratch is a huge undertaking and it’s very rewarding to see that it has been so well received,” Ms Lucas said.

“Customers really appreciate the quality and freshness of the produce,” she said.

“On top of that, they can talk to the farmer who produces the food and get the best possible advice on food preparation and cooking and become more connected with the food they are buying.”

“Mackay is following what is a global trend for people to understand more about where their food comes from and how it is produced,” she said.

“We showcase local produce and it has been really educational for our shoppers to see the different lines of produce at the market and how it is produced,” she said.

“Our customers now recognise that you can’t grow certain vegetables in tropical north Queensland in the hot summer months and now have a better understanding of what is actually grown locally at different times of the year.”

The education has gone both ways. Farmers have also had to learn new skills, leaving the farm every week to share their produce and learn how to engage with thousands of shoppers.

Economic Development and Planning Committee deputy chair Cr Karen May said council was really happy to support a market that supported local farmers.

“Over the first year the markets have built a network within our community to bring produce from the farm to the consumer,” she said.

“It’s also amazing to see restaurant owners, who now have direct access to local produce, featuring and promoting the produce on their menus.”

Cr May said the weekly market has attracted a crowd of over 15,000 shoppers annually, which is a great result for its first year of operation.

“The weekly market has provided a shopping experience that complements the already vibrant Mackay City Centre,” she said.

“The number of people attending no doubt provides a significant boost to city businesses and our local farmers and producers.”

The Greater Whitsunday Farmers’ Market is held every Wednesday from 7am to 11am at the Bluewater Quay on River Street in the Mackay City Centre.

For more information visit mackaycitycentre.com.au



OVERVIEW

Trial Farm

MKY-04670A

Mill Area

Mackay Sugar

Property size

475 ha

Number of years farming

More than 40 years
(third generation)

Trial Subdistrict

Dawlish

Area under Cane

475 ha

Service provider contact

Farmacist

Where did this idea come from?

Grower-led





ALAN, KAREN AND GRANT MATSEN

Clearacre

Comparing crop nutrient uptake and runoff - application of
mud sub-surface vs surface

THE CHALLENGE

Alan and Grant Matsen wanted to lift their farm's productivity through robust sustainable practices, to ensure their farms future viability for the following generations. While investigating ideas, the Matsen's heard about some promising yield results in cereal crops in Victoria, after animal manure had been buried below the surface.

The burying of soil ameliorants below the surface of the soil can have the potential to improve soil qualities further down the profile, increase organic carbon levels, and potentially expand the topsoil and root zone. The deep placement of ameliorants also reduces the likelihood of runoff, promotes microbial activity and has the potential to increase a crop's Nitrogen Use Efficiency (NUE).

THE TRIAL

Initially the Matsen's sourced chicken and cow manure for their own farm, however this proved to be economically unviable. So the decision was made to trial sub-surface applied mill mud instead.

Three treatments were applied.

T1- No mud
T2- Mill mud @ 100t/ha was band applied in open furrows and then bed formed
T3- Mill mud @ 100t/ha was surface applied and incorporated into the soil

KP water event samplers (which automatically collect samples at pre-set intervals during a water event) were placed in each treatment. The samples collected are then tested for nutrient runoff.

A soybean crop (A6785) was planted in December 2017, and this crop will be taken through to seed. A plant cane crop will then be planted afterwards.





Repetition		1			2			3			
Treatment	Guard	2	3	1	1	2	3	3	1	2	Guard
No Rows	3	6	6	6	6	6	6	6	6	6	rest of block

Eastern side



The samplers were in these 3 treatments

TRIAL DETAILS

Trial Crop: Soybean and sugar cane

Variety: Soybean – A6785

Trial Block: MKY-04670A-08-02

Trial Block Size: 6.05 ha

Soil Type: Sunnyside soil – deep soil with a sandy to loam topsoil over a grey to brown clay.

TRIAL STAGES

	Date	Activities
Stage 1	September 2017	Mill mud applied
Stage 2	December 2017	Soybean planted and KP samplers put in
Stage 3	March/ April 2018	Soybean harvested
Stage 4	May 2018	Cane planted
Stage 5	2019	Plant cane harvested

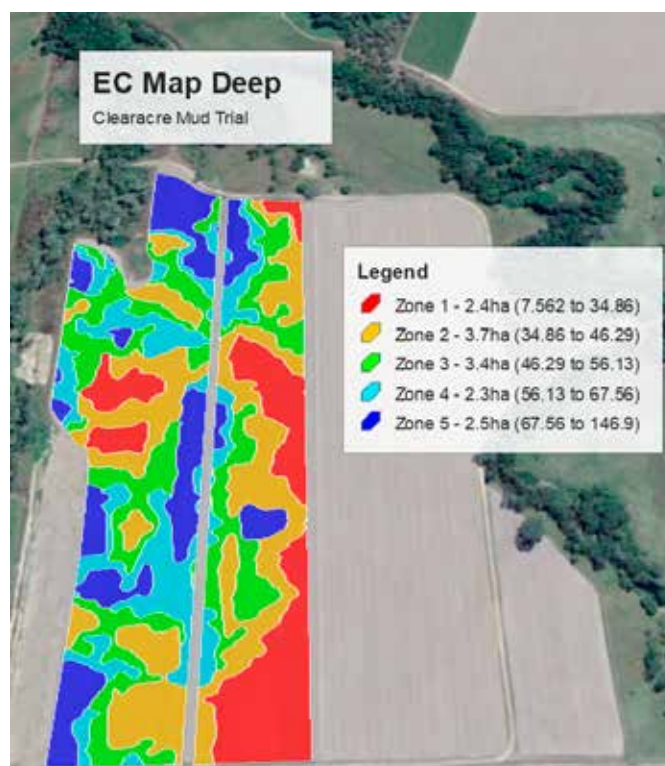
TRIAL DESIGN

The trial site was EC mapped to determine the location of soil boundaries (with Zone 1 having the lowest reading and Zone 5 having the highest). High EC readings are often associated with soils that are heavier in texture and can have drainage issues, while lower EC values often indicate lighter textured soils with good drainage properties.

The trial paddock had no previous mud applications. The whole paddock was ripped before the mud application and the sub-surface treatment areas received an additional rip to create the open furrow.

TREATMENTS

T1	No mud
T2	Mill mud @ 100t/ha was band applied in open furrows and then bed formed
T3	Mill mud @ 100t/ha was surface applied and incorporated into the soil





GROWER GOAL

To lift productivity, maximise the benefits of mud and to create a robust sustainable practice that will ensure the farm's longevity for future generations.

POTENTIAL WATER QUALITY BENEFIT

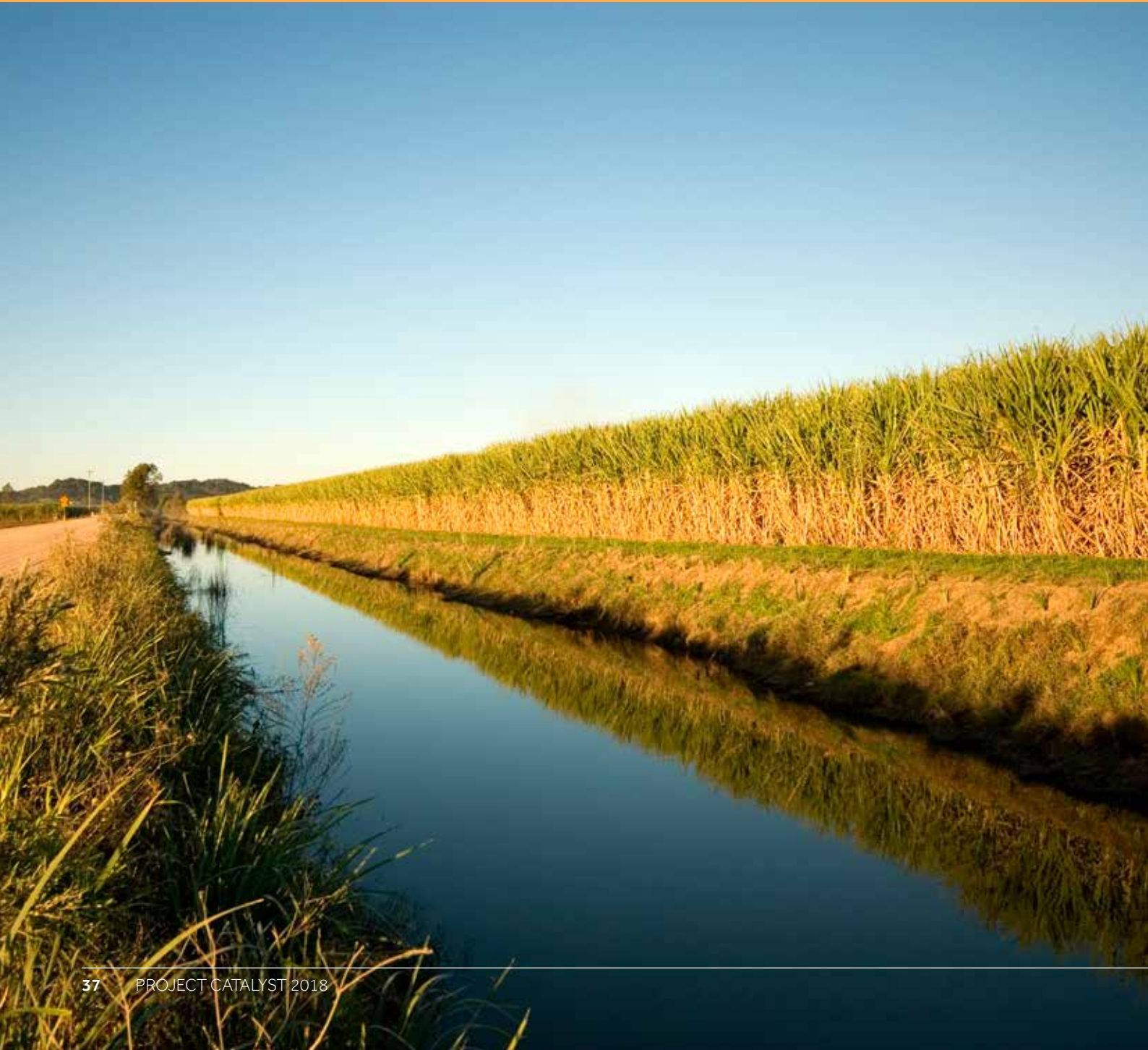
Reduce the risk of nutrient and sediment movement off site.

EXPECTED OUTCOME OF TRIAL

Improved soil structure, increased yield in treatment zones.



ALS is proud to be a part of Project Catalyst





A brief History of ALS in Queensland

The ALS Environmental Division works with Government, industry, water authorities, mining and agriculture to help assess the environmental impact of regulated industry activities.

Australian Laboratory Services started as a small geochemistry laboratory in Brisbane in 1976 to service mineral exploration companies exploring the eastern part of Australia. From that small Geochemistry laboratory, the need for environmental analysis was identified by our mining clients, and with greater public and regulatory awareness on environmental issues, the ALS Environmental Division was born in the early 1990's. The ALS Environmental Division works with Government, industry, water authorities, mining and agriculture to help assess the environmental impact of these activities. ALS has now expanded throughout Australia and the world to become one of the largest and most diversified laboratory providers globally.

Despite this, ALS is committed to maintaining its roots in Queensland, operating the Global Corporate Head office in Brisbane and continuing to grow services throughout the State. This includes regional service offices in Gladstone, Rockhampton, Mackay, Mount Isa,

Emerald, Roma and Chinchilla, and the opening of an environmental laboratory in Townsville in January 2016. This laboratory not only creates local jobs, but provides further support to farmers and industry in the North Queensland region with a local and knowledgeable, dedicated service. ALS is this year expanding their North Queensland footprint, by building and moving into a bigger, larger capacity laboratory, creating more employment opportunities, using local contractors and staff and increasing our ability to service clients in the North Queensland region.

ALS is proud to be a part of Project Catalyst

The Queensland Government has conducted studies over the past 15 years to determine the causes of the decline in health of the great barrier reef. A major contributing factor has been found to be linked to poor water quality, partially caused by excess nutrients, sediments and pesticides from agricultural sources. ALS has a long history of working in partnership with consultants on

research trials and assessments, as well as working direct with farmers, to provide laboratory based analysis of nutrients and pesticides. This helps to assist farms in understanding their soil composition, nutrient processes and losses and pesticide use, helping them to minimise their farm's impact on local waterways and the Great Barrier reef.



OVERVIEW

Farm area

126 ha

Region

Airville (near Mt Kelly) in the Burdekin Delta

Number of years farming

Second generation farmer – Denis's father originally started the sugarcane farm in 1957.

This trial focuses on:

- *Production improvements using different Enhanced Efficiency Fertilisers (EEF's)*
- *Investigating the potential of using EEF's at lower rates to maintain production*
- *Profitability of EEF's compared to conventional urea based products*





DENIS POZZEBON

Enhanced Efficiency Fertilisers

Denis Pozzebon is a second generation farmer. His father originally started the sugarcane farm in 1957 and Denis now has 126 hectares under production at Airville, near Mt Kelly in the Burdekin Delta. The property is part of the Sheep Station Creek catchment area.

Denis' farm is fully irrigated and has a range of soil types from clays to sands. The farm is broken up into three major nutrient management zones based on EC mapping data ground truthed with comprehensive soil analysis. The soil variables require these zones to be managed individually.

With funding through various projects, Denis has developed a state of the art irrigation system comprising of variable speed pumps, pump controllers, end of row sensors recorded and managed through a WiSA system to ensure irrigation efficiencies are maximised.

Denis has a range of irrigation water supply including open channel water, bore water and water from his recycle pit. Denis captures about 90% of his irrigation tail water, which is reapplied to 30% of his farm. Denis is a director of Society of Precision Agriculture Australia, as well as a director of Kalamia Cane Growers Organisation and is actively involved in various projects within the sugarcane industry.

FOCUS ON

- Production improvements using different EEF's
- Investigating the potential of using EEF's at lower rates to maintain production
- Profitability of EEF's compared to conventional urea based products

STORY

Denis has been involved in Project Catalyst for many years and has recently completed a three-year block trial on Enhanced Efficiency Fertilisers (EEF) on his Airville farm. This was one in a series of twelve trials conducted by Farmacist across the district over the last three years looking at the effect of EEF at different rates on various soil types and application timing. Denis' trial commenced in the 2014 season on a loam soil type matched with cane variety Q253 and was last harvested on the 10th November 2017. Denis wanted to investigate any production improvements using these EEF. To investigate the performance of the EEFs there were five treatments applied to his block;



KEY POINTS

Recent studies have shown that varieties such as Q253 are potentially more efficient at extracting and utilising nitrogen. In this case, the EEFs performed no better than the urea based blend at the same rate over the last three years and there was no significant difference in net return. This highlights the opportunities of taking varieties into account when developing nutrient budgets when considering block yield potential. The reduction of 40kg N/ha in this trial had no impact on production or profitability and will potentially lead to improved water quality leaving farms as a result.

Treatment 1 – Urea at 220 kg ha of nitrogen (N)

Treatment 2 – Urea at 180 kg ha of N

Treatment 3 – Entec Urea (Nitrification Inhibitor) at 180 kg ha of N

Treatment 4 – Agromaster (Polymer-coated Urea, Controlled Release) as 25% of N at 180 kg ha N in total.

Treatment 5 – Agromaster as 50% of N at 180 kg ha in total.

All treatments had an equal amount of phosphorus (P), potassium (K) and sulphur (S) applied and were replicated three times.

The aim of the trial was to compare the lower rates of N using the EEFs (180kg N/ha) to the higher conventional rate of urea (220kg N/ha). If the lower N treatments performed similar to the conventional rates, Nitrogen Use Efficiency (NUE) will be improved and reduce the risk of N leaving farms and potentially entering the Great Barrier Reef (GBR).

Fertiliser was applied each year in the same treatment locations using a stool-split fertiliser box controlled by GPS using Trimble TAC guidance. All treatments were purpose blended and calibrated individually prior to application. At harvest each year, Farmacist staff were present to ensure all trial plots were consigned separately to ensure correct weights and commercial cane sugar (CCS) analysis were collected from the mill data. All farm operations including tillage, irrigation and chemical application was consistent across the block. The only variable was nitrogen application rate and the form of nitrogen whether it was conventional urea or EEF.

TREATMENT

Summary of three years (2014-2017)

Treatment	N form	Rate (kgN/ha)	tCane/ha	CCS	tSugar/ha	Net Rev
1	Urea	220	135.6 b	13.0	17.6 c	\$2,221.92
2	Urea	180	137.5 ab	13.0	17.9 abc	\$2,338.00
3	Entec	180	137.6 ab	12.9	17.8 bc	\$2,254.51
4	Agromaster 25%	180	141.0 a	13.1	18.4 a	\$2,327.22
5	Angomaster 50%	180	140.3 a	13.1	18.3 ab	\$2,181.56

Economic analysis provided by Matt Thompson, Senior Agricultural Economist with the Department of Agriculture and Fisheries.





OVERVIEW

Farm area

120 ha

Region

Burdekin Delta

Number of years farming

Frank has been growing sugarcane for twenty-five years in the Burdekin; twenty-one years in the BRIA and four in the Delta.





FRANK MUGICA

Banded mill mud

Frank has been growing sugarcane for twenty-five years in the Burdekin; twenty-one years in the BRIA and the last four in the Delta.

Frank currently farms 120 hectares and has been actively investigating zonal application of mill mud on his farm. Following on from these trials implemented in 2014, Frank has extended his mill mud management strategies to incorporate mud at planting with great success. He uses a purpose-built Gessner tine bar to vee out the planting furrow, followed by mill mud banded into the vee and bedformed over the top. Frank had extended this practice into mung bean planting and experienced great results cutting nearly 2 tonnes to the hectare in 2017.

Frank is always keen to try innovative ways to improve his farming and is also involved in wetland restoration projects with NQ Dry Tropics. Frank is also very active in community based activities.

FOCUS ON

- Using banded mill mud on the hill to replace mud applied in the furrow (conventional)
- Reducing the risk of nutrient loads leaving farm

- Productivity and profitability of banded treatments compared to conventional application.

STORY

Mill Mud is an excellent source of nutrient and organic carbon that is applied to cane fields to improve soil health, soil chemical and physical status and improve crop yields. However it can lead to nutrient loss problems when applied in to furrow irrigated farms in the Burdekin. Mill mud applied in furrows can lead to significant amounts of phosphorous leaving farms. To address this issue, Frank became involved in trials investigating the potential of banding the mud on top of the hill instead of banding the product in the furrow on a first ratoon crop following plant cane harvest. Not only could this practice have the potential to reduce the risk of nutrient runoff, it could also improve productivity and reduce application costs. This trial was one of four trials in the Burdekin examining the productivity and profitability of applying mill mud using various methods and application rates.



Traditionally, mill mud is banded into the furrows of ratoons at a rate of 200 wet tonnes per hectare (200 wt/ha). Frank's trial compared this rate to 100 wt/ha banded in the furrow, as well as 120 wt/ha banded on top of the hill. These three treatments were compared against a treatment that had no mill mud applied to determine production benefits. Nitrogen (N) and phosphorous (P) applications were reduced in line with the SIX EASY STEPS recommendation in the first year. The following second and third years had Mid N (liquid biodunder fertiliser) applied at 3,3 m3/ha (180 kg N/ha, 83 kg K/ha and 15 kg S/ha) across all treatments however, no mud was reapplied in these years. The liquid fertiliser was applied due to issues experienced in the first year where the fertiliser chutes on the stool-splitter blocked up with the mill mud when being applied to the banded treatment, which led to inadequate amounts of inorganic fertiliser being provided to the plant.

The four treatments were replicated and conducted in the same positions each year. The treatments were as follows:

T1	No Mud
T2	Mud banded in the furrow (200 wt/ha)
T3	Mud banded in furrow (100 wt/ha)
T4	Mud banded on hill (120 wt/ha)

If results showed that mud applied on the hill is comparable to the other mud treatments over time, this practice could be safely adopted by the industry to improve crop yields whilst reducing off-site impact of nutrient losses to the environment.

At harvest each year, Farmacist staff were present to ensure all trial plots were consigned separately to ensure correct weights and commercial cane sugar (CCS) analysis were collected from the mill data. All farm operations including irrigation and chemical application was consistent across the block.

KEY POINTS

Mud applied on top of the hill compared similarly to mill mud applied at higher rates in the furrow. Due to the mud, which has a high P content, not being applied in the furrow, the banded practice on top of the hill can potentially lead to a significant reduction in nutrient loads leaving blocks. These trials have led to a couple of Burdekin contractors modifying their trucks and equipment to enable mud to be banded on the hill, which has been actively adopted up by growers who can see the benefit of strategically applying the product for economic and environmental reasons. Care needs to be taken when applying fertiliser post mud application, placing the fertiliser before the mud application would be a better option in hindsight.

As a result of this work, Wilmar Sugar is currently working with DEHP looking at placement and rate of application of mill mud products in both the Burdekin and Herbert regions to assist in developing guidelines on how best to use these products.

OUTCOMES TO DATE

Results for the first ratoon crop (2015) showed no difference between the in-furrow mud treatments and the control, however the on the hill mud treatment produced lesser tonnes in comparison. This may have been due to blockages in the stool splitter chutes that were not identified until later in the year via satellite imagery from University of New England. The costs of mud purchased and applied, as well as fertiliser costs were taken into account when calculating the gross margin (economic outcome) in the first year.

In the second ratoon crop (2016) with the change of fertiliser delivery systems, all mud treatments performed better than the control. Interestingly, the banded mud treatment on the hill produced more cane than the conventionally furrow applied mud treatments, and all the mud treatments performed better than the control highlighting the benefits of mud in the cane production system. The banded treatment on the hill also delivered the highest average gross margin in 2016.



FROM THE LANDHOLDER

The success of the banded mill mud trial tested on my farm over the past 3 years has given me the confidence to adopt the practice across the entire farm on ratoon cane. Building on success of this trial, I am now applying the banded mill mud subsurface, bedforming and then planting cane or mung beans. There has been significant improvement to our profitability in both sugarcane and mung beans with reduced input costs and increased yield. The support offered by Farmacist has really improved my profitability and farming practices. Being involved in Project Catalyst and working with Farmacist, DAFF and NQ Dry tropics has been really good and I urge other growers to give it a go.

This trial focuses on:

- *Using banded mill mud on the hill to replace mud applied in the furrow (conventional).*
- *Reducing the risk of nutrient loads leaving farm.*
- *Productivity and profitability of banded treatments compared to conventional application.*

In the final year (3R Q183), all mud treatments produced more cane than the control indicating a long-term positive effect. Cane yield and CCS was suppressed due to the crop being cut early in June 2017 to facilitate wet weather harvesting. As this was going to be a plough-out block, Frank decided to cut this block first and allow a crop of mung beans to follow straight after. Results showed the on the hill mud treatment performed the same as the furrow applied mud treatments three years after application. The results from these trials provide confidence that applying the mud on top of the hill instead of in the water furrow was successful. This practice should not only maintain similar yields as conventionally applied mud, but also lead to improved water quality and environmental stewardship.

2015	Cane t/ha	Sugar t/ha	Gross margin \$/ha
Control - No Mud	148.0	19.3	\$2,532
Mud applied in furrow (200 wt/ha)	149.2	20.2	\$2,553
Mud applied in furrow (100 wt/ha)	144.6	17.7	\$1,778
Banded mud on hill (120 wt/ha)	128.2	17.5	\$2,105

2016	Cane t/ha	Sugar t/ha	Gross margin \$/ha
Control - No Mud	110.2	16.7	\$2,384
Mud applied in furrow (200 wt/ha)	128.7	18.7	\$2,777
Mud applied in furrow (100 wt/ha)	125.7	18.9	\$2,869
Banded mud on hill (120 wt/ha)	135.5	19.8	\$3,025

2017	Cane t/ha	Sugar t/ha	Gross margin \$/ha
Control - No Mud	107.4	11.6	\$612
Mud applied in furrow (200 wt/ha)	118.0	13.0	\$926
Mud applied in furrow (100 wt/ha)	115.6	12.8	\$904
Banded mud on hill (120 wt/ha)	116.6	12.6	\$789

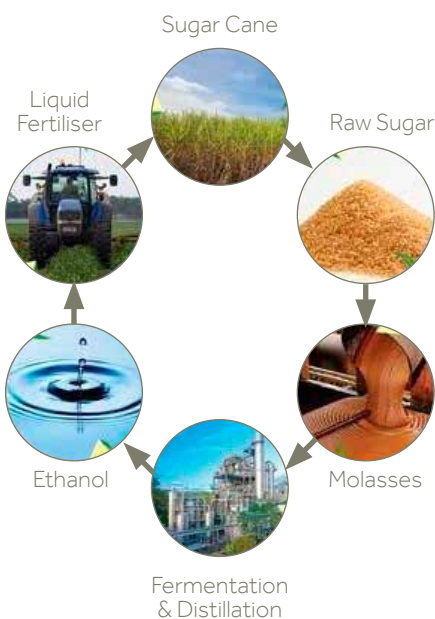
Economic analysis provided by Matt Thompson, Senior Agricultural Economist with the Department of Agriculture and Fisheries.



Bio Dunder Liquid Fertilisers



Manufacturing Cycle



For more than 30 years growers have looked to Bio Dunder® for liquid fertilisers offering precise application, convenience and sustainability.

Precision: The Bio Dunder® products have been specifically formulated for application with our contractors' precision equipment. An application computer linked to a variable speed pump, flow meter and GPS ensures that the targeted rate of nutrition is precisely applied and mapped to assist with record keeping.

Sustainability: Bio Dunder® products recycle nutrients back onto the paddock. We use molasses sourced from Burdekin, Proserpine, Mackay and Sarina sugar mills to produce Bio Dunder®. This increases the viability of the mills and allows for the nutrients removed with the sugarcane crop to be replaced during Bio Dunder® application.

Convenience: Fertilisation of an entire farm can be organised with one phone call. By using one of our dedicated contractors, growers have more time to focus on increasing efficiencies in other areas of their farms.

Wilmar BioEthanol AgServices is proud to support the continued innovative and sustainable farming practices of the Project Catalyst Farmers.

Improving yields the major focus of international sugar conference.

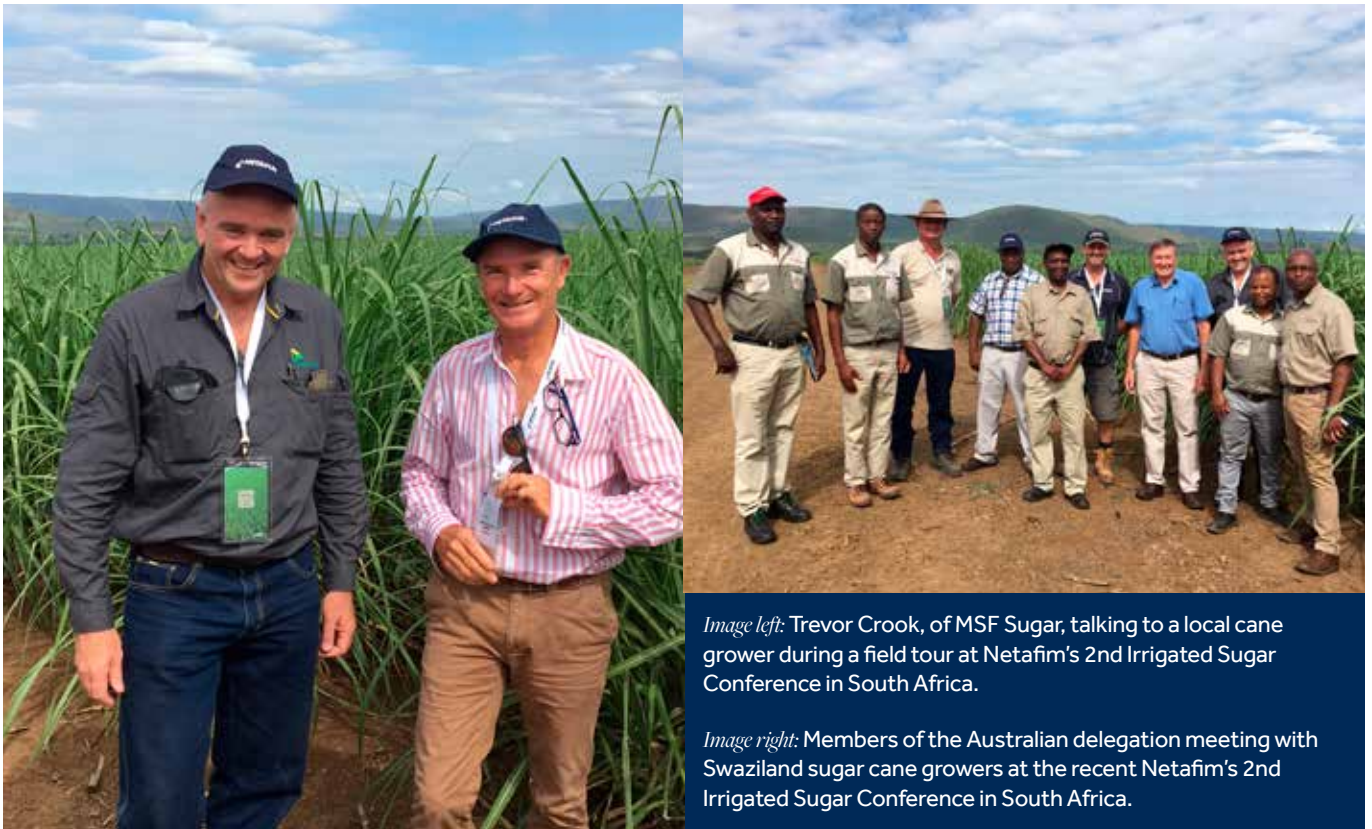


Image left: Trevor Crook, of MSF Sugar, talking to a local cane grower during a field tour at Netafim's 2nd Irrigated Sugar Conference in South Africa.

Image right: Members of the Australian delegation meeting with Swaziland sugar cane growers at the recent Netafim's 2nd Irrigated Sugar Conference in South Africa.

Improving yields across multiple years was the major focus of the recent sugar cane conference held in South Africa and attended by a number of Australian industry people.

Netafim's 2nd Irrigated Sugar Conference was designed to look at ways in which growers from throughout the world use different technologies to produce more cane.

Matt Cotton, from Netafim Australia, and Trevor Crook and Andrew Adams, from MSF Sugar represented Australia at the event and were impressed by the way techniques from around the world were being used to increase yields.

"It was great to meet people from all over the world, Mr Cotton said. They were able to answer a lot of questions.

He said a major focus in Australia, and throughout the world, was to try to get more ratoons from the cane crop.

"Internationally some farmers are getting up to 18 ratoons and still getting good sugar content and yields. In Australia we are well under that mark and this was an important option to see how we could increase the number of years from sugar cane."

"The conference looked at improved planting and harvesting techniques as well as efficiencies in using different irrigation methods."

Mr Cotton said Subsurface Drip Irrigation was a major component to the success of overseas cane and something that MSF Sugar were concentrating on with trials and large scale projects.

He said SDI provided an option to produce more yield from the available water:

"The initial MSF Sugar results from sub-surface drip irrigation produced 12.6 tonnes of cane per megalitre compared to their best result of 8.1 tonnes per megalitre from flood irrigation."

Subsurface Drip Irrigation in cane paddocks has been placed at a depth of 280 to 300mm, at spacings of two metres.

The cane is planted at 350mm either side of the irrigation row.

Mr Cotton said SDI produced higher, more consistent yields, allowed fertigation at all stages of the crop and, importantly, reduced run-off.



OVERVIEW

Location

Mona Park and Stockham Road,
Burdekin

Property size

3500ha

Landuse

Sugarcane production

Wilmar Sugar owns almost 6600 hectares (ha) of agricultural land within the Herbert, Burdekin, Proserpine and Plane Creek milling regions. Of this total area, we farm 3500ha in the Burdekin, with irrigation water mainly supplied from the Burdekin Haughton Water Supply Scheme. Wilmar Sugar is continually looking to improve its farming operations and all of our Burdekin farms are both BMP and Bonsucro accredited.

The Wilmar Sugar farm team in the Burdekin is continually challenged with how to manage the interaction between variety, irrigation and nitrogen on sodic soils.



WILMAR SUGAR

Managing nitrogen in q232 ratoons growing on sodic soil

Wilmar Sugar owns almost 6600 hectares (ha) of agricultural land within the Herbert, Burdekin, Proserpine and Plane Creek milling regions.

PRACTICES

Wilmar Sugar schedules irrigation of its sugarcane crops using G-dots to identify the appropriate time to furrow irrigate different crop classes and varieties. G-dots are calibrated to crop growth every year to maximise sugarcane growth potential and increase water use efficiency. Over 90% of the Wilmar Sugar farming area has recycle pits to capture irrigation runoff and minimise water movement from our farms to the environment.

Nutrient application on Wilmar Sugar's farms is managed under an Environmental Management Plan that ensures nutrients and ameliorants are applied as per SIX EASY STEPS and "The method for calculating the optimum amount of nitrogen and phosphorus to be applied to sugarcane properties regulated under the Environmental Protection Act 1994".

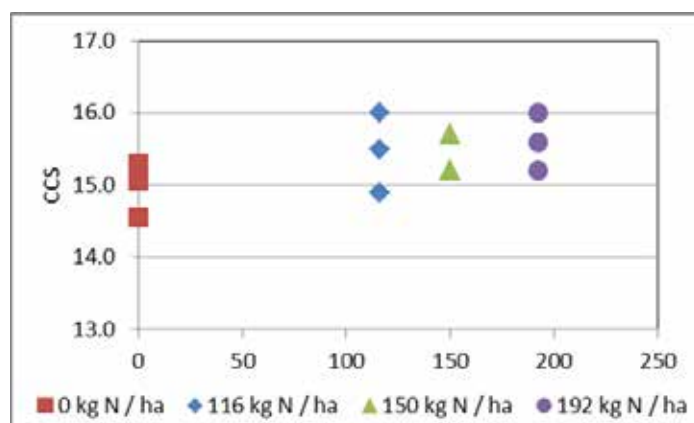
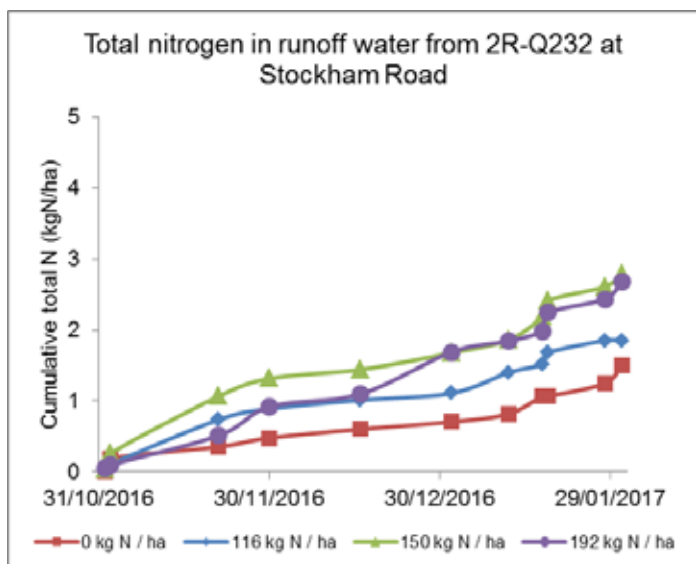
Nutrient application rates are block specific and determined under the guidance of a local agronomist taking into account yield potential of blocks based on variety, crop class and soil tests taken during the fallow. Nutrients are

applied underground in granular form using either double disc opener side-dressing, or stool splitter, fertiliser boxes. The fertiliser tractors are GPS guided and have fertiliser boxes with rate controllers that are routinely calibrated for each fertiliser type during the fertiliser season.

THE CHALLENGE

The Wilmar Sugar farm team in the Burdekin is continually challenged with how to manage the interaction between variety, irrigation and nitrogen on sodic soils. Varieties that continue to produce moderate to high yielding sugarcane crops in second or third ratoon on sodic soils are in high demand. Unfortunately, they are also limited in their availability.

To maximise profitability on these sodic soils, Wilmar Sugar is assessing how best to match nitrogen fertiliser application to maximise sugarcane crop growth and minimise costs and losses to the environmental.



PROJECT OVERVIEW

A nitrogen fertiliser rate trial was established on a second ratoon Q232, growing on our Stockham Road farm.

Q232 is recognised as a tough variety that grows and ratoons well on sodic soils. The variety is thought to be good at scavenging nitrogen from the soil and the gossip is to go steady with the nitrogen fertiliser.

The soil of the trial site is a “light to light medium sodic cracking clay” and sodicity increases with depth.

Depth (cm)	pH	Organic carbon (%)	ESP (%)
0-25	7.3	0.8	4.3
25-100	8.4	0.7	19

TREATMENTS

Custom blend fertiliser was applied to the site for each treatment within 14 days of the first ratoon being harvested on the 13 October 2016. The custom blend fertilisers were applied to give similar rates of phosphorus, potassium and sulphur to the soil and variable nitrogen rates as shown in the table below. Each treatment was replicated three times.

Treatment	Nitrogen (kg/ha)	Phosphorous (kg/ha)	Potassium (kg/ha)	Sulphur (kg/ha)
T1	0	18	71	23
T2	116	18	71	23
T3	150	18	73	20
T4	192	18	70	18

TRIAL RESULTS

WATER QUALITY

Water samples were taken from the centre furrow of each treatment, from one replicate only, using KP Composite Water Samplers and analysed for total N. Water samples were collected from 10 runoff events (6 irrigation and 4 rainfall) between the 1 Nov 2016 and the 31 Jan 2017. Nitrogen flux was calculated using an average of 20% runoff from all irrigation and rainfall events, and it has been determined that irrigation events are usually 0.8ML per application.

The zero N fertiliser rate had approximately 1.5kg total N/ha runoff whereas the 150 and 192 kg N/ha fertiliser application had approximately 2.7kg total N/ha runoff as shown in the total nitrogen water quality graph below.

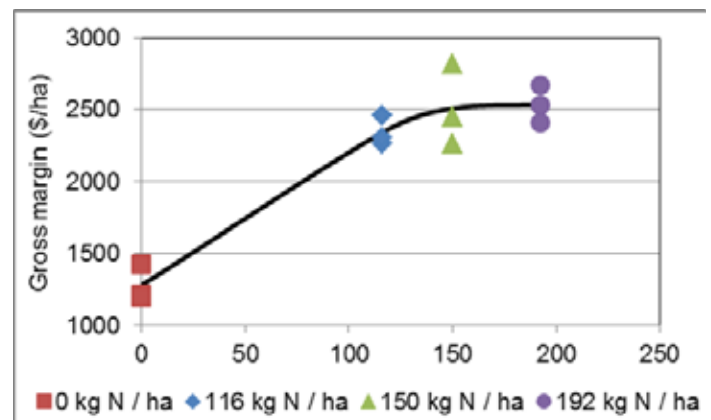
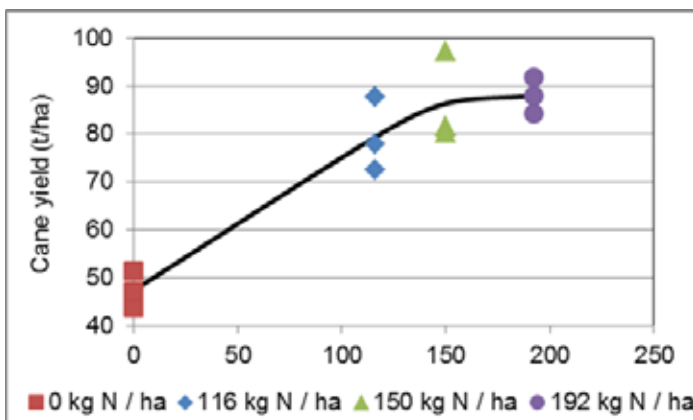
CROP PRODUCTIVITY AND GROSS MARGIN

The trial site was dried down for approximately 12 weeks prior to harvest and did not received irrigation or rainfall during this time. The second ratoon crop was harvested on the 13 October 2017; exactly 12 months after the first ratoons were harvested.



FROM THE LANDHOLDER

Wilmar Sugar will continue this trial to harvest the third ratoon Q232 in 2018 and monitor water quality over the 2017/18 wet season. In addition, Wilmar Sugar is investigating using mill ash and mud/ash mixes at low rates in plant cane crops to alleviate the impact of sodicity and compaction on water availability.



Sugarcane yield and CCS was collected for each treatment and gross margin per hectare calculated by subtracting the cost of harvesting, levies and fertiliser from the gross revenue received from each plot, assuming a sugar price of \$400/tISP.

Sugarcane yield results are shown in the graph below. The zero nitrogen treatment yielded 48 tonnes of cane per hectare (t/ha), and was significantly less than the other three nitrogen treatments. There was a trend for sugarcane yield to increase as the nitrogen fertiliser rate increased from 116kg N/ha to 192kg N/ha treatments. However, the sugarcane yield for the 116kg N/ha, 150kg N/ha and 190kg N/ha treatments, which were 79.4, 86.4 and 87.9 t/ha respectively, were not significantly different.

CCS was reduced in the zero nitrogen treatment compared to the other treatments as shown in the graph below. However, there was no difference in the CCS between all the treatments.

As shown in the graph below grower gross margin for the 116kg N/ha, 150kg N/ha and 192 kg N/ha treatments increased as nitrogen fertiliser increased from \$2342/ha to \$2509/ha and \$2535/ha, respectively. However, there was no difference between the gross margin received

for these three nitrogen fertiliser application rates. The treatment that received no nitrogen from fertiliser had a gross margin approximately 50% of those areas that received nitrogen.

DISCUSSION AND CONCLUSION

Sodic soil in the Burdekin, with subsoil ESP greater than 10%, are routinely observed to have sugarcane crop yields less than 100 t/ha in second ratoon or older crops, despite irrigation practices scheduled using G-dots.

SIX EASY STEPS recommend that nitrogen should be applied at 180 kg N/ha to ratoon crops growing on these soils, assuming a sugarcane district yield potential of 150 t/ha, to maximise grower gross margin. The results from this one trial suggests that sugarcane growth and hence grower gross margin is not limited by nitrogen fertiliser applied at rates between 116 kg N/ha and 192 kg N/ha. Sugarcane productivity on this sodic soil is more than likely limited by water availability which is a function of the interaction between the high soil ESP and compaction from farming and harvesting operations.

It is easy to conclude from the results of this trial that the quantity of nitrogen fertiliser applied to sodic soil could be reduced in ratoons older

than second ratoon, compared to the SIX EASY STEPS recommendation, as there is likely to be no impact on grower margin.

However, it is important to realise that there was no improvement in the grower gross margin from reducing the nitrogen fertiliser rate. With cost of production increasing year-in/year-out growers need to improve their sugarcane yield on these sodic soils to remain viable. Consequently, there is a need to reduce the impact of sodicity and compaction on sugarcane yield so that the sugarcane plant has the ability of utilising the full nitrogen rate recommended by SIX EASY STEPS. This will result in growers gross margin increasing and the loss of nitrogen to the environment decreasing as the sugarcane plants nitrogen use efficiency increases.

Wilmar Sugar will continue this trial to harvest the third ratoon Q232 in 2018 and monitor water quality over the 2017/18 wet season. In addition, Wilmar Sugar is investigating using mill ash and mud/ash mixes at low rates in plant cane crops to alleviate the impact of sodicity and compaction on water availability.

Value while still minimising
impact on the environment.





Grower Serenade trial

Protecting surface and groundwater quality are cornerstones of the responsible use of water as a natural resource.

Bayer is committed to ensuring that our products, both established and new, provide growers with value while still minimising their impact on the environment. For example, the registration of a lower application rate of Balance herbicide in order to reduce the pre-emergent herbicide load, and the registration of Basta® in sugar cane has provided growers with an alternative to current knockdown products. Most recently, Bayer has collaborated with QDAFF to develop a new finger wheel slot closing attachment to assist with the application of Confidor Guard in sugar cane ratoon crops.

In 2016 a trial was established on Neil Walpole's Koumala property south of Mackay which involved a novel product from Bayer – Serenade® Prime. So what role does a product like Serenade Prime play in improving water quality? Ben Schofield, Customer Sales Representative explains. "As growers adopt practices that improve soil health and nutrient efficiency, both production and sustainability improve. Biological products can deliver results in both of these areas of innovation in a number of ways."

Serenade Prime is a product based on the soil ameliorating beneficial bacteria *Bacillus subtilis* strain QST713, specifically selected for its superior performance in cropping systems. In each container of Serenade Prime there is a guaranteed quantity of viable spores of the bacteria *Bacillus subtilis* strain QST713. Serenade Prime lives on plant root surfaces and in the soil around the plant root system in a zone called the rhizosphere. In the rhizosphere, plants and bacteria can develop a mutually beneficial relationship under suitable

conditions. When the interactions between the bacteria, the plants and the soil are balanced, both the plants and the bacterial populations in this zone function at a higher level as a result. When plants and beneficial bacteria are functioning in harmony in the rhizosphere, resources required for growth such as nutrients and water become more available through the mutually beneficial plant/bacteria relationship.

Ben adds, "It is important to understand that it is only as a result of these interactions within the rhizosphere that the benefit to plants becomes available. Serenade Prime does not directly provide improved plant growth - it is only when there is an active interface between the plant roots and Serenade Prime bacteria that the benefits of higher functioning plants/crops become accessible."

Ben hopes to scientifically assess the impact of applying Serenade Prime to a Ratoon Crop on Neil's farm. "Previous trials have shown consistently that Serenade Prime had a positive impact on Plant cane. I'm now working on achieving consistent benefits in ratoon cane."

Despite receiving the full impact of Cyclone Debbie in March, the trial was carried through and harvested in late 2017. Results will be discussed at the 2018 grower forum. The good news is that the trial at Neil's has been continued, with the application of Serenade Prime to a now 3rd ratoon crop. The continuation of this trial will assist in the assessment of the long term impact Serenade Prime has on crop growth.

With growers focusing on reducing inputs without compromising returns, there will continue to be a concerted effort in product development and industry support from Bayer. "By partnering with an organisation like Project Catalyst, we get a first-hand look at the challenges growers are facing as the nature of farming changes. This kind of industry collaboration is crucial in pioneering change and Bayer will continue to support Project Catalyst and initiatives like it well in to the future."

Introducing Ben Schofield (pictured left with Phil Deguara)

Ben Schofield has taken over the Commercial Sales Representative role from Tim Murphy. After studying Ag. Science at UQ Gatton, he spent time as a horticulture Agronomist in the Lockyer Valley. Ben looks forward to supporting Project Catalyst and its growers well into the future.

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OVERVIEW

Trial Farm

PCK-0305A

Mill area

Plane creek – Sarina Mill (Wilmar)

Total Farm Area

210 ha

Number of years farming

35 years

Trial sub district

Dawlish

Area under cane

183 ha

Service provider contact

Farmacist

Idea

Grower led





MANUEL MUSCAT

J & F Muscat and sons

Improve productivity and increase nitrogen use efficiency by tailoring variety to soil type

THE CHALLENGE

In blocks with sodic soils, it can be hard to decide which cane variety to plant. Should a hardy variety such as Q138 be planted? This variety performs better in sodic areas but has a lower sugar yield. Alternatively, should a higher yielding variety such as Q183 be planted to take advantage of the non-sodic soil in the block, but sacrifice yield in the sodic areas? It is a problem facing many growers across the region.

Sodic soils have poor soil structure which affects water infiltration, percolation, and nutrient availability. High sodicity levels cause clay particles to swell excessively when wet to the point that they separate and disperse. This results in structural collapse of the soil profile, and as the soil dries out, the dispersed soils reharden and block soil pores. This causes issues such as water logging, hard crust formation on the surface and a decrease in gaseous exchanges. Typical impacts of sodic soils on sugarcane crops include reduced plant populations, poorer growth and low yields, which decreases the overall economic viability of the farm.

THE TRIAL

This trial is assessing a paddock with variable soil, ranging from sodic to non sodic, and planting varieties that suit accordingly.

The treatments will include:

1.	Plant Q138 Variety across the block, incorporating sodic and non sodic areas
2.	Plant Q183 Variety across the block, incorporating sodic and non sodic areas
3.	Plant Q138 in sodic area and swap to Q183 for the rest of the row
4.	Mix Q138 and Q183 together and plant across the block





POTENTIAL WATER QUALITY BENEFIT

Increased nitrogen use efficiency, leading to reduced nutrient runoff.

EXPECTED OUTCOME OF TRIAL

It is expected that the Q138 will out-perform the Q183 in the sodic end of the paddock.



TRIAL DETAILS

Trial Crop: Sugar cane
 Variety: Q183 & Q138
 Trial Block: PCK-305A 12-02
 Trial Block Size: 11.9 ha
 Soil Type: Sodosol – sandy to loam topsoil over a grey/brown clay

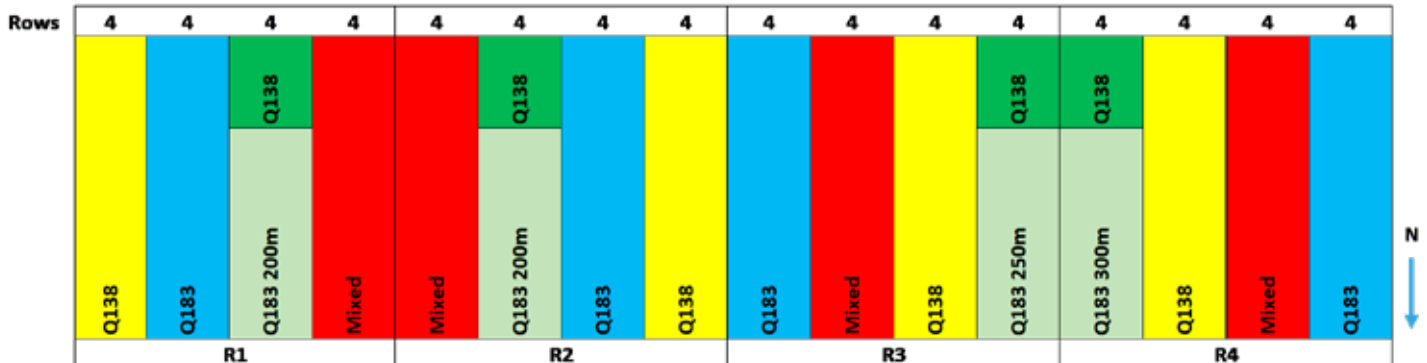
TRIAL STAGES

	Date	Activities
Stage 1	July 2016	EM map and soil sample to assess soil constraints.
Stage 2	September 2016	Plant sugarcane according to trial plan.
Stage 3	October 2017	Catalyst bus trip.
Stage 4	October–Nov 2017	Harvest.

TRIAL DESIGN

Manuel Muscat - Targeting variety to soil type

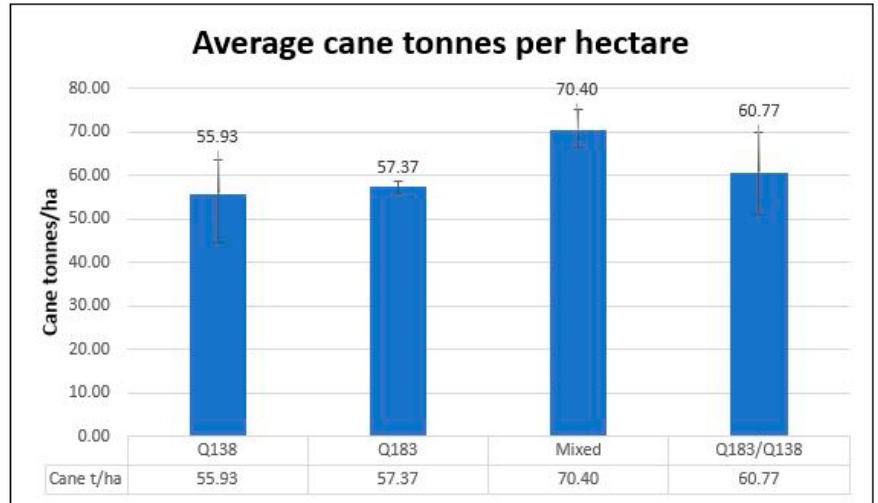
PCK-305A-12-02



TREATMENTS

T1	Plant Q138 Variety across the block, incorporating sodic and non sodic areas
T2	Plant Q183 Variety across the block, incorporating sodic and non sodic areas
T3	Plant Q138 in sodic area and swap to Q183 for the rest of the row
T4	Mix Q138 and Q183 together and plant across the block

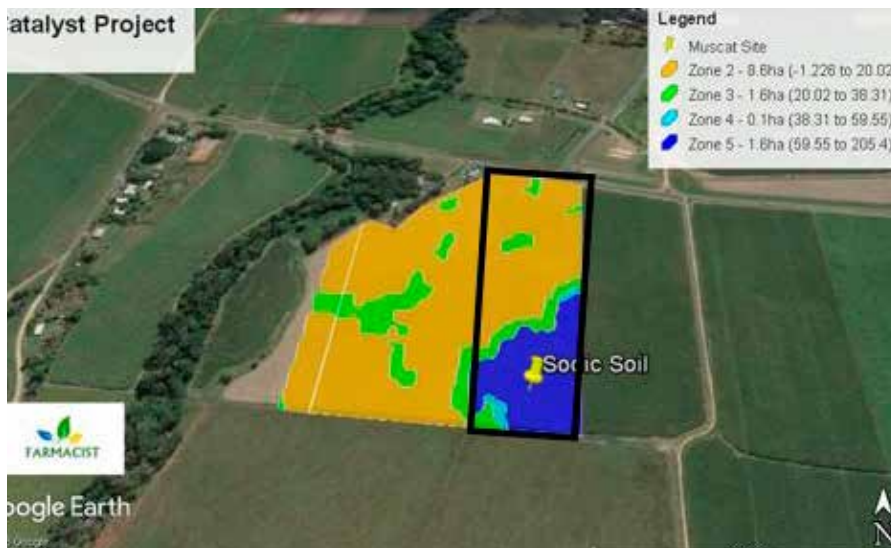
The trial site was EC mapped (Figure 2) to determine the location of soil boundaries, with Zone 1 having the lowest reading and Zone 5 having the highest. High EC readings are often associated with soils that are heavier in texture and can have drainage issues, while lower EC values often indicate lighter textured soils with good drainage properties. Zone 5 (dark blue) is the sodic section of the paddock.



RESULTS

The plant cane harvest results for the site were very interesting – Treatment 4, the mixed variety treatments gave the highest yield of cane and the highest yield of sugar for the four treatments. The next highest performing treatment was Treatment 3, the targeted variety Q183, Q138 planting. This was followed by the straight Q183 planting and lastly, the straight Q138 planting.

These results suggest that mixed and targeted variety planting may improve crop productivity. The trial will be continued for the full crop cycle to monitor changes in treatment performance over time.



Working with growers to uncover opportunities and find solutions to today's challenges



Sugarcane growers are operating in a complex environment and are faced with many challenges, the greatest of which is how to continue operating a profitable farming business while sustainably managing the land.

Dealing with challenges often leads the way to uncovering opportunities. Sugar Research Australia works with the industry's sugarcane growers and millers to seek solutions to some of today's challenges by engaging in effective research, development and adoption.

Some of this research is highly technical and needs to be carried out in a laboratory, while much of the research is carried out in partnership with growers through on-farm trials. The knowledge gained through these trials goes on to inform other research and to develop products

and tools that allow growers to make on-farm decisions and overcome some of the challenges they face.

Challenges will always be a part of the agricultural equation and research is one element in uncovering opportunities and finding solutions. Programs such as Project Catalyst is another. SRA is excited to be supporting Project Catalyst and the growers whose passion, innovation and drive to find solutions is the key to overcoming our industry's challenges.

SRA researchers working with Joe Linton in the Burdekin on the EEF60 enhanced efficiency fertiliser project. Outcomes from this project will help Project Catalyst growers further develop trials and test and adopt new management practices.

Within the recently launched Soil Health Project, sample collection and testing is an important part of the research process. Field technicians collect the samples which are then sent to the laboratory for testing. (Richard Brackin, UQ)



Cane growers know that a successful enterprise is about optimising productivity while managing the land sustainably. Smartcane BMP provides cane growers with a platform that both recognises their current practices and helps identify opportunities for ongoing improvement. Its best practice framework is based on both industry experience and research results.



SUPPORTING A SUSTAINABLE SUGAR INDUSTRY

Users of raw sugar in Australia and around the world are increasingly demanding sugar that meets sustainability requirements. For example, large companies like Coca Cola and Unilever have been publicising their commitment to sourcing only sustainable sugar for their products by 2020. Smartcane BMP is supporting growers and the cane industry to meet on-farm sustainability requirements and offers a credible path to be able to prove this.

Smartcane BMP program offers coverage of the whole farm system with modules focused on soil health and plant nutrition, pest, disease and weed management, irrigation and drainage, crop production, natural systems, farm business and workplace health and safety. The Smartcane BMP modules also align with the on-farm criteria used by Bonsucro and other international standards for sustainable sugar.

Local facilitators are on hand to help growers complete Smartcane BMP, from joining the program to benchmarking current farm practices, right through to the accreditation process.

Growers who have achieved accreditation believe the on-farm verification process is a practical and robust means of demonstrating their stewardship of the environment. Half of these growers report a practice change from participating in Smartcane BMP with nearly 20% of the cane production area in Queensland managed by BMP accredited growers.

Stephen Calcagno, an accredited grower from Babinda, believes Smartcane BMP is the best tool farmers have at their disposal to prove that they are minimising the loss of nutrient, pesticide and sediment into their Great Barrier Reef catchment.

“The more who do it, the more it puts our industry in a favourable light with the community. We’ve got to prove to everyone that we’re doing the right thing by the Reef.”

Good drainage management is crucial for Stephen in his high rainfall environment. Riparian zones, silt traps and grassed headlands slow water flow keeping nutrient, herbicide and sediment on his farms.

As Stephen sees it, there’s much at stake for growers given the importance of a productive, profitable and environmentally sustainable sugar industry to the Queensland’s regional economy.

“Everyone makes an impact, it’s just trying to minimise the impact that you do make,” he said.



OVERVIEW

Farm area

700 ha under management, across multiple farms

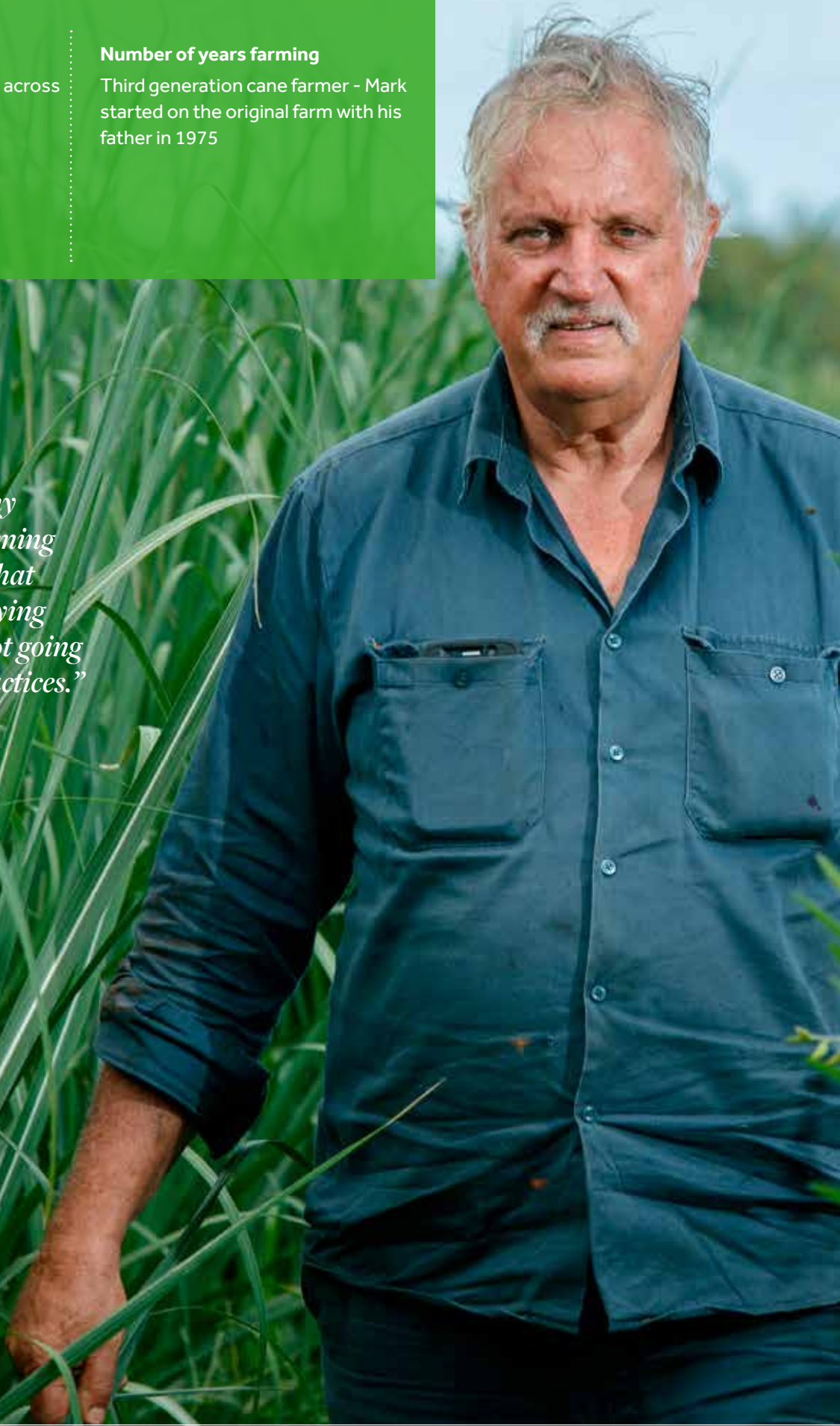
Region

Barron Delta area of the Mulgrave Mill

Number of years farming

Third generation cane farmer - Mark started on the original farm with his father in 1975

“If I am killing my soils with my farming practices, then what is the use in applying biology if I am not going to change my practices.”





MARK SAVINA

home-produced microbial product

Assessment of a home-produced microbial product as a potential replacement for inorganic nitrogen.

Mark Savina manages 90% of the cane in the Barron Delta area of the Mulgrave Mill and is a significant industry player, who has been experimenting and adopting innovative practices for many years. Much of his farming land is surrounded by urban development, and with the focus on dissolved inorganic nitrogen (DIN), Mark with the assistance of Gavin Kay, Derek Sparkes and Willem Landman began investigating the ability to reduce inorganic nitrogen application without the loss of production or reduction in profitability.

Mark began by looking at how he could change some practices to help improve the use of trash blanket to increase the biology in the soil. It was said to him by another farmer, "If I am killing my soils with my farming practices then what is the use in applying biology if I am not going to change my practices?". So as part of changing his farming practice to encourage the soil biology, Mark is moving to a 1.8m row spacing and is planting the mounds with either legume or sun hemp or with mixed species in the fallow, and when it comes to work the fallow crop in and prepare for planting, he is now leaving the rotary hoe at home, which has saved him a very expensive operation, and the resultant plant crop is visually no different.

Mark has been running a trial now for 3 years on Q208 comparing a 6ES fertilizer rate, with a 80% 6ES fertilizer rate and 40% 6ES fertilizer rate with the addition of known microbes. The objective of the last treatment is to use the biology to break down the 10-15 t/ha of organic matter (cane trash) that is left after harvest reducing the reliance on synthetic inputs. Initially, the biology is added to improve the soil biology, and then targeted biological amendments are added to break down the trash, once the cane canopy is starting to shade the ground, so the trash can also be used as a weed mat to reduce herbicide usage.

The results from the 2015, 2016, and 2017 harvest shows that it is only the tonnes of sugar per hectare in 2017 (3rd ratoon crop) where there are any significant differences in productivity, with the full rate of fertilizer being significantly better than either of the reduced fertilizer treatments, but overall across all 3 seasons there is no significant difference between any of the treatments.



2015 HARVEST – 1ST RATOON

Treatment		tc/ha		CCS		ts/ha	
1	100% 6ES – 127 kg N/ha	98.18	-	12.72	-	12.47	-
2	80% 6ES – 101 kg N/ha	96.45	-	13.01	-	12.52	-
3	40% 6ES – 54 kg N/ha + Microbes	92.29	-	13.53	-	12.46	-
p-value (p=0.05)		0.4281		0.0744		0.9869	
LSD (p = 0.05)		N/A		N/A		N/A	

2016 HARVEST – 2ND RATOON

Treatment		tc/ha		CCS		ts/ha	
1	100% 6ES – 127 kg N/ha	101.45	-	11.81	-	11.95	-
2	80% 6ES – 101 kg N/ha	74.27	-	12.29	-	9.12	-
3	40% 6ES – 54 kg N/ha + Microbes	89.42	-	12.45	-	11.13	-
p-value		0.1838		0.2373		0.2272	
LSD (p = 0.05)		N/A		N/A		N/A	



2017 HARVEST – 3RD RATOON

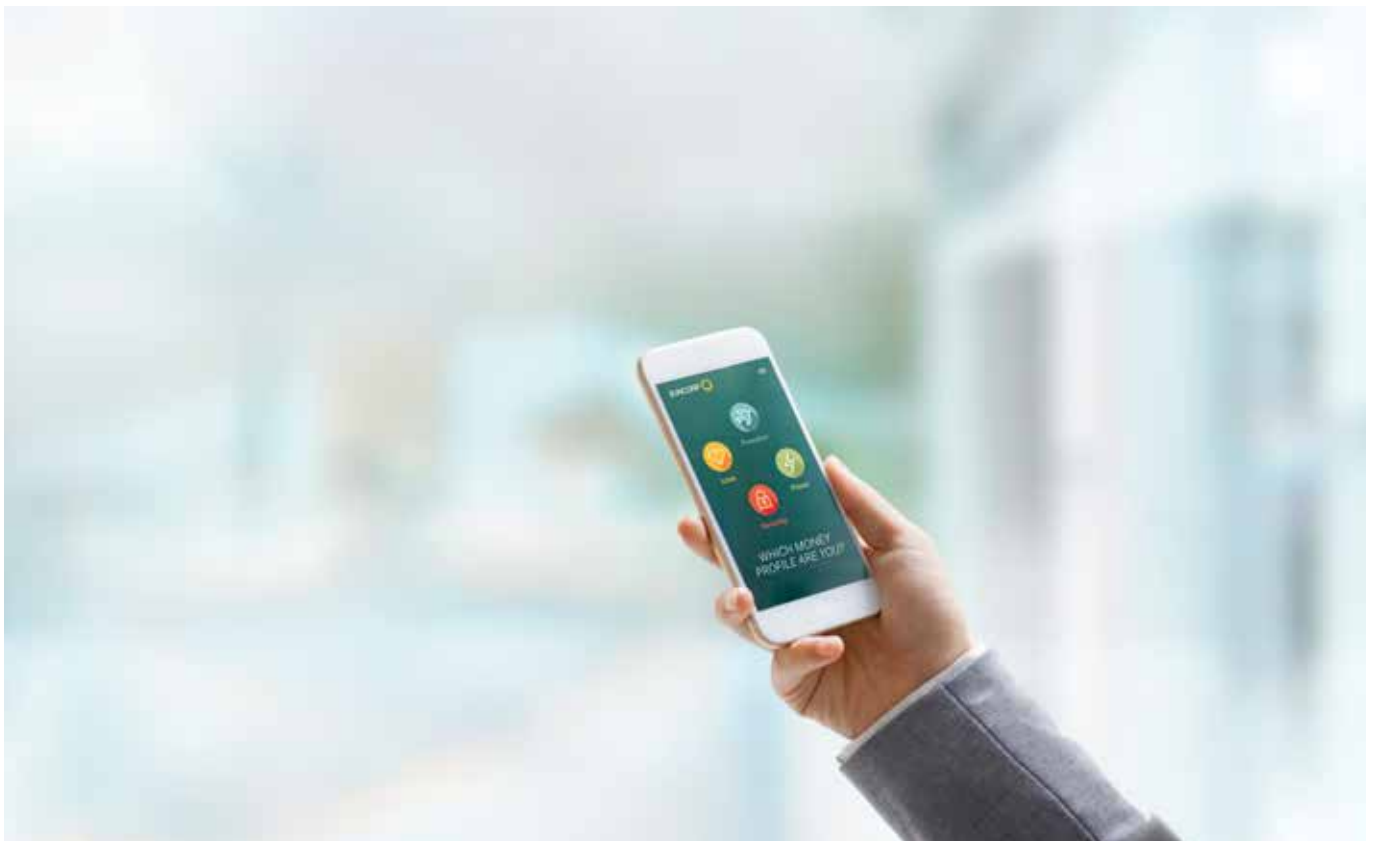
Treatment		tc/ha		CCS		ts/ha	
1	100% 6ES – 127 kg N/ha	69.64	-	13.47	-	9.37	a
2	80% 6ES – 101 kg N/ha	62.02	-	13.79	-	8.55	b
3	40% 6ES – 54 kg N/ha + Microbes	63.59	-	13.60	-	8.65	b
p-value		0.0623		0.4397		0.0292	
LSD (p = 0.05)		N/A		N/A		0.568	

2015 -2017 HARVEST SUMMARY

Treatment		tc/ha		CCS		ts/ha	
1	100% 6ES – 127 kg N/ha	89.76	-	12.66	-	11.27	-
2	80% 6ES – 101 kg N/ha	77.58	-	13.03	-	10.06	-
3	40% 6ES – 54 kg N/ha + Microbes	81.77	-	13.19	-	10.75	-
p-value		0.3151		0.3141		0.4211	
LSD (p = 0.05)		N/A		N/A		N/A	



Suncorp has a long and proud history supporting the agricultural sector and we're once again delighted to be part of Project Catalyst and 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. And talking about them can be even more of a challenge.

It's been proven that money is one of our biggest controversial taboos, which is difficult to understand given it's one of the biggest things we all have in common.

Research in recent years has shown that money is the number one cause of anxiety among Australians. In fact, anxiety over our financial security ranks higher than the worries we have about our safety. We're actually less scared of being hurt, than financially struggling, so it's no wonder Australian's find it difficult to talk about money.

We know starting a conversation about your financial situation, your goals and dreams isn't easy, but it's something that's worth having. To help kick things off, Suncorp has launched a quick and easy survey that will help you identify your Money Profile, and give you some insight into your relationship with money so you can get a better understanding of your financial behaviour. Find it at <https://moneyprofile.suncorp.com.au>

This can not only help your business, but also your relationships, and it only takes a few minutes of your time.

Since its beginnings in 1902 as the Queensland Agriculture Bank, Suncorp has been an integral part of the Queensland banking landscape. Today, Suncorp Bank is one of Australia's leading banks serving one million personal, small to medium enterprise (SME) and agribusiness customers nationally.

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

David Hardin
Burdekin District
0407 579 831

John Deguara
Mackay District
0407 762 655

Rod Greenland
Wet Tropics District
0409 840 094

Growers have long been calling for on farm water quality monitoring so they can see exactly what's running off their farm. For growers in the Johnstone and Tully catchments in the Wet Tropics, this is one step closer to becoming a reality.



ONE STEP CLOSER TO ON FARM MONITORING

The Wet Tropics Major Integrated Project (MIP) is the first of its kind – a reef water quality program funded by the Queensland Government but entirely designed by the local community. There is a lot riding on the success of this \$15 million project, and it's a positive step that the government has entrusted industry and communities to deliver solutions that draw on local knowledge and expertise and are tailored to suit farmer circumstances.

The MIP was designed during the first half of 2017 through a number of workshops with farmers, community members and a wide range of technical experts, researchers and investors.

The MIP is overseen by a Project Panel including representatives from the sugar and banana industries, local government, research, community and traditional owners

The Johnstone and Tully catchments are identified as hotspots because of their intensive agriculture industries and high nutrient loss potential. By concentrating efforts using a

localised approach, the MIP aims to achieve greater water quality improvements while ensuring productive and profitable local communities.

More than 500 ideas were generated by the community, ranging from known solutions to things that are new and untested. These ideas were consolidated and turned into a plan that the project team is now busy putting into action. The exciting thing about the MIP is that it has the potential to be replicated in other reef catchments.

A recurring theme throughout the MIP workshops, and also in many shed meetings over the years, has been the need for “hands on” localised and farm scale water quality monitoring. “Show me the problem at my farm and I will work hard to fix it” is a common local reaction, particularly for pollutants such as dissolved inorganic nitrogen.

The MIP is an opportunity to finally implement local scale monitoring with farmers that will provide localised data in a timeframe that farmers can act upon.

SO WHAT EXACTLY ARE THEY DOING?

Water quality monitoring is not a cheap exercise, but the MIP is investing nearly \$3 million in local scale monitoring.

The MIP team is working closely with cluster groups of farmers to make sure data will be rapid, timely, targeted and useful.

The draft monitoring program is being finalised with implementation due to begin from March onwards. Once the equipment has been installed, training and support will be provided to farmers so they can operate, interpret and utilise the results themselves to inform their own decision-making.

For more information about Project Catalyst and to find out what other opportunities are available for cane farmers in the Wet Tropics go to www.terrain.org.au



OVERVIEW

Farm area

Approximately 530 ha of cane across multiple farms

Region

Spread geographically from Bilyana to El Arish

Number of years farming

More than 30 years - third generation cane farmer

“The new farm at Bilyana is low in potassium and has some poor soil structure and I am hoping that the mill mud can improve the soil.”





SAM DI MAURO

Mill mud trialled

Since 2014 Sam Di Mauro has been trialling mill mud application at various rates to improve soil and reduce fertiliser.

Sam Di Mauro is a third-generation cane farmer, who has been farming for more than 30 years. The farming enterprise started as a small farm at El Arish and is now a large enterprise which includes a harvesting contract and approximately 530 Ha of cane spread across multiple farms geographically from Bilyana to El Arish. Sam's two sons, Jason and Matthew are now involved in the harvesting and farming operations.

In 2014, Sam trialled using mill mud banded at 100 t/ha on the last ratoon crop as an alternative to synthetic fertilizer, and then in 2015/16, he trialled just reducing the rates of synthetic fertilizers, because mill mud was not available due to the late harvest timing of the crop. Then in 2016 he trialled the use of mill mud again with and without a low rate of fertilizer. The results of all of these trials showed that there was no loss of yield even with a 45% reduction in fertilizer. The mill mud treatment in the trial in 2014, showed a slight yield loss, however, this was most likely because of the very dry season that we experienced, and the mill mud took a long time to become incorporated into the soil.

The idea behind these trials was to better utilize the mill mud. Quote from Sam "The new farm at Bilyana is low in potassium and has some poor soil structure and I am hoping that the mill mud can improve the soil." Mill mud provides a lot of soil health benefits and is packed full of nutrients, however the amount of nutrient available within the mill mud can be quite

variable, and it can be difficult to accurately make deduction for the mill mud that is being applied. So the thought behind this is that traditionally mill mud is applied to the fallow, so instead of applying it then, lets apply it to the last ratoon where it will have time to breakdown, and the crop can utilize some of the nutrients in it, and reduce the application of synthetic fertilizer. The soil tests are then taken after the harvest of the last ratoon crop, as it is going into fallow which allows a more accurate recommendation to be made for ameliorants and nutrients for the plant and subsequent ratoon crops.

In the 2016/17 trial, the use of mill mud at 100 t/ha and mill mud @ 100t/ha plus 35% fertilizer rate both showed equivalent yield to the standard rate of fertilizer. We expect that the large rainfall event in January, soon after the application of the mill mud and fertilizer, allowed the mill mud to be broken down and become available sooner than it did in 2014, and as such the mill mud alone was sufficient.

From these trials, Sam has become confident to reduce the amount of fertilizer used in the last ratoon crop. He is still refining the use of Mill mud as an alternative, but from these trials, if rainfall is expected, mill mud banded at 100 t/ha will provide enough nutrition, but if there is a long dry period post the application of the mill mud, a low rate of synthetic fertilizer is required just to give the crop a small kick along, until the nutrients in the mill mud is available.



2017 HARVEST

Treatment		tc/ha		CCS		ts/ha	
1	Liquaforce Fert (14:1:9:1) @ 1000 L/Ha	51.11	-	9.39	-	4.84	-
2	Liquaforce Fert (14:1:9:1) @ 350 L/Ha + Mill Mud @ 100 t/ha	66.23	-	9.09	-	5.98	-
3	Mill Mud @ 100 t/ha	70.49	-	8.65	-	6.10	-
p-value (p=0.05)		0.2179		0.2994		0.4652	
LSD (p = 0.05)		N/A		N/A		N/A	

2015 HARVEST

Treatment		tc/ha		CCS		ts/ha	
1	Liquaforce NKSHiK (16.6:0:9:1) @ 1100 L/Ha	105.52	-	9.99	ab	10.53	a
2	Liquaforce NKSHiK (16.6:0:9:1) @ 600 L/Ha	100.06	-	10.33	a	10.34	a
3	Mill Mud @ 100 t/ha	95.51	-	9.69	b	9.26	b
p-value (p=0.05)		0.1162		0.0152		0.0325	
LSD (p = 0.05)		N/A		0.363		0.939	



10 years of Project Catalyst

In 2018 we celebrate 10 years of Project Catalyst. From small beginnings in 2009, the project has grown to 132 farmers today, from Sarina in the South to Mossman in the North.



Image: Coral Reef health supports marine life

The project is one of the longest running investments to improve farm practices and the health of the Great Barrier Reef, and as a founding partner, WWF is proud to see Project Catalyst go from strength to strength. Together, we're showcasing that more efficient farming practices and environmental benefits such as improved water quality can be the same side of the coin; they are complementary, not conflicting outcomes.

A key message WWF has received from growers over the last few years is a desire for greater recognition for their achievements. So, WWF is thrilled that our partner Coea-Cola is moving ahead in Australia with its commitment to be 100% sustainable sugar supply by 2020, and over the coming year the project seeks to support Project Catalyst growers to become accredited in sustainable sugar.

Farming can be a tough business. Many of the growers in the Mackay Whitsunday suffered substantial crop and infrastructure losses from Cyclone Debbie. It's only after visiting the affected area can you gain a full appreciation of the level of damage and the daunting task of recovery facing the local communities. The Project Catalyst growers have shown extraordinary tenacity and resilience in the face of adversity as they recover from the devastating impacts of the cyclone.

WWF would like to thank our partners for their commitment and contribution to the project, to the team at Catchment Solutions and the extension staff who play such an important role in the delivery of the project; and most importantly, the growers who's willingness to try new things is such a great model for the industry. We'd also like to welcome the growers who have joined the project over the last year and hope that you find your involvement in the project rewarding and enriching.

The year ahead will be an exciting one and WWF looks forward to working with our partners, project team and growers through 2018.

A key message WWF has received from growers over the last few years is a desire for greater recognition for their achievements.



Based in Ayr Nth Qld with another 9 offices spread throughout 5 states of Australia, VANTAGE (formerly BMS Lasersat) has 35 years of experience integrating innovative technology into Australian Agriculture



Vantage has always centred on improving outcomes for farmers, initially with Spectra Lasers, we designed and manufactured Laser Scrapers in order to utilise Laser technology to grade paddocks, and were pioneers in water management in Australia.

As a cane farmer, I encountered this 20 years ago.

So, when I was looking for something to do post farming I accepted the opportunity to work with farmers, improving their knowledge of the soil that they farm. A personal passion of mine, using this new technology we have been able to provide farmers with more detailed information, which translates to a better understanding of what is driving productivity, profitability and sustainability.

TRIMBLE, (who specialize in GPS machine Guidance, GPS Field levelling solutions, Sprayer control, SiS soil data collection, unmanned aerial vehicles and a variety of software processing tools) acquired Spectra (2000) and the range of technology has evolved to the point where we provide solutions for the many complex operations for today's modern agricultural enterprise.

Importantly as technology evolves, so must the experience and expertise of the people who use it, Vantage staff pride themselves on providing training and support to customers. With complete solutions from Satellite Imagery, to the most advanced Soil Information currently available.

Moving forward in the digital age we incorporate Trimble Ag Software to collate, process and record all aspects of modern agriculture. It has the flexibility to communicate with other brands of equipment and pull in data from multiple operating systems on the one platform. Knowing how to decipher and maximise the value from all the data, we include our clients in the precision Ag journey.

Having been a farmer, I understand all the contradictions that farming brings and therefore approach the technology from a farmer's perspective.

The entire Vantage team knows what it takes to make technology work for you, to provide solutions. Our people have been Farmers, Earthmoving Contractors, Diesel Fitters, Tractor Mechanics and our highly trained specialist technicians have worked extensively in agriculture.

How we have helped improve management, is evident in the many farms delivering increased productivity through innovation.

The best example is an innovative farmer in Giru who wanted to have a better understanding of what was going on in his soil; we conducted a SiS survey of one of his paddocks. What we found were areas that were suffering from high exchangeable sodium causing the biggest impediments (sodicity). Using the data collected, we were able to come up with a variable rate Gypsum prescription based on several layers

of data. The outcome of this was to reduce overall inputs by only treating areas with what was required, saving him time and money. We were also able to look at micro-nutrient levels across zones, for his agronomist to provide recommendations on.

He then wanted to know where to place soil moisture probes to best represent the different zones in his paddock; we once again went through the several SiS layers that pertained to water holding capacity, to come up with location within zones that we marked in GIS software in the office. Armed with an RTK GPS and hand-held tablet we went into the paddock to mark and install probes.

WHAT'S THE OUTCOME OF ALL THIS DATA AND NEW TECHNOLOGY?

When I asked the farmer, he said that he now has confidence in where and why he is doing things in his paddocks. He also recorded the most consistent yield and quality that this paddock has ever produced. This outcome is a combination of technology, data, a considered practical approach from the farmer an advisor that has 30 years of farming experience, irrigation specialists, agronomists, a collaboration with the one goal to produce workable, actionable results.

⋮ **Bryan Granshaw**
 ⋮ **Precision Ag Agronomist**
 ⋮ **SIS Specialist - Vantage**
 ⋮

Regional business can help farms finances



Too many farms are run as a family necessity rather than as a business. In a world of increasing costs, regulations and uncertain markets, it's no longer enough.

At The Investment Collective, you'll find practical, experienced people who will help you with; management plans, financial and business modelling, cash flow analysis, budgeting, maintenance scheduling and short term crop lending.

We're not accountants, we have a business consulting and bookkeeping team dedicated to helping your business thrive. Our aim is to immerse ourselves in your world, so that our work reflects your reality. We are focussed on helping you get results.

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

Solar energy is one of the cleanest, most sustainable and most renewable energy sources in the world – but did you know it can be cheaper than alternative energy sources? So why don't more people utilise solar energy? At CDIF Solar, we know that the upfront costs of a solar installation stop business from using solar and we want to help.

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. In 2017, CDIF Solar supplied approximately 15% of Suncorp House's energy consumption.

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, Tropical Pines supplies approximately half the fresh pineapples in Australia. The CDIF Solar installation supplies approximately 40% of Tropical Pines energy consumption.

Both CDIF Solar and The Investment Collective are committed to helping your business.



Over the past year cane specific work has included Reef Trust III and the National Landcare Program trials being managed by Farmacist.

Reef Catchments is a proud and long-term supporter and facilitator of agricultural innovation in the Mackay Whitsunday and Isaac (MWT) region. As the area's leading NRM (Natural Resource Management) group, Reef Catchments founded Project Catalyst nine years ago. Since then we have continued to work with farmers on multiple fronts to grow our knowledge and improve practices in sustainable sugarcane production.

Over the past year cane specific work has included Reef Trust III and the National Landcare Program trials being managed by Farmacist.

Reef Trust III has brought 175 growers into the program since July 2016, offering agronomic advice through our partners MAPS, Plane Creek Productivity Services, Soil and Land Surveys Pty Ltd as well as Farmacist. Growers are benchmarked in the Paddock to Reef Management Questions, giving them the opportunity to identify ways to move towards best practice and beyond industry standard in nutrient and herbicide management. The program also offers growers \$1,500 to purchase equipment and services to carry out these practices and the option to apply for a grant up to \$15,000. We are working closely with our farmers and are looking forward to sharing the findings through case studies, website and social media channels.

GET IN TOUCH

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Some interesting insights are emerging in the trial sites under a National Landcare Program (NLP) that aims to increase sustainable cane production. A good example is Werner Farming who began their trial with the Queensland Government Department of Agriculture and Fisheries three years ago. This NLP program has allowed them to continue their trial, with Farmacist undertaking field work, sampling and harvest data collection. The initial findings from this site are promising, showing improved nitrogen use efficiency in the cane crop where lime has been applied.

The trial was established in a highly acidic fallow field (average pH 4.6) with sugarcane planted the following year. The aim of the trial is to quantify the benefit of liming acidic soils in terms of nitrogen mineralisation and crop yield benefit, with the end goal of reducing nitrogen runoff

into local aquatic systems. Soil microbes that transform nitrogen into a plant available form, are sensitive to acidic conditions. The addition of lime raises soil pH, which increase soil microbe's nitrogen conversions, leading to more nutrients for the plant.

Four treatments were applied in the trial and each treatment was replicated 3 times.

- 115N rate + 5 tonne/ha lime (control + growers standard practice)
- 30N rate + 5 tonne/ha lime
- 115N rate + nil lime
- 30N rate + nil lime

Over the three years of this trial, crop yields from the reduced nitrogen treatments have been equal to the higher nitrogen treatments. One of the most promising results to come out of the latest harvest results was a 30kg/ha nitrogen application with lime. This produced 2.3 t/ha more than a 115kg/ha nitrogen application that had no lime applied. The 85 kg/ha nitrogen reduction, equates to \$138/ha in savings.

From these findings, it is suggested that if a grower applies lime, they could consider reducing their nitrogen rate application.





Innovation in farming practices and advances in technology are essential to help improve yield, reduce costs and improve environmental sustainability for the Australian Sugar Industry.



Innovation in farming practices and advances in technology are essential to help improve yield, reduce costs and improve environmental sustainability for the Australian Sugar Industry. However, these do not come easily and require nurturing and support to help growers achieve these goals. Now celebrating the 10th year of Project Catalyst it cannot be underestimated the wonderful contribution the project has made in providing growers with the necessary investment, encouragement and support to help foster their ideas and skills in developing innovative practices that has contributed greatly in improving water quality outcomes for the GBR.

As the largest privately owned agronomic service provider in the Australian Sugar industry, Farmacist is a proud supporter of Project Catalyst. We have been involved with Project Catalyst since its inception providing agronomic support, R&D and project data to the participating growers. We have taken great pride in helping this

project expand from just a few dedicated growers in the Mackay-Whitsunday region just 10 years ago to now having a large family of growers with a wide-ranging set of skills from multiple regions.

As an employer of many recently graduated agronomists, the exposure that our staff have to the many innovative and likeminded growers and other service providers within Project Catalyst has been invaluable to their learning experiences.

Farmacist has been involved in numerous Project Catalyst activities that have achieved valuable outcomes for the industry, both economically and environmentally. Many of these activities have been the springboard to the widespread adoption of innovative new farming techniques into the wider industry growing community. One such advancement that Farmacist and Catalyst growers have been at the forefront of has been development of soil mapping techniques and the use of site specific soil analysis to better plan

for improved farm management including the adoption of variable rate technologies.

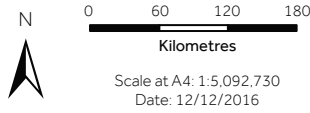
However, a far greater legacy of the project has been a greater appreciation of the impact that some farming practices have on the environment, particularly on water entering the Great Barrier Reef. And while the project has been an invaluable learning experience for all involved there is also an appreciation that there are more challenges ahead but with continued support from Project Catalyst and the funding providers and with greater grower involvement, these challenges can be met.

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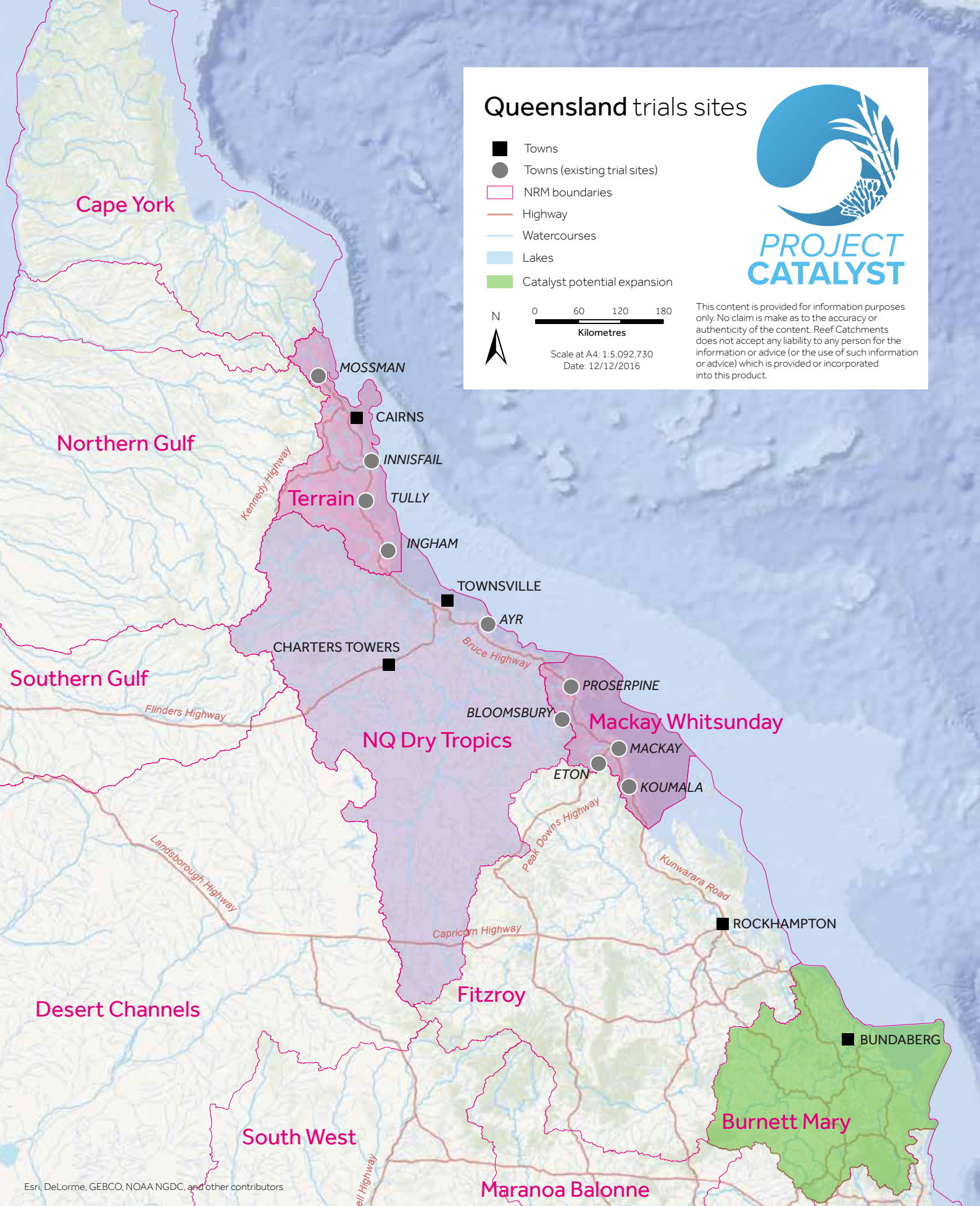
Queensland trials sites



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



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