

PROJECT CATALYST

PROJECT CATALYST 2021 – **ADOPTING A DECADE OF INNOVATION - SECURING OUR FARMING FUTURE**



REEF HEALTH

“Never doubt that a small group of concerned people can change the world”
Dr Adam Smith

AGRIBOTICS

Reducing herbicide rates with precise robotic weed control

MIXING IT UP

Adopting mixed species fallow to address soil profile and water quality



Image: Project Coordinator Ross Neivandt and General Manager Andrew Campbell

CATALYST COLLABORATION

It's great to be back in Townsville for the 2021 Project Catalyst Annual Forum and we're excited to bring you this wonderful event. You'll notice this year's Forum looks a little different as we present a program that fits with COVID restrictions and provides a mixture of live presentations, digital participation and field visits.

Despite the restrictions we've endured over the last 12 months, Project Catalyst continues to promote innovation and practice change adoption in the Queensland sugar industry, producing great outcomes for our growers and the environment.

With the introduction of the Great Barrier Reef Foundation's (GBRF's) Early Investment project funding in 2019 for new trials, continuing trials and broader adoption, Project Catalyst evolved in both grower numbers and the area of farmland included in the program. The Coca Cola Foundation's 2020 support allowed further expansion of broader adoption and practice change activities in the Burdekin and Wet Tropics, whilst new GBRF Water Quality funding for the Mackay/Plane Creek and Lower Herbert districts, extended the practice change adoption program. Combined, there are 155 growers and 41,000ha of farmland currently working with the Project Catalyst team. A further 24 growers will join the program in coming months.

Over the last 12 months Project Catalyst now includes:

- 44 innovation trials
- 65 Broader Adoption Validation activities
- 46 Growers receiving ongoing On-Ground Service Provider support to continue the practice adoption and innovation pathways.
- 4 new Mackay/Plane Creek Practice Change Adoption activities commenced (10 more in planning for 2021)
- Planning for 14 Lower Herbert Practice Change Adoption activities
- 11 Economic Analysis Case Studies with 10 more in progress

In addition, we conducted a digital communications survey, which will help us make sure growers receive information in the most effective way.

77 growers participated in this survey and we thank them for their time, ideas and comments.

Despite the challenges of holding events this past year we were still able to make the most of our opportunities. Project Catalyst and HCPSL supported the Savannah Ag Research Spring Field Day near Mareeba that was attended by more than 120 people.

In a first for Project Catalyst, I was invited to present at the Australia Water Association's Queensland State conference on the Sunshine Coast attended by 219 delegates. HCPSL also ran a Project Catalyst, Variable Rate Amendments and Micro-Nutrients information evening, which proved very popular for Herbert region growers.

As we continue to focus on innovation and adopting practice change for improved production, cost reduction and water quality improvement, 2021 is looking very positive thanks to our long-term funding partners, The Coca-Cola Foundation and the Great Barrier Reef Foundation.

As Project Catalyst continues to promote the immense value of grower led innovation and seeks out funding where available, the project must also take a lead in promoting the wider adoption of practice change for future sustainable farming. Project Catalyst growers, maybe better than most, understand that innovation underpins all future practice change work and industry sustainability. With our passion and commitment, Project Catalyst will continue to lead the push for continued innovation development and funding.

So please take this opportunity to catch up with your Project Catalyst friends, and warmly welcome our new growers. For those of you attending for the first time, please make the most of the opportunity to see what other growers are up to, discuss ideas and share your stories. We hope you find the presentations and activities interesting and informative.

As always, let us know what you think so we can continue to provide you with information and opportunities that interest you.

Ross Neivandt
Project Coordinator, Catchment Solutions



FEATURE



WWF

Future funding



SPEAKERS

Courage, collaboration and vision



GBRF

Supporting change financially



BURDEKIN

Growers driving innovation



Great Barrier Reef Foundation



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PROJECT CATALYST

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FORUM/CONFERENCE PROGRAM

SUNDAY, FEBRUARY 21ST

WELCOME FUNCTION

Thanks to Wilmar BioEthanol and Suncorp
The Pavilion - The Ville Resort & Casino, Townsville

17:00 – 19:30	Delegates Check-in (Collect name tag) - Join us for drinks and canapes
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MONDAY, FEBRUARY 22ND

GROWER FORUM/CONFERENCE

The Pavilion - The Ville Resort & Casino, Townsville

07:30 – 08:00	Delegates Check-in (Collect name tag)
08:00 – 08:10	Housekeeping and Introductions
08:10 – 08:15	Welcome to Country
08:15 – 08:30	Virtual Farm Tour - Advancing Innovation Video presentation
08:30 – 08:45	Great Barrier Reef Foundation - Robert Speed
08:45 – 09:25	Keynote Speaker - Dr Adam Smith, Reef Ecologic
09:25 – 09:40	Virtual Farm Tour - Broader Adoption Video presentation

09:40 – 10:20 MORNING TEA

Thanks to ALS Global

10:20 – 11:20	Trial Presentations Session 1 – 2 groups of 3x20min presentations each
11:20 – 11:30	Break for Presenters change rooms
11:30 – 12:30	Trial Presentations Session 2 – 2 groups of 3x20min presentations each

12:30 – 13:40 LUNCH

Thanks to North Qld Bulk Ports

13:40 – 14:40	<p>Breakout Session 1 Supported by Qld Dept of Environment and Science</p> <p>Group 1: Broader Adoption presentations from: <i>Farmacist – Modifying Machinery for Multi Crop Species Planting project</i> <i>Tony Matchett – Fallow Cropping</i></p> <p>Group 2: Advancing Innovation presentations from: <i>DAF – Weighing up the pros and cons of farming changes with FEAT Online</i> <i>Sara Bennett – a Local Area Nutrient Datahub (LAND) project</i> <i>JCU – Mostafa Rahimi Azghadi – Precise Robotic Weed Control</i></p>
14:40 – 15:40	<p>Breakout Session 2 Supported by Qld Dept of Environment and Science</p> <p>Group 1: Advancing Innovation presentations from: <i>DAF – Weighing up the pros and cons of farming changes with FEAT Online</i> <i>Sara Bennett – a Local Area Nutrient Datahub (LAND) project</i> <i>JCU – Mostafa Rahimi Azghadi – Precise Robotic Weed Control</i></p> <p>Group 2: Broader Adoption presentations from: <i>Farmacist – Modifying Machinery for Multi Crop Species Planting project</i> <i>Tony Matchett – Fallow Cropping</i></p>

15:40 – 16:10 AFTERNOON TEA

Thanks to Farmacist

16:10 – 16:25	Ross Neivandt, PC Project Officer - 2021 and beyond
16:25 – 16:30	Wrap Day 1 & Preview Day 2 – CLOSE
16:30 – 16:45	Group photo

FORUM DINNER

The Pavilion - The Ville Resort & Casino, Townsville

18:00 – 18:45	Pre-Dinner Drinks
18:45 – 23:00	Formal Dinner - three courses with drinks Guest speaker - Tony Matchett 'Whales and the fallow'

FIELD TRIP / FARM TOUR PROGRAM

TUESDAY, FEBRUARY 23RD

FIELD TRIPS Thanks to GBRF/HCPSTL/Farmacist/NQDT

OPTION 1

Burdekin – Ayr DPI Farm Tour

07:30 – 08:00	Registration check-in
08:00 – 09:45	Board buses/cars - travel to Ayr

09:45 – 10:15 MORNING TEA

10:15 – 12:30	Group Tour of Ayr DPI : Legume break crops for soil health - Six varieties of Soybean in the field
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12:30 – 13:30 LUNCH

13:30 – 15:15	Travel home/buses return to Townsville
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OPTION 2

AIMS – The Australian Institute of Marine Science

08:00 – 08:20	Registration check-in (Groups allocated 1 & 2)
08:20 – 09:00	Board buses/cars - travel to AIMS (South of Townsville)
09:00 – 09:10	Arrange into groups & Briefing
09:10 – 12:10	Group Tour of AIMS

12:10 – 13:30 LUNCH

13:30 – 15:00	Travel home/buses return to Townsville
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OPTION 3

Ingham 2 x Farm Tour

07:30 – 08:00	Registration check-in
08:00 – 10:00	Board buses/cars - travel to location

10:00 – 10:30 MORNING TEA

10:30 – 12:00	Group Tour of Location 1 – Hayden & Lawrence Di Bella : Mixed fallow legumes and rotational crops for soil health.
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12:00 – 13:00 LUNCH and travel to site 2

13:00 – 14:30	Group Tour of Location 2 – Alan Lynn Farm : Lime products - improving cane yield and soil health by focusing on pH levels & aluminium saturation
14:30 – 16:30	Travel home/buses return to Townsville





Innovative Practices



What a year it's been since Forum 2020 with lockdowns, travel restrictions and considerable economic stress to many businesses and families. I very much hope that you and your family have remained safe during the year.

The last 12 months have been busy for the project, notwithstanding the challenges that COVID lockdowns and travel restrictions have imposed. I'd like to start by welcoming the growers new to the project who have signed up for the broader adoption validation program; I hope you have a long and rewarding involvement with the project.

We now have about 150 growers participating in the project farming over 41,000 ha across the Mackay-Whitsundays, Burdekin and the Wet Tropics. Some of you are involved in innovation trials, some with broader adoption validation and practice change adoption, whilst others are the subject of case studies showcasing practice

change or the economic analysis from trials results.

There is a diverse list of best practices being supported in the broader adoption validation program, including precision nutrient management, legume fallow, and zonal & zero tillage to name a few. This initiative is vitally important as the stepping-stone from innovation to farm-wide adoption of best practices as well as helping to reinforce that many practices that improve farm efficiency are also best practice for water quality improvement.

This work is being recognised with funding secured this year from the Great Barrier Reef Foundation for the Mackay-Whitsundays and the Lower Herbert regions. I'm also pleased to report that I've just heard that our application for funding from the Coca-Cola Foundation for 2021 has been successful. I'd like to thank both

foundations for their ongoing support for the project.

Over the last year we have cut back on the number of innovation trials and are focusing on those themes that are showing the most promise. Funding for innovation is increasingly challenging to secure with an understandable emphasis from donors to fund the uptake of proven practices. It does mean that we need to find other models and approaches for funding our innovation work moving forward.

I encourage you to check out the project results, fact sheets and grower stories on the website: <https://www.projectcatalyst.net.au/project/>

I look forward to catching up with you at the Forum.

⋮ **Andrew Rouse**
⋮ **WWF Senior Manager Food Security**
⋮ **E arouse@wwf.org.au**



Dr Scott Crawford
NQ Dry Tropics CEO

Welcome

to the Burdekin region

NQ Dry Tropics is proud to see the Project Catalyst Forum return to the Burdekin region.

More than ever, the focus of NQ Dry Tropics is to support Lower Burdekin farmers, the lifeblood of the region. By supporting them to continue searching for ways to improve farming systems, profitability, lifestyle and the quality of water leaving their farms, we increase their resilience and the legacy of generations to follow in the industry. All primary producers are innovators, none more so than those growing sugar cane.

During the past decade, there has been an enormous increase in innovative farming practices in reef catchments. Farmers have optimised nitrogen application rates; in some cases making reductions of up to 20 per cent. They have improved the efficiency of irrigation systems, transitioned to lower-toxicity herbicides at reduced rates and focused on enhancing soil health. Project Catalyst has helped farmers to meet new challenges such as the regulations surrounding reef water quality, rising input costs and uncertain returns for their crop.

Having to compete in a global market and continue to meet community expectations that they will always seek to implement best practices with proper regard for the environment, has also driven the pace of technological advances in the industry. Against this backdrop of rapid change, extension officers and industry support groups have a critical role to play in ensuring they can navigate practical pathways for farmers to adopt new technology and new practices. This rapid adoption of innovative farming practices is testament to farmers' open-mindedness, adaptability and commitment to leaving their farm and the environment in a better condition than it was when they picked up the reins. We need to collaborate and work together at all levels. This gathering, our annual forum, is a celebration of that ongoing collaboration.

Project Catalyst is an opportunity to share, develop and promote mutually-beneficial goals to turn farming innovations into standard practice, and secure the future for farming through profitable, environmentally-sustainable and resilient businesses for future generations.

SPEAKER PROFILES



Dr Robert Speed

Great Barrier Reef Foundation

In 2018 the Australian Government announced an unprecedented investment in reef protection.

Creating a \$443.3m partnership with the Great Barrier Reef Foundation, to help fund new and existing projects that protect and restore the Reef into the future.

Climate change is the greatest threat to coral reefs. But the science is clear: coral reefs need action both at the local and global level. Improving water quality is a critical and practical local pathway to improve Reef health.

The Reef Trust Partnership includes \$201 million to contribute to efforts (like Project Catalyst initiatives) aimed at addressing water quality issues.

Robert Speed is the Director of Water Quality for the Great Barrier Reef Foundation. With qualifications in science and law in science, Robert has 20 years' experience in water planning, policy and management. "I've managed various international projects in China, South America, Europe, and across Asia, undertaking roles for the World Bank, the OECD, UNESCO, and the Australian Government."

Having an understanding of life on the land, is equally valuable when advising governments and implementing projects. "Growing up on an irrigation farm on the Darling Downs, my connection to the land and people led to working extensively with the Queensland agricultural sector, including leading on behalf of irrigators, the review and transition to local management of four of Queensland's channel irrigation schemes."

The presentation will summarise the types of activities and that are being funded to cost-effectively achieve target pollution load reductions in priority catchments, with a particular focus on a suite of innovative projects developing new technologies and approaches to reducing pollutant loads, increasing financing opportunities for water quality improvement, and supporting better data management.



Dr Adam Smith

Managing Director - Reef Ecologic Collaborating, Researching, Restoring

Adam Smith is a free-diver spear-fisher, scientist and leader who has a lifelong commitment to the marine environment and a vision to make a positive difference, for current and future generations. This quote sums up his passion,

"My personal and organisational values are people first, leadership, environmental responsibility, excellence and passion. Collaboration, ethical and quality science, all of which relate strongly to Project Catalyst. I want to make a positive difference and be a change maker for healthier oceans, reefs and communities."

Adam is Managing Director of Reef Ecologic and Adjunct Associate Professor with James Cook University. With almost 30 years' experience he has initiated, collaborated and delivered many innovative and important ecological and social projects involving tourism, fisheries, ports, Defence and research in the Great Barrier Reef, Pacific and the world.

"Shared knowledge and inspiring stories help to focus my vision, passion and courage to tackle new challenges, collaborating with and empowering communities."

A 'people person' he is recognised for empowering teams and delivering excellent outcomes. Highly educated and attaining a BSc (Hons), PhD and MBA, Adam has authored over 50 Scientific papers and books. "Leadership is about inspiring and empowering people with a vision for the future. Our natural environment health, is declining and we need leadership to challenge the status quo and inspire change."

An informative presentation blending science, culture, art and industry, will showcase the link between people, innovation, best practice, leadership and the reef. Incorporating pre-survey feedback from the audience – Adam is keen to take you with him.

"I recognise and applaud that Project Catalyst is a pioneering partnership, Reef Ecologic has similar goals for partnership, best practices and improved health of the GBR. Never doubt that a small group of concerned people can change the world."



Tony Matchett

Managing Director - Savannah Ag Research Pty Ltd

Dinner Speaker

"The influence of whales on our cane fallow"

Working collaboratively with growers, universities and industry partners, Tony Matchett operates as an independent consultant to assist with Research & Development projects for companies looking to investigate agricultural programs in the north. This includes work on seed and variety selection and development, cropping systems and rotational crop choices and best management practice development. With 25 years experience across farming, agronomy, research, breeding, marketing and agribusiness development, he has a good understanding of growing conditions and crop suitability.

"Projects also involve considering the adaptation of cropping systems in new or diverse environments, from the wet tropics, lower cape, tablelands and gulf regions, right through to western Queensland where we support the Cloncurry shires Biofuels project."

Completing a science degree in agriculture only strengthens Tony's agronomic background. Passionate about and supporting agribusiness growth in northern Queensland to enhance sustainable food production for domestic and international markets, makes him highly sought after.

"Industry sectors that we are currently working with include rice, sesame, safflower, guar, Asian vegetables, specialty oilseeds for food, industrial and biodiesel purposes and cover crops. Our aim is to develop robust, sustainable and diverse farming systems with enduring profitability."

Whether new, emerging or existing farming systems like cane, Savannah Ag explores crop sequences and rotations that add value to the whole farm.

"These types of projects are what motivate and excite my passion for new technology that can advance agriculture in northern Australia, and Queensland in particular."

Tony will engage and inspire, sharing his knowledge about what an extended fallow period in our cane cycle can deliver as a sustainable practice, exploring the rationale behind the extension, and what this means for soil health, productivity, enduring profitability and the survival of the industry.



Sara Bennett

Director - Dirrawan Consulting Group

Over the past two years Sara Bennett has been working with LiquaForce to design and develop an innovative information platform, for Queensland sugarcane growers. The Local Area Nutrient Datahub or LAND HUB, is designed to increase the information capacity of growers and thereby enhance decision making processes around nutrient application and other farming practices, leading to productivity improvements on-farm, and water quality outcomes off-farm.

Prior to undertaking this role, Sara worked as a Director for Deloitte within the Decision Science & Analytics practice, travelling globally for 17 years, before stepping into Managing Director of a start-up that she co-founded, from 2014 to 2019. Sensing Value Pty Ltd was a strategic analytics firm deeply involved in the 'smart cities' space - designing and delivering data, digital platforms and strategic insights on people, place and movement over time. "Our work included the co-design of Telstra's smart cities strategy and the design and build of two mobility data products using the Telstra network data."

Sara is now managing water quality projects for LiquaForce in the Mackay Whitsunday and the Lower Herbert, funded by the partnership between the Australian Government's Reef Trust and the Great Barrier Reef Foundation and will present an overview of the projects in these regions. Outlining the rationale behind the development of LAND and the importance of unravelling decision-making processes.

"Starting with top-down strategic questions that growers need to answer to drive productivity, to bottom-up consideration of data and information available to answer those questions - this leads us to the "missing-middle" - what is required to leverage the available information to make optimal decisions to drive farm productivity and improve water quality?"

LAND not only produces an optimal Six Easy Steps nutrient management plan for each grower tailored to their region and to specific farm, paddock, and soil lab data inputs, it also provides secure, private, digital storage of all their farm, soil and production data year on year, enabling easy long-term monitoring of crop and financial performance over time.

"The quality and accessibility of the connected data in LAND delivers farmers the information capacity for widespread practice change, which will result in substantial water quality outcomes for the Great Barrier Reef."



Dr Alex Olsen

AutoWeed

Alex Olsen completed his PhD in Electrical & Electronic Engineering at James Cook University in Townsville QLD Australia, where he was born and raised. During his PhD, he applied deep learning and machine vision to improve the accuracy of weed species detection in complex real time environments. His robotic weed control prototype, AutoWeed, was the crowning achievement of his research and presented a new efficient tool for weed management on Australian farms.

Dr Olsen has since formed his own company, AutoWeed Pty Ltd, to commercialise this pioneering research to realise such technological benefits for today's growers. He is passionate about developing machine vision and deep learning solutions for agricultural applications.

Since 2017, Dr Olsen has led three research grants to deliver ground-breaking agricultural research. He also has over five years' experience developing hardware and software solutions for marine, mining, and agricultural applications. Alex is also fostering that passion in the next generation, "During my postgraduate study, I taught programming and embedded systems design at James Cook University to tomorrow's aspiring engineers."

The recipient of several awards including the Academic Medal for Bachelor Coursework in 2014, a Canon Extreme Imaging Award for outstanding student research in 2015, JCU TropEco's Sustainability Award for Research in 2016, a JCU Bev Frangos Graduate Instructor Prize in 2017 and a JCU Sessional Staff Teaching Award in 2018, he is keen to show growers his work.

"Examples of how the system can be retrofitted to available agricultural machinery will be covered along with analytical results for sugarcane. Experimental results from applying the technology to other crops and pasture weeds will illustrate how significant this solution is for reducing herbicide usage when compared to blanket spraying. The presentation will conclude with a demonstration of our AutoWeed detection unit."



Dr Mostafa Rahimi-Azghadi

James Cook University

Mostafa Rahimi Azghadi (S'07-M'14-SM'19) completed his PhD in Electrical & Electronic Engineering at The University of Adelaide, Australia, earning the Doctoral Research Medal, and the 2015 Adelaide University Alumni Medal. He is currently a senior lecturer at the College of Science and Engineering, James Cook University, Australia, where he researches Machine Learning software and hardware design for a variety of applications including automation, precision agriculture, aquaculture, marine sciences, mining, and medical imaging.

Dr. Rahimi Azghadi was the recipient of several accolades including a 2015 South Australia Science Excellence award, a 2016 Endeavour Research Fellowship, a 2017 Queensland Young Tall Poppy Science Award, a 2018 Rising Star ECR Leader Fellowship, a 2019 Fresh Science Queensland finalist, and a 2020 JCU Award for Excellence in Innovation and Change.

Supported by colleague Dr Alex Olsen, the technical presentation provides an overview of the current project developing AutoWeed smart spot-spraying technology for sugarcane farms, as Mostafa explains.

"We will briefly discuss how AutoWeed uses Artificial Intelligence to perform green-on-green detection of weeds in both crop and pasture. We then show how our system can be trained to detect and spray different weeds, saving farmers on herbicide costs and reducing their environmental footprint."





TOWARDS 2030

What a year 2020 has been, certainly not one we're likely to forget in a hurry. We were so fortunate to celebrate the 2020 Forum just prior to national Covid lockdowns and border closures. Here's hoping 2021 throws a few less challenges for everyone and we can enjoy a safe and successful 2021 Forum.

The Coca-Cola Foundation has proudly supported Project Catalyst since 2008. Thirteen years later we have gone on to become one of the longest running corporate philanthropy partners preserving the Great Barrier Reef in Australia.

It's testament to the passion, dedication and commitment from each and every Project Catalyst grower that this program continues to thrive today.

In 2007 our company set an ambitious global goal. It was to return to communities the same amount of water as we use in creating our beverages by 2020. To meet this goal we needed to develop community-based partnerships that would support water conservation. In Australia we recognised that need was preserving the pristine and iconic waters of the Great Barrier Reef.

We're proud to have achieved that goal five years ahead of time. And as 2020 draws to a close, we now look to 2030, with a renewed set of ambitious goals and targets.

In many ways Project Catalyst has been ahead of its time when it comes to Coca-Cola's global environmental strategy. While water replenishment continues to be front and centre of our sustainability commitments, the challenges around climate change will play an increasingly significant role in our continued

focus on the Great Barrier Reef. Project Catalyst is well-placed to support these goals, under our water, climate and sustainable agriculture strategies.

It's fantastic to see over 150 growers now participating in the project and we welcome all the new growers to the project who have signed up for the broader adoption validation program.

While innovation trials remain the heart and soul of Project Catalyst, we are excited for the opportunities to grow the learnings and broader adoption of best practices in 2021 through Coca-Cola Foundation funding.

We look forward to more great outcomes ahead in 2021 and beyond, and thank Andrew Rouse, Andrew Campbell and Ross Neivandt for their continued leadership and commitment to making this project the success it is. Have a great Forum and we hope to see you soon, Queensland borders permitting!



RACECOURSE PROJECTS

Dynamic nutrient planning - right place, right time

BACKGROUND

When it comes to altering fertiliser rates on sugarcane crops, there is no exact decision-making formula, however a team at CSIRO has developed an app called 1622WhatIf?™, which “allows farmers to evaluate the risks and benefits of changing nitrogen fertiliser applications. For example, ‘what if I change my fertiliser rate, harvest date and/or fertilising date and how would that affect my crop yields and nitrogen losses?’ This Catalyst project will utilise this CSIRO 1622WhatIf?™, tool to model crop nitrogen fertiliser requirements for a large sugarcane field at Dawlish.

Soil cores, field productivity history, irrigation practices and soil type were collected and provided as inputs to the 1622WhatIf?™ model. Based on the outputs of the model, a replicated field trial was established where nitrogen fertiliser inputs are varied yearly according to model predicted requirements.

Crop nitrogen uptake, crop yield and sugar content were collected in 2020 from four baseline nitrogen rates. Based on this crop performance data, model runs were refined, and new targeted treatments were applied.

Catchment Solutions has been collecting water samples from each treatment during

the 2019/2020 wet season, they will continue collecting water samples to measure potential nutrient run off for the life of the trial.

AIM

1. Evaluate the 1622WhatIf?™ tool as more robust, scientific method for determining crop nitrogen fertiliser requirements within field.
2. Identify nitrogen fertiliser savings by better understanding soil/crop/seasonal dynamics for better nitrogen fertiliser decision making.

POTENTIAL WATER QUALITY BENEFIT

A more robust decision support methodology is required to assist growers and their advisers in making more informed decisions about nitrogen fertiliser applications in sugarcane, particularly identifying scenarios (soil type constraints, seasonal constraints) which may result in reduced yield and determining an appropriate nitrogen rate reduction to support that yield potential. This project will support nitrogen rate reductions and associated water quality benefits while maximising & protecting crop yield.

EXPECTED OUTCOME

A robust evaluation of the 1622WhatIf?™ model and nitrogen fertiliser applications in response to its outputs. A decision support tool to provide more confidence to growers and advisors to better match fertiliser nitrogen rates to crop yield and seasonal potential.

Table 1 - Plan

	Date	Activities
Stage 1	October 2019	Assess trial site soil characteristics, EM map the paddock, take relevant soil samples and cores were appropriate
Stage 2	December 2019	Develop trial plan and apply fertiliser treatments
Stage 3	January 2020	Catchment solutions installed KP's water samplers
Stage 4	October 2020	Crop nitrogen uptake assessments, trial harvest - yield performance assessments, 1622WhatIf?™ model re-runs with trial data input, new treatments determined in response to year 1 results
Stage 5	November 2020	New altered fertiliser rates where applied and catchment solutions installed KP's water samplers

Table 2 - Project Trial Site Details

Trial Crop	Sugarcane
Q240 1st ratoon	Q240 1st ratoon
Trial Block No/Name:	2-1
Trial Block Size Ha	11.2 ha
Trial Block Position (GPS)	149° 9'43.65"E, -21°22'1.70"S
Soil Type	Sunnyside class A sodosol, silty clay loam over grey heavy clay subsoils

BLOCK HISTORY, TRIAL DESIGN

The trial design remained the same in terms of replications and repetitions, only nitrogen rates have been altered.

A control strip was left in to serve as a baseline. Each treatment and repetition area equates on average 0.7 of a hectare.

Table 3 - Trial Plan for Dawlish Trial

Replicate 1	Replicate 2	Replicate 3	Replicate 4

In 2019 the following applications rates were applied. These figures were chosen as starting points, and the 1622WhatIf?™ tool was used to alter the rates applied for the 2021 harvest. Two dunder brews were used in order to maintain the same phosphorus, potassium and sulfur quantity across the four treatments, while only the nitrogen changed.

Table 4 - Treatments for Trial

Control – 0kg N/ha
Treatment 1 – 110 kg
Treatment 2- 130 kg
Treatment 3 – 6ES 150kg
Treatment 4- 170 kg

The following applications were decided based on the 1622WhatIf?™ tool simulations, local climate conditions and crop performance.

Table 5 - Plan

Treatment	Nitrogen rate (kg/ha)	
1	110	WhatIf?™ app showed very little yield risk between 80 kg/ha and 110 kg/ha.
2	80	No yield drop occurred last season between the lowest and highest treatment. Given the crop was cut late, fertilised late and low yielding (60 t/ha average) the rate was dropped to 80 kg/ha
3	150	150 kg/ha is the Six Easy Steps rates, this will stay constant throughout the trial
4	180	A la Niña year has been forecast, which often prompts some growers to increase nitrogen rates for two reasons. To mitigate the potential extra nutrient (in particular nitrogen) loss from water logging and run off and potentially increase yield due to extra water availability.

RESULTS

Initial results indicated no significant yield difference in tonnes of cane and sugar between the four treatments. The paddock was cut late and fertilised late in 2019, which restricted the crops overall potential growth. This first fertiliser application was to get baseline data, the 2020 fertiliser rates were chosen through 1622WhatIf?™ based on these results.

Table 6 - Cane Yield (tC/ha) for 2020 Treatments

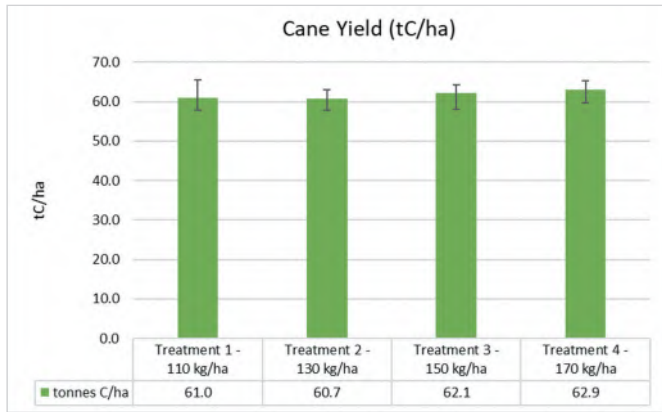
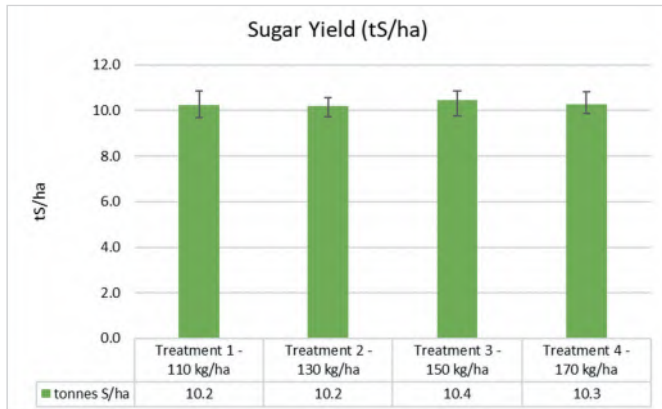


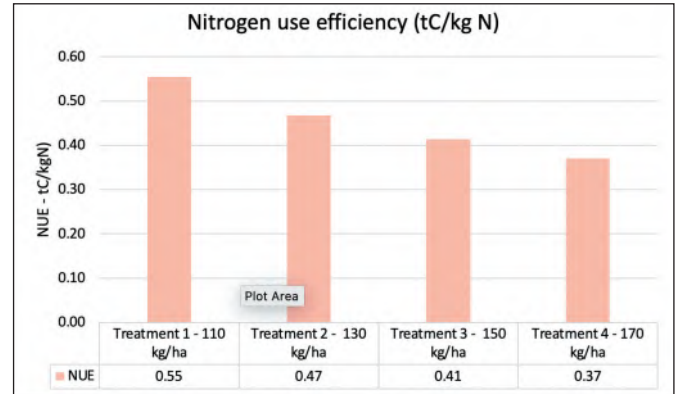
Table 7 - Sugar Yield (tS/ha) for 2020 Harvest



... This trial has only just begun and will be harvested in 2021 with the new treatment applications.

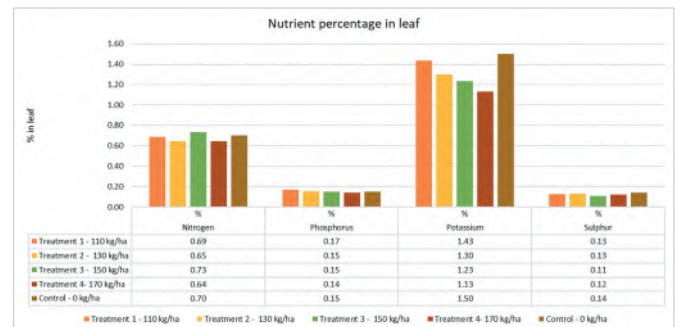
Nutrient use efficiency (NUE) results indicated that treatment one (110 kg/ha of nitrogen) was the best bang for buck so to speak. The grower saved 60 kg/ha of fertiliser and grew only 1.9 t/ha extra cane, and the sugar difference was only 0.1 t/ha higher, which equates to a 67% increase in efficiency between treatment one and four. As stated, before the crop is limited in its potential, next year's results may indicate a change in the crops response to nutrients.

Table 8 - Nitrogen use efficiency (tC/kg N) for 2020 Harvest



The leaf results indicated little difference between nitrogen, phosphorus, and sulphur percentage in the leaf, however potassium levels increased as nitrogen levels decrease. Interestingly the control had similar if not better nutrient content in the leaves compared to the fertilised treatments. Given this is only one data set no theories can be drawn till more datasets are compiled.

Table 9 - Nutrient percentage results in Leaf



Birds Eye View of the Harvest Trial

WATER REPORT

Catchment solutions collected water samples throughout the 2019/20 wet seasons, the following is an extract from their detailed report.

"KP Samplers developed by BBIFMAC were used to collect end of furrow run-off. The KP sampler is considered cheaper and simpler to run, as well as provide data more accepted as representing farm paddock run-off from rainfall events. The water quality assessment involved the use of KP Samplers to collect end of paddock run-off following extensive rainfall events.

Samples were collected over the 2020 wet season on the:

- 28th January 2020
- 17th February 2020
- 27th February 2020
- 5th March 2020

Water quality analysis included:

- Suspended solids
- Nutrients: nitrogen and phosphorus (dissolved and total)

The initial assessment determined that the Dissolved Inorganic Nitrogen estimate run-off loads increased in line with the increasing nitrogen treatment, with T4 (170 kg N / ha) having the highest paddock run-off at 0.228 kg N / ha). There were no changes in mass loads for the paddock run-off for both the Dissolved Organic Nitrogen and Particulate Nitrogen. There were no changes in mass loads for the paddock run-off for Total Phosphorous, while Particulate Phosphorous had a more elevated mass load in the T3 Treatment (150 kg N / ha), although this may be associated with factors outside of the trial assessment."



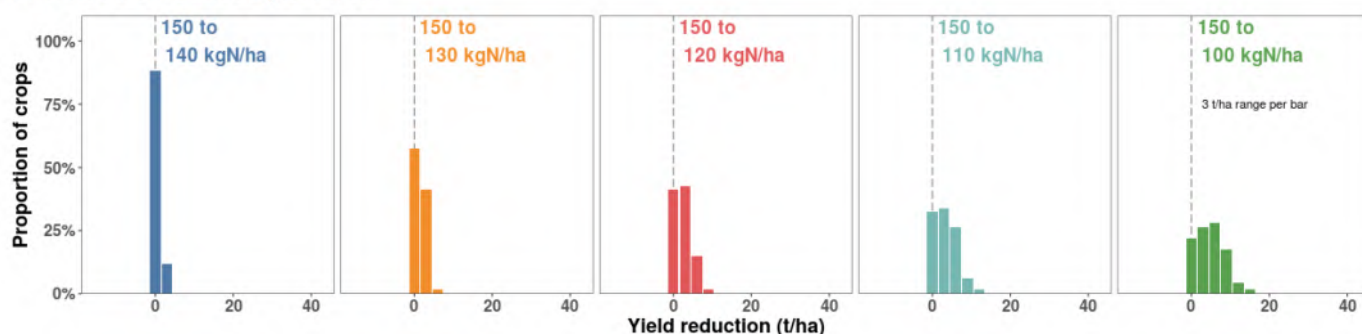
Kp Water Sampler



Day of Harvest

Table 10 - 1622WhatIf?" Analysis

Likelihood of reduced yield from:



Hitting the sweet spot through improved cane farming practices

Sugarcane growers across the Reef catchments are reaping the benefits from taking action to improve their farm management practices.

These stewards of the land are optimising their productivity while managing their farms sustainably and reducing run-off to the Great Barrier Reef.

Many are being supported to take action through Queensland Government funded programs and support tools.

These include the Smartcane Best Management Practice (BMP) program, delivered by CANEGROWERS, which was the first to become a recognised accreditation program under the Reef protection regulations with accredited growers being considered the lowest priority for compliance inspections for up to five years.

Implementation of the SIX EASY STEPS™ methodology is supported through an online toolbox, developed by Sugar Research Australia with funding provided by the Queensland Government, CANEGROWERS and Sugar Research Australia, that assists growers and advisors to develop nutrient management strategies that are specific to their farms.

The SIX EASY STEPS™ is also being rolled out through the Complete Nutrient Management Planning for Cane Farming projects which now operate in the Burdekin (RP161), Mackay Whitsunday (RP196), Isis (RP200), Herbert (RP210) and Russell Mulgrave (RP222C and RP223) areas. They are delivered by Farmacist, Sugar Research Australia, Herbert Cane Productivity Services Ltd, Mackay Area Productivity Services and Isis Productivity Limited. Four (RP161, RP196, RP210 and RP222) are acknowledged practice change projects under the Reef protection regulations which means growers are a lower priority for compliance inspections while they are actively involved in the project.

Recognising the connection between a range of land uses and water quality, the Janes Creek Land Impact Contributors project in Mackay is working with sugarcane farmers, graziers and harvesting contractors. Water quality monitoring helps participants understand the local contribution to water quality and the benefits of taking a whole-of-system improvement approach including farm management practices, system repairs and treatment solutions.

New initiatives include the innovative Reef Credit Scheme which has received a \$10 million boost from the Queensland Government. Reef Credits is a market-based solution that offers land managers the opportunity to undertake projects that improve water quality through changes in land management to generate a tradeable unit of pollutant reduction or 'Reef Credit'.

Eligible growers can also claim a Farming in Reef Catchments rebate of up to \$1000 to help offset the costs of obtaining professional and agronomic advice from an Accredited Agricultural Adviser.



REEF PROTECTION REGULATIONS ROLL OUT

The Reef protection regulations roll out over three years from 1 December 2019. The minimum practice agricultural standards for sugarcane focus on retaining nitrogen, phosphorus and sediment on-farm to minimise run-off and improve water quality.

All sugarcane producers in all regions (except Cape York) are already required to keep general records, for example of agricultural chemicals and fertilisers applied to land.

All growers in the Wet Tropics, Burdekin and Mackay Whitsunday regions must also comply with the minimum practice agricultural standards. From 1 December 2021, these growers need to implement a farm nitrogen and phosphorus budget that requires calculating nitrogen and phosphorus rates for each block or management zone. This will help growers refine their nitrogen and phosphorus management leading to improved nutrient use efficiency, improved production and profitability, and reduced losses of surplus nitrogen and phosphorus.

From 1 June 2021 all sugarcane growers in all Great Barrier Reef regions must obtain an environmental authority (permit) before commencing new or expanded cropping or horticulture activities on five hectares or more that do not meet the cropping history test. A cropping history is when cropping or horticulture activities have occurred during three out of the last 10 years (with at least one of the years being in the last five years). The draft standard conditions for activities on up to 100 hectares are being finalised following consultation. They will provide a simplified way for growers to obtain a permit.

Further information about the regulations is available at www.qld.gov.au/ReefRegulations.





DAMIAN WIRTH

Comparing mixed species fallow to bare fallow

BACKGROUND

Well managed legume fallow crops can provide a wide range of benefits to the blocks that they are grown on, from significant Nitrogen (N) contribution for the following crop to reducing the risk of soil erosion and disrupting pest and disease cycles.

There has recently been a lot of interest in planting multiple species of fallow crops together in fallow blocks (mixed species fallow crops). Project Catalyst has supported growers to trial and adopt mixed species fallow cropping through more than 20 projects aimed at enhancing the benefits from the fallow period.

After attending a Regenerative Cane Farming Forum in Ingham in 2018 and discussing mixed species fallow cropping with the local Project Catalyst service provider, Damian decided that he would like to have a go at mixed species fallow cropping on his farm.

IMPLEMENTING THE PRACTICE

Choosing the species mix was one of the most important decisions that needed to be made while planning Damian's fallow. Some of Damian's farm was previously grazing land and as a result, grass weeds are a major problem. As a result, Damian decided not to include grass species in the fallow seed mix to enable better control of grass weeds during the fallow period with use of selective herbicides to target the problem grass weeds.

The next factors affecting species choice were based around what Damian wanted to achieve out of the fallow and on seed availability. Legume species were chosen based on establishment rates, plant structure and potential N contributions. Sunflowers were also added to the mix as they are said to be good phosphorous scavengers and provide a big flower to keep his daughters happy.

The species used are as follows:

Table 1 - Species Used

"Seed Variety"	"Mix 1 (kg/ha)"	"Mix 2 (kg/ha)"
Leichardt	10	7
Ebony	6	8
Meringa	6	8
Dolchos	15	10
Sunflower	2	2
Total	39	35

Damian planted the cover crop into cultivated rows using a HBM seed box mounted on a tool bar which dropped the seeds behind 2 curly tines and were covered with two covering discs.



Damian's Planter



Biomass Sample

OUTCOMES

Both mixes performed well with biomass samples taken three months after planting to identify species populations and measure crop biomass to enable N contribution estimations.

Table 2 - Cover Crop Biomass

	Mix 1	Mix 2
Sunflower	0	0
Cowpea	4710	6960
Soybean	190	510
Dolichos	1190	350
Total (kg/ha)	6090	7820

Unfortunately, none of the sunflowers in either mix germinated, it was suspected that this was the result of using bird seed grade seed rather than seed grade, this was also a problem across the district for other growers that planted sunflowers.

Nitrogen contributions were estimated based on plant N% from SIX EASY STEPS® guidelines (Soybean 3.5%, Cowpea 2.8% & Dolichos 2.3%), with Mix 1 producing an estimated total of 166kg/ha N and Mix 2 producing an estimated total of 221kg/ha N after three months. As a result, Damian is not planning on top dressing the plant crop.

Damian is now planning to plant mixed species fallow crops on all suitable fallow blocks in the future adjusting the species mix as required, and will use seed grade sunflower seeds rather than bird seed.



Planted Fallow block

Water Quality Improvement Program



The Great Barrier Reef Foundation and the Australian Government's Reef Trust have a \$443.3 million partnership that includes \$201 million for improving water quality in the Great Barrier Reef Catchments.

The Foundation are committed to working collaboratively with growers, natural resource management groups, governments and research institutes to achieve significant, measurable improvements in water quality, while enhancing farm productivity and profitability.

Funding has been awarded to projects in priority catchments that will cost-effectively achieve target pollution load reductions. This includes \$141m for regionally focussed water quality improvement and \$10m for innovation and systems change.

Regional water quality programs are underway in several Great Barrier Reef catchments including the Mackay Whitsundays, Herbert and Burdekin, with the Wet Tropics (Mulgrave-Russell & Tully Johnstone) due to commence in mid-2021. These programs aim to establish enduring economic drivers that maintain best practice, leading to ongoing environmental and agricultural benefits.

Water quality programs in the Mackay Whitsunday, Herbert and Burdekin regions are primarily focused on working with landholders in the sugarcane industry to improve nutrient, pesticide and irrigation management practices. Growers receive agronomic and technical

support, as well as limited financial incentives. Constructed wetlands will also be developed in some drainage features situated downstream from cane catchments, to capture and treat polluted runoff and enhance ecosystem function.

The 'Innovation & Systems Change' program is designed to support transformational change in water quality improvement activities. These include new practices, tools and approaches for farming, grazing and land restoration.

Twenty-one innovation projects commenced in 2020 which are based on new technologies, strategic interventions and innovative financing and funding initiatives.

Through this program the Foundation is supporting:

- Technology-focused projects, such as robotic weed control to reduce herbicides and improve farm management costs; trialling drones for mapping, weed spraying and seed dispersal; seaweed biofilters to capture products for use in biofertilizer products and testing and modelling of Enhanced Efficiency Fertilisers.
- Multispecies cropping trials in sugarcane to improve soil health and water quality; regenerative grazing practice investigations to demonstrate how they can improve

landscape condition; and in a world-first, virtual fencing technology is being trialled in sensitive riparian areas to exclude livestock and reduce sediment runoff caused by gully and streambank erosion.

- The Reef Credit Scheme, which is being transitioned from the start-up phase to a fully implemented program. This is a market-based incentive mechanism, where landowners are paid for on-farm actions that improve water quality flowing to the Reef.
- The innovative insurance product 'Prototype nitrogen insurance', which is being trialled to help farmers manage the risk of reduced yields from fertiliser application, aiming to overcome barriers to adoption of reduced nitrogen rates.
- Rejuvenating farm ownership for new generations, through the Cultivate Farms social enterprise which connects aspiring farmers with retiring farmers and investors.

The Foundation are excited to be partnering with new stakeholders, to fund diverse and instrumental projects that are driving innovative solutions to improve water quality flowing to the Reef and boost agricultural outcomes. More information on these and other projects is available on the Foundation's website.

⋮ **Subscribe to our e-newsletter via our website to keep up to date with the program and funding opportunities.**





HAYDEN & LAWRENCE DI BELLA

Mixed legume fallow

Nematodes Results from 2017-2019

BACKGROUND

Since late 2016 Hayden and Lawrence DiBella have been trialling legume fallow cropping as a part of their farming system. It is hoped that the legume fallow crops will increase soil biodiversity, break the monoculture, improve soil structure, and build soil and crop resilience. Together, Lawrence and Hayden have been running a 100 ha of land under an improved farming system of, wider row spacing, controlled traffic, and minimum tillage. They believe the next step in improving their farming system and soil health is by growing mixed fallow break crops during the fallow stages of their sugarcane.

TRIAL DETAILS

In the last four years mixed legume trials have been running on Hayden and Lawrence's farm near Ingham. They farm on terrace loam to clay soils near the Herbert river. Every year a new block was chosen to set up a mixed legume trial to compare bare fallow, monoculture cover crops and mixes of species cover crops.

The trials have been looking at a range of subjects such as: legume dry biomass, legume soil nutrient input, studies of VAM (mycorrhizal fungi) populations, and impacts on Pachymetra and nematode populations.

Treatments: The below treatments have been chosen for their consistent, timely nematode data over the last three years of sampling.

- Bare Fallow
- Soybean Leichardt
- Cowpea Ebony
- Sunflowers
- Sunhemp
- Pigeon Pea
- Rongai Lablab
- Tillage Radish
- Mix #3 – High Performer – Soybean Leichardt, Cowpea Ebony & Meringa, Sunhemp, Rongai LabLab

RESULTS

The results have been compiled together & averaged over three years of nematode sampling (2017-2019). The samples were collected at the same stage of legume growth each year.

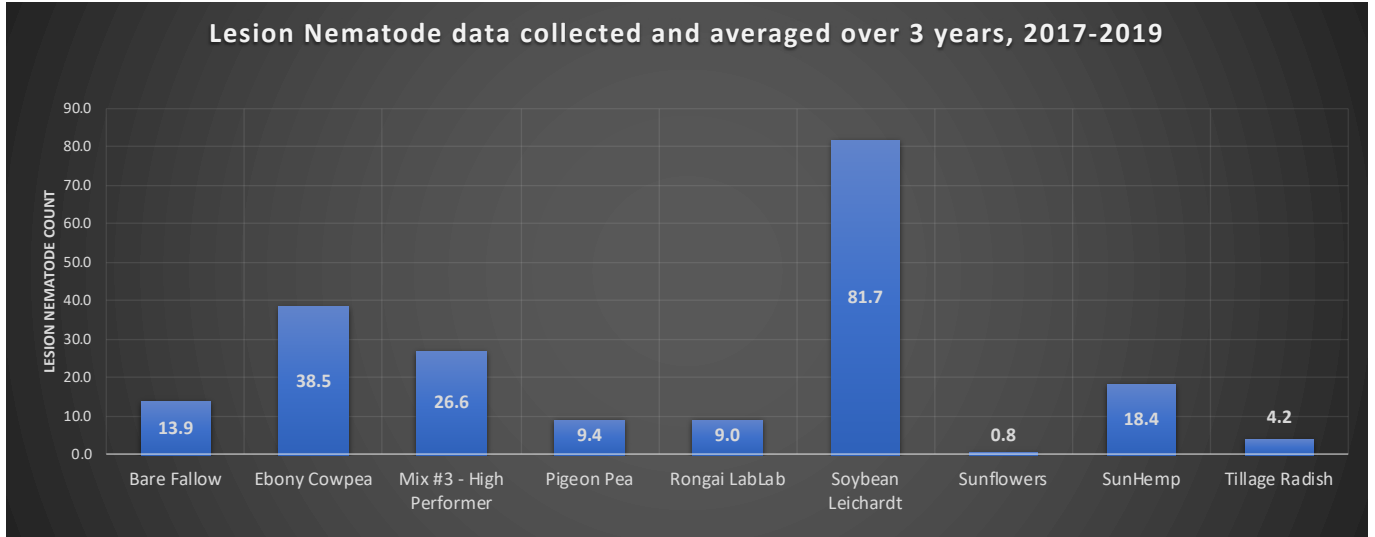
Hayden and Lawrence have a naturally low parasitic nematode population believe to be influenced by their farming system over the past 20 years.

They had extremely low numbers of Root Knot nematodes which is why this data has not been included in the below results.

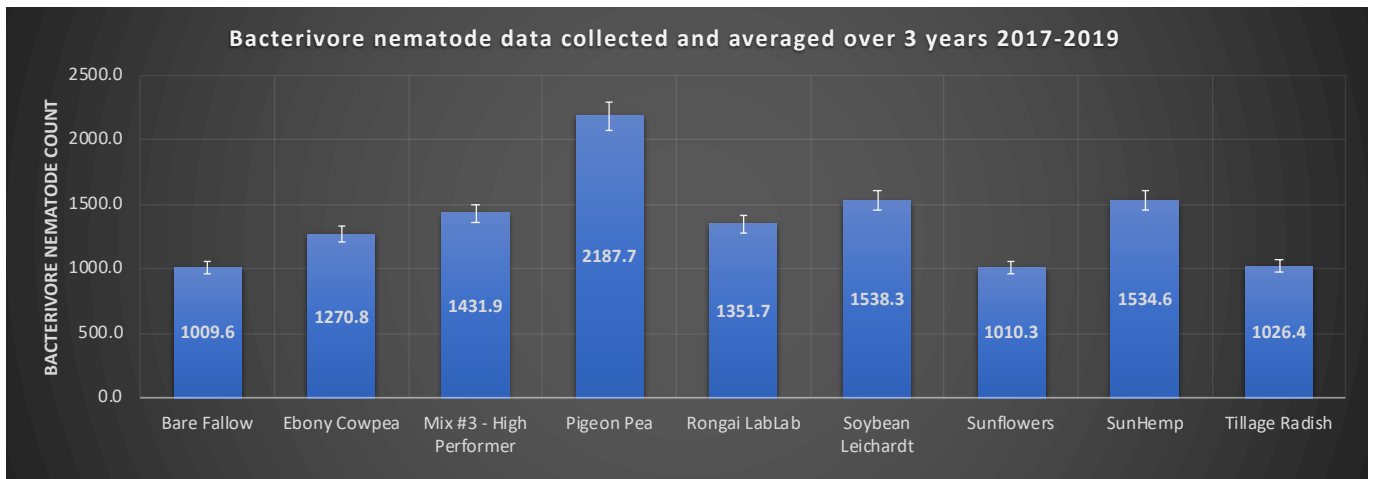
Focus has been on: Lesion nematodes, Bacterivore nematodes, Fungivore nematodes, and Omnivore & Predator nematodes.

These groups of nematodes are being studied for their soil health benefits.

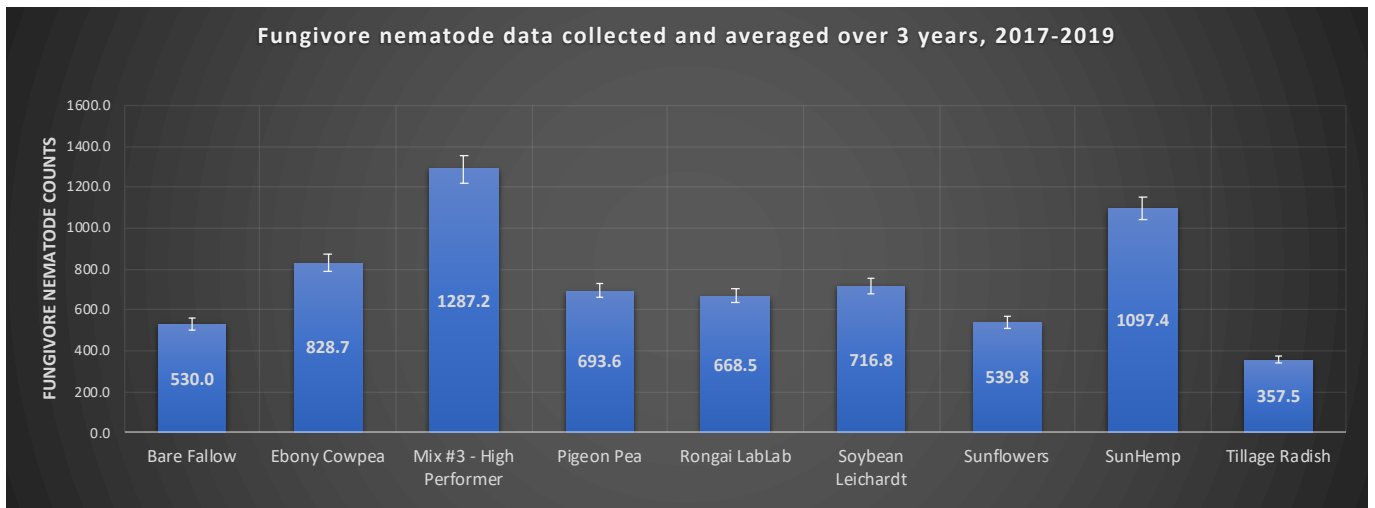
Graph 1 - Nematode data averaged over three years of sampling. Lesion Nematode Groups



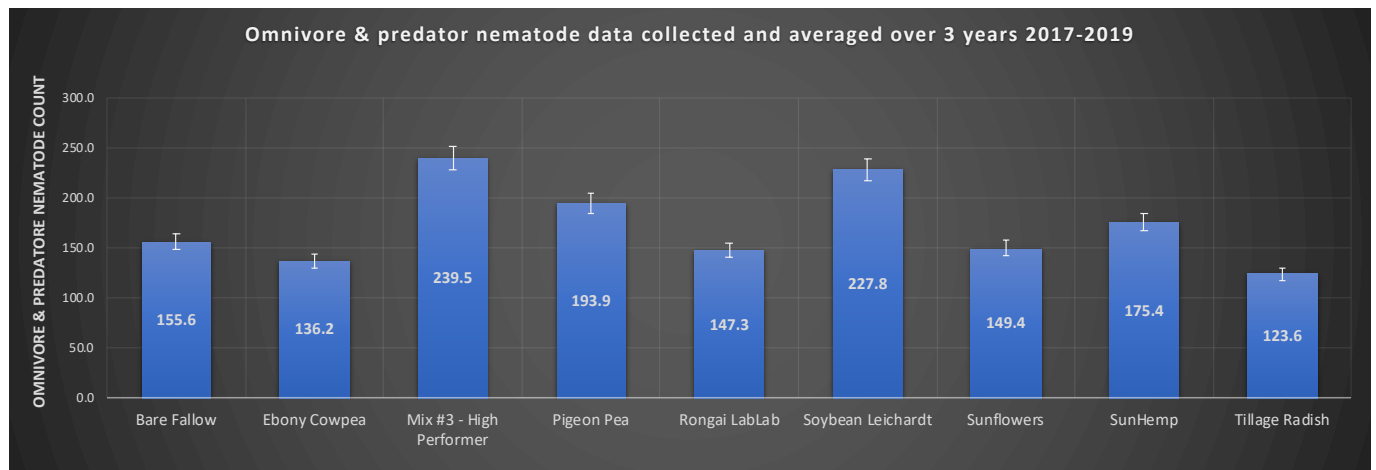
Graph 2 - Nematode data averaged over three years of sampling. Bacterivore Nematode Groups



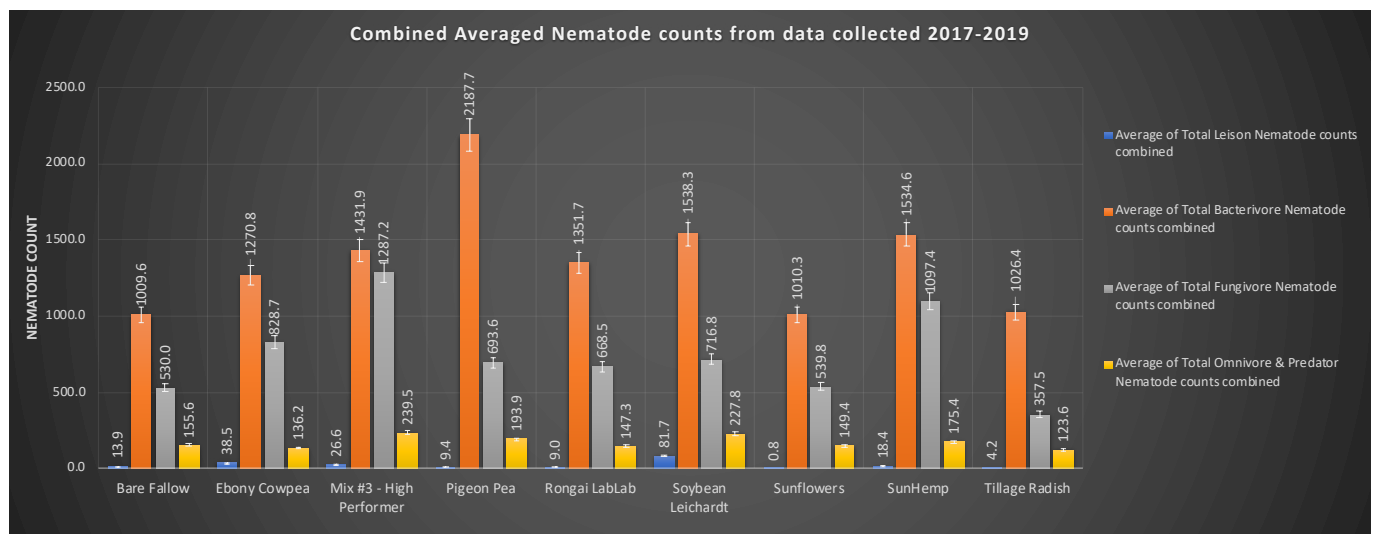
Graph 3 - Nematode data averaged over three years of sampling. Fungivore Nematode Groups



Graph 4 - Nematode data averaged over three years of sampling. Omnivore & Predator Nematode Groups



Graph 5 - Nematode data averaged over three years of sampling. All Nematode Groups



CONCLUSION

The nematode populations are believed to be influenced by legume biomass size. Simply put, the bigger the biomass produced, the more food for the nematodes to eat and populate, especially the beneficial nematodes.

Mix #3 has a good bacterivore/fungivore ratio with a low population of lesion nematodes. It also has a high omnivore & predator count. All these are indications of good soil health.

The results show that Leichardt soybean can increase lesion nematode populations, though when combined with other legumes like Sunhemp, as it is in the Mix #3 treatment, these lesion nematode populations were controlled.

There are many good reasons to have a mixed cover fallow crop from: minimising herbicide use, reducing erosion, reducing bare ground exposure from die-out of one legume species, healthy nematode/plant relationships, better water holding capacity of soils, organic matter inputs, reduced chemical fertiliser inputs in plant cane and overall improved soil health benefits.

If you would like to see more about Hayden and Lawrence DiBella's mixed cover crop trials, feel free to visit www.projectcatalyst.net.au



Understands the challenges of the agricultural sector

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

We understand the challenges and opportunities the sugar industry is facing, and whether it be in

farming, or everyday life, managing your finances can be hard work. Talking about them also can be even more of a challenge.

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

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

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

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

Suncorp Bank's local agribusiness specialists are dedicated to understanding the needs of their customers. They understand the critical role a bank plays in supporting regional communities and they are committed to building in-depth relationships with customers to support them on their journey.

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

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

Having maintained a 'Level 2 of Sustainable Green Print' certification for 7 years, BB Print's commitment to the environment and environmental printing practices remains unwavering.

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



Leading the way in environmental printing

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

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

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

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

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

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

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

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

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

Recycled biowaste to revolutionise farming



At the launch of the first batch of AJK HumiSoil is, from left, Mayor Greg Williamson (Mackay Regional Council), Andy Kippen (Founder and Director, AJK Contracting) and Ken Bellamy (Founder and Director, VRM Biologik).

A NEW organic fertiliser will not only revolutionise farming but will also provide economic and environmental benefits for the Mackay region.

As reported last year, AJK Contracting was awarded Mackay Regional Council's Biosolids and Green Waste contract in 2019. Following council's review on the management of biosolids and subsequent release of an Expressions of Interest, Engineering and Commercial Infrastructure director Jason Devitt said AJK Contracting had come up with a best-practice way to utilise the two products together.

"AJK Contracting has used a blend of green waste and biosolids, collected from the region's wastewater treatment plants and green waste disposal facilities, to develop AJK HumiSoil," Mr Devitt said.

"An additional groundswell component, contributed by local company VRM Biologik, acts as a catalyst for the biosolids and green waste to ferment into HumiSoil. This is a unique product – the first of its kind in Australia – and it will optimise the 6000 tonnes of greenwaste and 8000 tonnes of biosolids that Mackay produces each year. It will also represent a saving to ratepayers of more than \$600,000 in the first 12 months of the contract by using the same contractor to process both waste streams" he said.

HumiSoil goes beyond traditional fertilisers to trigger a biological process in the soil which regenerates humus. Humus is the vital difference between sand and soil – the black component in soil that makes it conducive to plant growth. Macro-organisms and microorganisms like bacteria produce humus by consuming decaying plant and animal matter. Humus

usually takes 25 years to build in the soil. Using the HumiSoil process, AJK Contracting can do it in six months.

By improving soil health after farming has stripped nutrients from the land, HumiSoil will reduce the amount of chemical fertiliser that farmers apply, which is not only expensive but can cause detrimental runoff into waterways. It will also reduce the amount of water needed for irrigation. HumiSoil is also a recyclable waste product that does not require any traceability and has been cleared for unrestricted use.

HumiSoil is now available through AJK Contracting.







DAVID RUSSELL

Companion planting in ratoon cane

BACKGROUND

Alternative crops have again become a common topic talked about on farmer's headlands in the Burdekin region, with many exploring the opportunities that legumes and other crops have to offer. Monoculture of sugarcane began to take precedence in the mid 70's as the cane assignment restrictions stating that 25% of ground should be fallow was removed. This allowed for quick turnaround of cane; however, it also allowed the potential for diseases to build up and create a lack of diversity in the soil biology. The Sugar Yield Decline Joint Venture in the 90's identified that monoculture was one factor impacting on sugarcane production and that incorporating a legume fallow into the farming system could help improve the following cane crop by 20-30%. The Burdekin region particularly is able to grow a three, to four month legume crop to gain a financial benefit out of harvesting for grain. David Russell is a sugarcane grower in the Burdekin region and has incorporated legumes into his farm rotation over the past few years for a financial and soil health benefit.

PURPOSE

Through David's trialling of different legumes in the cane's fallow period he became curious if there could be a soil health benefit by growing legumes and radishes in his ratoon cane crop. For the purpose of this trial Kuranda soybean and tillage radish, were chosen to be planted in combination and individually along the shoulder of the cane row. Kuranda soybeans are grown as a fallow crop throughout much of North Queensland's sugarcane regions. It has a high growth rate and produces a high biomass, therefore providing good ground cover. Tillage radish is a brassica known for its production of a large tap root. It helps to improve soil structure by breaking up the soil and reducing issues such as compaction. It has the ability to absorb and retain macro and micronutrients from the soil and reduce nutrient leaching. Once the radishes die-off, the nutrients are then made available for the cane crop. This variety of radish has excellent seedling vigour and produces ground cover rapidly. These varieties of companion crops were chosen for the benefits they would bring to the sugarcane. The Kuranda soybean for its nitrogen fixing abilities and the tillage radish for its soil structure improvement and nutrient retaining abilities.



TRIAL DESIGN

A young ratoon cane block was selected and had grown to approximately 50cm in height before planting the seeds. By planting the companion crops when the cane is still relatively small allows the radishes and soybeans to grow without competing with the cane for light and space. The seeds were planted in late October 2020 with David's three row Napier Grassland planter. The planter was calibrated individually for both seed types as the sizes are significantly different. The seeds were planted on the shoulders of the row and two passes were made per plot. The seeds were separated into three treatments to assess any differences to the sugarcane crop:

1. Kuranda soybean
2. Tillage radish
3. Kuranda soybean and tillage radish mixture

The treatments were replicated across the block randomly three times.

RESULTS

Germination of the soybeans and radishes were successful. All rows came up; however, the radishes were overpopulated in some rows due to the rate applied as a result of the seed plates. The soybeans have begun producing nodules and pods, all radishes are producing tap roots of varying lengths. The cane canopy will begin to close-in in the next few weeks and the companion crops will die off and provide nutrients to the cane.



NQBP backs grower innovation to safeguard reef



NQBP and James Cook University announce a \$5m, five-year partnership supporting research and scholarships.

North Queensland Bulk Ports Corporation (NQBP) is proud to be supporting Project Catalyst for the second successive year.

The Queensland Government-owned port authority is responsible for the ports of Mackay, Hay Point and Abbot Point, in the Great Barrier Reef World Heritage Area, and Weipa in far North Queensland.

NQBP CEO Nicolas Fertin said NQBP was dedicated to getting the balance right between stewardship of the reef and the environment and keeping trade moving to support the Queensland economy.

“The protection of the reef and the environment is of paramount importance to us. This is central in our planning, everyday operations and other important activities such as maintenance dredging to keep ships flowing in and out of our

ports and support local industries, including cane farming.” Mr Fertin said.

“NQBP’s 81-year-old Port of Mackay continues its proud association with the sugar industry, facilitating the export of more than one million tonnes (1.05MT) of sugar in the 19-20 financial year. Approximately 30 per cent of Australia’s sugar exports go via the port, directly supporting more than 1500 jobs in the Mackay region.”

Mr Fertin commended Project Catalyst growers for their forward-looking approach, information sharing and leveraging the latest technology to assist farming practices.

“We commend their willingness to be at the forefront of agricultural learning, and leveraging new technologies - which NQBP is equally passionate about when it comes to monitoring the marine environment.

“As the only port authority in the world to manage three ports within a World Heritage Area, NQBP takes a leading approach to applying industry best practice science through our partnership with James Cook University.”

In September 2020, a new \$5m extension to the partnership was announced at JCU’s Centre for Tropical Water and Aquatic Ecosystem Research (TropWATER) in Townsville. An increased scope of the partnership expands JCU’s role to track the health of the marine environment around NQBP’s ports and will enable new PhD and BSc scholarships and new internship programs. Data from the partnership contributes to the Mackay-Whitsunday Healthy Rivers to Reef Partnership’s (HR2P) annual waterway health report card and other reef health reporting.

⋮ Visit our website nqbp.com.au/jcu

900,000 marine water quality records collected annually at NQBP’s ports

1.05 million tonnes of sugar exported from Port of Mackay (19-20)

30 per cent of Australia’s sugar exports go through Mackay Port

The role of economics in industry adoption

Over the last ten years, many of the practices that showed financial promise from Project Catalyst trials have been adopted and are now considered common practice. Looking forward, can economics tell us something about the future adoption of current trial practices and technologies?



DAF economists Mark Poggio and Matthew Thompson with growers at the 2020 Project Catalyst Grower Forum.

Since 2010, agricultural economists from the Department of Agriculture and Fisheries (DAF) have been working with Project Catalyst service providers and growers to assess the financial implications of practice change and technology adoption. Many practices from trials that showed good economic returns are now accepted practice. The earliest project trials assessed by DAF economists were conducted by growers in the Mackay region. Some of these trials and practices included:

- GPS technologies
- Controlled traffic
- Variable rate chemical application
- Legume cash crops
- Lower rate/banded mill mud application

Over the past ten years, GPS guided farming systems, controlled traffic and legume cash crops have become more commonly accepted practice in different regions. Variable rate application technologies are also showing promise for the future (e.g. variable rate applicators linked to EM mapping).

In more recent years, project trials have shifted focus to investigating the impact of various nitrogen management strategies (e.g. alternate rates, controlled release fertilisers and accounting for groundwater N). Most cases show that a strategic approach to nitrogen application has the

potential to maintain and even improve profitability while reducing runoff risks to the reef, although longer-term replicated trials across a wider variety of sites will further validate these findings. Sub-surface mill-mud application and multi-species fallows are also current focus points for economic analysis and could prove exciting options for growers in the future.

Project Catalyst trials that demonstrate economic benefit for growers are likely to have more chance of wider industry acceptance and eventual adoption than those without. Based on historical adoption results, the incorporation of economics could possibly provide some insight for future adoption levels.

To view the more recent studies visit the Queensland Government website at: <https://publications.qld.gov.au/dataset/sugarcane-economics>.

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The DAF economist team is proud of its continued involvement with Project Catalyst collaborators, in particular the support provided by growers and project partners.
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Improve productivity and profitability

Farmacist has proudly supported Project Catalyst growers since its inception in 2010. During this time, we have been on an amazing journey with pioneering growers testing innovation and inspiring farming systems for the future.

The last 10 years have been full of trials and tribulations and we believe our work with growers has made real progress in the industry. Nobody said innovation was easy, but with passion, drive and determination, anything is possible. Many gains have been made in soil health, legume cropping, biological applications, precision chemical application and understanding our farms better through precision agriculture. Adopting techniques like EM mapping, has paved the way for prescription application of nutrient, chemical and ameliorants. As the first service provider to test zonal mud applications, prescription gypsum and lime data files, large scale Enhanced Efficiency Fertiliser trials, and strategic chemical applications, we're proud to help growers to improve business returns and environmental stewardship.

The lessons learnt over the last decade of trials, have evolved into the latest projects for growers to be involved in. Opportunities are now open in both the Mackay and Burdekin regions to work with

our Agronomists in new pesticide and nutrient management projects.

Project Bluewater focusses on improving chemical application and efficacy, whilst ensuring our environmental responsibilities are of the highest standard. In this project growers will receive chemical and agronomy support, spray rig assessments, calibration support and upgrades with incentives up to \$3000 for equipment improvements, spray water analysis (required to validate improved chemistry interaction), pesticide management planning and ensuring growers chemical records and compliance obligations are kept to a high standard.

The Precision to Decision project in the Burdekin, and the Point of Difference project in Mackay will provide high resolution soil mapping to better understand soil variation, utilising a TSM mapper - the latest technology. With only two units in Australia, one in the Burdekin and one in Mackay,

coupled with cutting edge satellite imagery which allows us to understand yield variations, and using a multitude of precision agronomy data sets, we can make informed decisions that maximise productivity and profitability through a strong decision support platform tailored to your farm. This project will provide soil analysis to growers, accurate block boundaries, high resolution nutrient management plans and agronomic support, data management and compliance records all of which are needed for the incoming N&P plans which will be mandatory as of December 2021. Incentives for equipment upgrades are also available.

To be eligible for consideration farms must be in either the Plane Creek, Pioneer, and Lower Burdekin (Haughton) catchments.

Contact your local office for more information.

Bluewater 2, Point of Difference and Precision to Decision are funded by the partnership between the Australian Government's reef Trust and the Great Barrier Reef Foundation.



Great Barrier Reef Foundation



Global laboratory provider

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, basing the majority of corporate operational and administrative works in Queensland 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 has this year renovated their North Queensland laboratory to grow capacity, extend operation

capabilities, as well as expand services offered to local clients.

- 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.

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



PROJECT CATALYST BURDEKIN

Growers driving innovation

Starting with a small group of innovative growers, Project Catalyst in the Burdekin has grown to include over 50 growers who have been instrumental in driving innovation, implementing trials on their own farms and adopting new practices.

Farmacist agronomists have been excited to work with these growers to trial new ideas, technologies, and strategies on their farms – while collecting rigorous scientific data to validate or veto these new practices. Of course, not every trial resulted in an adoptable farming practice; however, many did! Innovation and practicality should go hand-in-hand in agriculture – the results of many Project Catalyst trials have been used to encourage other growers to challenge and adopt new practices to their benefit! Growers have trialled a wide range of innovative practices in all aspects of their farming system, from nutrient, pesticide, soil health and irrigation management to implementing precision agriculture and new technologies. Through these efforts, there are several farming practices that have moved from innovation to widespread adoption in the Burdekin.

A practice that has been gaining momentum from Burdekin growers is banding lower rates of mill mud on top of the bed instead of applying a conventional rate (200WT/ha) in the furrow. Mill mud is a nutrient rich by-product of sugar-milling with several other soil health benefits such as improved soil structure and

water holding capacity. The practice of banding mill mud on the bed in ratoons was developed and trialled by four Project Catalyst growers and the Farmacist team. This process involved designing an effective application mechanism to attach to the back of the mud trucks and trialling the efficacy of banding lower mill mud rates. The trial results showed that there were very few instances where there was a significant difference in yields where mill mud was banded on the bed when compared to conventional application. These trials have shown that banding mill mud is a viable option for growers – banded mill mud is an opportunity for growers who are further away from the mills to get the benefits of mill mud at economically acceptable costs.

Effective nutrient management has been an important factor in several Project Catalyst trials. Between 2016 and 2018, 12 replicated trials were established across the Burdekin district investigating the efficacy of several enhanced efficiency fertilisers (EEF) to a granular standard. These trials compared reduced nitrogen rates to an industry standard rate. The results of these trials showed that there was no significant yield difference between the industry standard nitrogen rate when compared to the reduced nitrogen rates (including where an EEF was applied) in a Burdekin system. This data laid the foundation for several future trials which investigated opportunities for reduced nutrient rates whilst maintaining productivity.



Due to the reduced yield potential of older and late cut ratoons, trials were implemented to compare reduced nitrogen rates to an industry standard. These trials saw in no change to productivity where the lower rate was applied. In the last eight to ten years, four sugarcane varieties were released in the Burdekin; however, many growers reported poor CCS results from three of these varieties: Q240, Q232 and Q253. The suspected cause of the reduced CCS was that these new varieties were more efficient at using nitrogen than the current varieties such as KQ228 and Q183. Varied nitrogen rate trials were established on blocks of Q240, Q232 and Q253 – the harvest results of these trials indicated that nitrogen rates could be reduced without negatively impacting cane yields or CCS. These practices are now commonly used by Burdekin growers to help reduce input costs and improve business profitability!

Managing the impact of groundwater nitrates is a uniquely Burdekin issue (in select areas). Due to the climate in the Dry Tropics, crops grown in the Burdekin are irrigated all year round. Nitrates in irrigation water are plant available - when irrigation is applied to crops in high-nitrate areas it can act like a small nitrogen fertiliser application. Consistent, small application of nitrogen encourages vegetative growth and prevents the crop from ripening until dry down occurs, resulting in lower CCS. Four growers in Project Catalyst monitored nitrate levels in

their bores and trialled reduced nitrogen rates to incorporate irrigation nitrates into their fertiliser budgets. The results of these trials showed that growers in high-nitrate areas can reduce their nitrogen fertiliser rates by 40kgN/ha with no negative impact on cane yield and even a bump in CCS! The work by these Project Catalyst growers has been used to increase the confidence of other growers to incorporate their irrigation nitrates into their fertiliser budgets.

Irrigation is a hugely important element of the Burdekin sugarcane system. Several Project Catalyst growers have trialled ways to improve their irrigation efficiencies to great success! One of the early Project Catalyst trials was investigating a low-cost automated irrigation option. As the project evolved, efforts were directed into developing a low-cost wireless soil moisture monitor that could send data directly to the grower. The current version of the sensor installed on farms communicates with the Telstra 3G network and sends soil tension readings (kPa) from a gypsum block to the grower's smart phone via the Farmacist App. The Farmacist App can also help growers record their irrigations on a set-by-set basis – as easy as pressing a start and stop button! Recording irrigations provides incredibly useful information; however, it is a huge task for Burdekin growers due to the scale of records required. Using the Farmacist App, an increasing number of growers are keeping irrigation

records and using this data to inform their irrigation decisions. When water availability is limited, some growers irrigate every other row instead of every row.

Project Catalyst also supported two growers to collect accurate data to verify that alternate row irrigation was a viable option to growers on soils that soak across the bed! Some growers are incorporating alternate row irrigation into their standard practice to improve their application and labour efficiency. On soils that have limited soakage, some innovative ideas were trialled to help improve this issue.

How a grower manages their fallow can have a lasting impact on the performance of the following sugarcane crop. Soakage is another issue primarily relevant to growers in the Burdekin. When irrigation water does not soak across to the centre of the bed or to the fertiliser band, not only does the crop not receive an appropriate volume of water, but there is a risk of stranded fertiliser if irrigation water does not reach the band for it to be activated and available for crop uptake. Sometimes, soakage problems are not reflected by soil mapping; however, they are clearly visible on drone imagery! One Project Catalyst site trialled using drone imagery to develop a prescription rate gypsum map to improve soakage. This has potential to become a viable option for prescription amelioration in the future.



Another element of fallow management is planting alternative crops. There are a variety of options for growers, including planting legume cash crops such as soybean and mungbean – planting a legume crop has several benefits. Legumes fix atmospheric nitrogen which can become plant available. They also provide a break from the sugarcane monoculture, breaking pest and disease cycles. There is not a great deal of information available about the amount of nitrogen available to the sugarcane crop following mungbeans – two trials were implemented to investigate reduced nitrogen rates after a mungbean fallow. Though these trials could not quantify the amount of nitrogen available to the crop following mungbeans, they did support reducing top-dress nitrogen rates by 20-30kgN/ha with no negative impact on productivity. Some growers have chosen to extend their fallow period from a traditional six months to 18 months. These growers have had the chance to not only give their soil a longer break from monoculture, but they have harvested 2-3 other crops as alternative income. By planting different crops such as soybean and corn, growers have a new suite of herbicides that they can use for weed control – setting up their future sugarcane crop for less weeds in the next cycle!

Choice of herbicide and timing of irrigation are two aspects of chemical management that Project Catalyst growers have trialled. To help

growers choose products that are both effective at weed control and lower risk to waterways, a number of trials were implemented investigating controlling grass and broadleaf weeds. The assessments involved evaluating the efficacy of the product following application and collecting water samples for pesticide analysis using event samplers after irrigation and rainfall events. To control difficult grasses such as wild sorghum (*S. arundinaceum*), the two herbicides trialled were Imazapic (Flame) and Isoxaflutole (Balance) at sites in both the Delta and BRIA. The results of this trial showed that if a grower could not capture his/her irrigation tailwater, then Imazapic (Flame) was a slightly more environmentally friendly option; however, both options have shown themselves to be viable options for controlling wild sorghum.

Following several exceedances of S-Metolachlor (Dual Gold) in Barratta Creek in 2015, a number of trials were instigated to offer better herbicide options. These trials compared runoff characteristics of between Pendimethalin (Stomp Xtra) and S-Metolachlor (Dual Gold) at 2 sites in the BRIA and the other in the Delta. When the end of paddock water quality was examined, it showed that amounts of Pendimethalin leaving the paddock in runoff water, was about 10% of the S-Metolachlor levels. Since this data has been made available to growers there has been a major shift in herbicide usage in the Burdekin with S-Metolachlor

sales dropping with a converse up surge in Pendimethalin usage.

Irrigation timing after herbicide application is essential to allow for chemical breakdown as well as boosting the efficacy on some grass weeds. A trial was implemented to investigate the effect of delayed irrigation from 2 days to 4 days post application on Metribuzin losses in irrigation tailwater. The effect of the delayed irrigation halved the Metribuzin losses from the field and enhanced weed control. A real win-win situation!

Project Catalyst in the Burdekin has been a fantastic opportunity for growers to trial innovative ideas and develop new practices which benefit the entire sugarcane industry. Without this group of growers taking risks and working to improve their farming practices, the Burdekin region would not have the same wealth of scientifically derived evidence to support improved practice change – change that benefits growers and the environment! Project Catalyst has supported the collection of data that can be used to help growers make informed decisions about their input choices, better evaluate risks to their business and the potential impact they may have outside their farms. If innovation is born of necessity, then Project Catalyst growers are well prepared to meet future challenges!

Precise robotic weed control – reducing herbicide



Figure 1. Four AutoWeed units (top) retrofitted to a John Deere Gator UTV (bottom)

PROJECT SUMMARY

James Cook University (JCU) and AutoWeed Pty. Ltd have developed the AutoWeed system (Fig. 1) that utilises Artificial Intelligence (AI) to detect and spot spray grass and broadleaf weed species within any target environment. Spun out

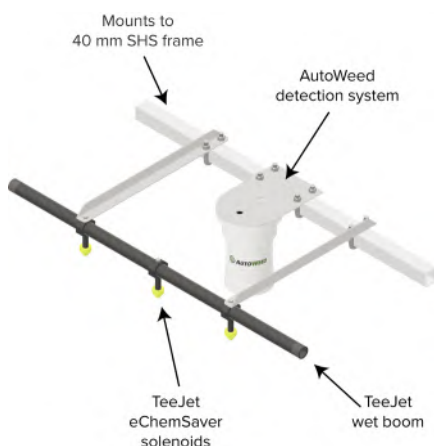
of JCU postgraduate research, this technology is now being commercialised by AutoWeed who are delivering spot spraying solutions for crop, pasture and horticulture farmers across Australia.

In a two-year project (2020–2022) funded by a \$400,000 grant through the partnership between the Great Barrier Reef Foundation and the Australian Government’s Reef Trust, JCU and AutoWeed will collaborate to extend the AutoWeed technology for herbicide reduction in sugarcane farms in the GBR catchment areas.

The project will rely on the pioneering “deep learning” AI technology being developed by JCU and AutoWeed to detect and spray priority sugarcane weeds. It aims to reduce knockdown herbicide usage on sugarcane farms by at least 80 percent. This will incentivise water quality improvements in reef catchment areas by reducing weed management costs for growers while also lowering the concentration of herbicides in runoff to support a healthy reef.

In the first year of the project, hundreds of thousands of images of sugarcane farmers’ crops will be collected, labelled by a human expert, and fed into deep learning models to train the weed and crop detection system. The second year will focus on developing and trialling the herbicide delivery component of the project. The project will design, develop, and trial the spot spraying method and fit it to a 24-metre wide, high-rise self-propelled boom to be used on a sugarcane farm.

Sugar Research Australia is also a key contributor to this project performing end of row water quality assessments during the 2021–22 wet season to compare water quality in runoff from sugarcane rows between traditional broadcast spraying with knockdown herbicides vs the AutoWeed spot spraying technology. It is worth noting that various factors such as rainfall and other farming activities may affect water quality. These will be carefully considered during assessments.



PREVIOUS FIELD TRIAL RESULTS

This cutting-edge technique allows for tremendous reduction in herbicide usage. For example, two AutoWeed trials conducted for broadacre cropping revealed a 95% reduction in herbicide targeting turnip weed in oats at Spring Ridge NSW, and a 96% reduction on milk thistle weed in wheat at Arcturus QLD (Fig. 2).

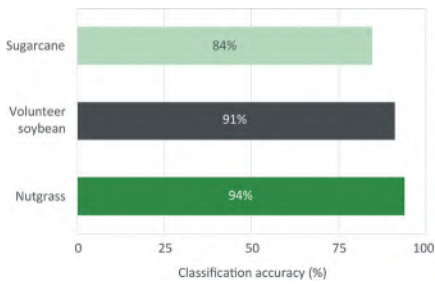
Figure 2 - Deep learning algorithms can detect weeds from crops



CURRENT SUGARCANE PROJECT DEVELOPMENT RESULTS

The project is off to a flying start with the collection of 33,124 images from a stooling sugarcane paddock with infestations of nutgrass and volunteer soybean in late 2020 from a farm in Giru, QLD (Fig. 3). Our deep learning algorithms were able to effectively classify the weeds from cane (Fig. 4) with over 90% accuracy. This is a strong result that bodes well for precise spray trials in 2021.

Figure 4 - Early detection results of soybean and nutgrass in stooling sugarcane



We have designed custom AutoWeed technology to retrofit a John Deere 4720 (Fig. 5) using existing Irwin leg mounting points. The AutoWeed camera has a 1.6 metre field of view to see weeds across the full interrow and at the base of cane plants in early-stage cane. The system will selectively activate three solenoids separately to spray only the weeds without spraying cane or soil. This will significantly reduce the amount of knockdown herbicide required to keep early cane paddocks clean compared to blanket spraying.

Figure 3 - AutoWeed system (top) fitted to a John Deere 4720 (bottom) to collect weed images for deep learning algorithm training.



CONCLUSION

Our previous and current results demonstrate that AutoWeed technology is an effective robotic solution that can be readily retrofitted to available farming machinery to treat different weeds in different environments in a green-on-green or green-on-brown setting. In our current project, we are targeting priority sugarcane weeds in the Burdekin reef catchment areas. However, our technology can be developed for other regions and lead to a practice change in weed management across the industry, tremendously reducing the herbicide and labour costs for growers while also mitigating the environmental effect of herbicides in support of a healthy ecosystem.

Figure 5 - AutoWeed Irwin leg mount retrofit designed for a John Deere 4720 self-propelled sprayer





Operating for nearly 20 years, North Queensland liquid fertiliser company LiquaForce is a well-known name to sugar cane growers along the east coast of Queensland.

And while core business may well be liquid fertiliser supply, the team wear many hats. On any given day someone in a LiquaForce shirt can be an innovator, a researcher, a logistics officer or paddock confidant.



The future in fertilising

Led by local Ingham boy, Managing Director Cameron Liddle was born into a rural trading family. He's seen his father make deliveries at 2am in the morning to a customer in need; has had a front row seat to the good times and the not so good times in the sugar industry; knows the merit of eye contact and a handshake; and he's bound by loyalty to the people and industry who have made his business – and the people who work in it – part of a proud north Queensland success story.

It's with those values that LiquaForce has been built – with strong roots that have allowed the business to grow and expand to supply growers from Mossman to Sarina.

Their products are proudly more than just NPKS in a bag and are also the only liquid fertiliser products on the market today for the sugar cane industry that are backed by quantified, independent data and research.

Recently, LiquaForce has risen once again to meet market demand, developing LAND HUB – a platform designed to make it easier for growers to access and store their farm data, improve their management decisions around inputs and farm productivity, clearly calculate what nutrients should be applied to the crop, and record

production outputs.

Built off the back of LiquaForce's core belief that sustainable coastal farming is absolutely possible with the right tools in the hands of growers, a specific LAND HUB Project has been rolled out by the Mackay Whitsunday Water Quality Program, funded by the partnership between the Australian Government's Reef Trust and the Great Barrier Reef Foundation.

The LiquaForce and LAND HUB teams look forward to meeting you – or catching up again – throughout the Project Catalyst event.



Visit our website www.liquaforce.com.au
or follow us on Facebook at
facebook.com/liquaforce/



2020 will enter the world's history books for various infamous reasons, none more so than the emergence of a global pandemic. But for the world's sugar, the year will also be remembered for its unpredictable and volatile nature when it came to price. From 15 US¢/lb to 9 US¢/lb and back again – the impact of both OPEC and COVID-19 – this was the first time since 2016 that such volatility has been present. So as we draw a line under 2020, the big question remains – what could 2021 bring for the sugar outlook?

From a fundamental perspective, Rabobank's latest Global Sugar Quarterly report projects a small global sugar deficit of 0.3 million tonnes raw value in the coming 2020/21 season. This follows an estimated 1.8 million tonne global surplus recorded for 2019/20. The 2020/21



Rabobank Small global sugar deficit predicted due to unpredictable and volatile year

deficit comes despite an expected increase in world-wide sugar production which is forecast to be offset by a projected 1.7 per cent year-on-year recovery in global consumption. Production increases expected this season in China, India and Pakistan, and also in North America, as crops there recover from recent years of drought. As for consumption, Rabobank notes a recovery as countries roll-out vaccination programs and economies begin to heal.

A 0.3 million tonnes deficit isn't particularly exciting and, historically, means a fairly balanced world supply outlook for the year ahead – if realised. However, Rabobank notes that the risks associated with the 2021 outlook are considerable and focused around three main areas: 1) La Niña dryness – particularly across Brazil's Centre South, 2) India's export potential, with lower government subsidies now confirmed, and 3) the speed of global consumption recovery in 2021. So while the fundamentals fail to excite, Rabobank notes that these three major risks. In our view, this means

more volatility into 2021 and – as a result – more opportunities to secure better pricing.

Closer to home, Rabobank notes the likely advantages of La Niña for Australia and Asia in 2021. Good rainfall in the forecast should assist domestic cane development and, ultimately, 2021 yields. Still, with a falling trend in cane area since 2015/16, it remains to be seen whether the 2021 cane crop can outshine 2020's 31m tonnes – fingers crossed.

Rabobank is a bank founded by farmers for farmers and provides finance to canegrowers and associated industries around the world. Our global coverage combined with commitment to knowledge and research provides Rabobank clients with unique insights into commodity trends to help them achieve their business goals.



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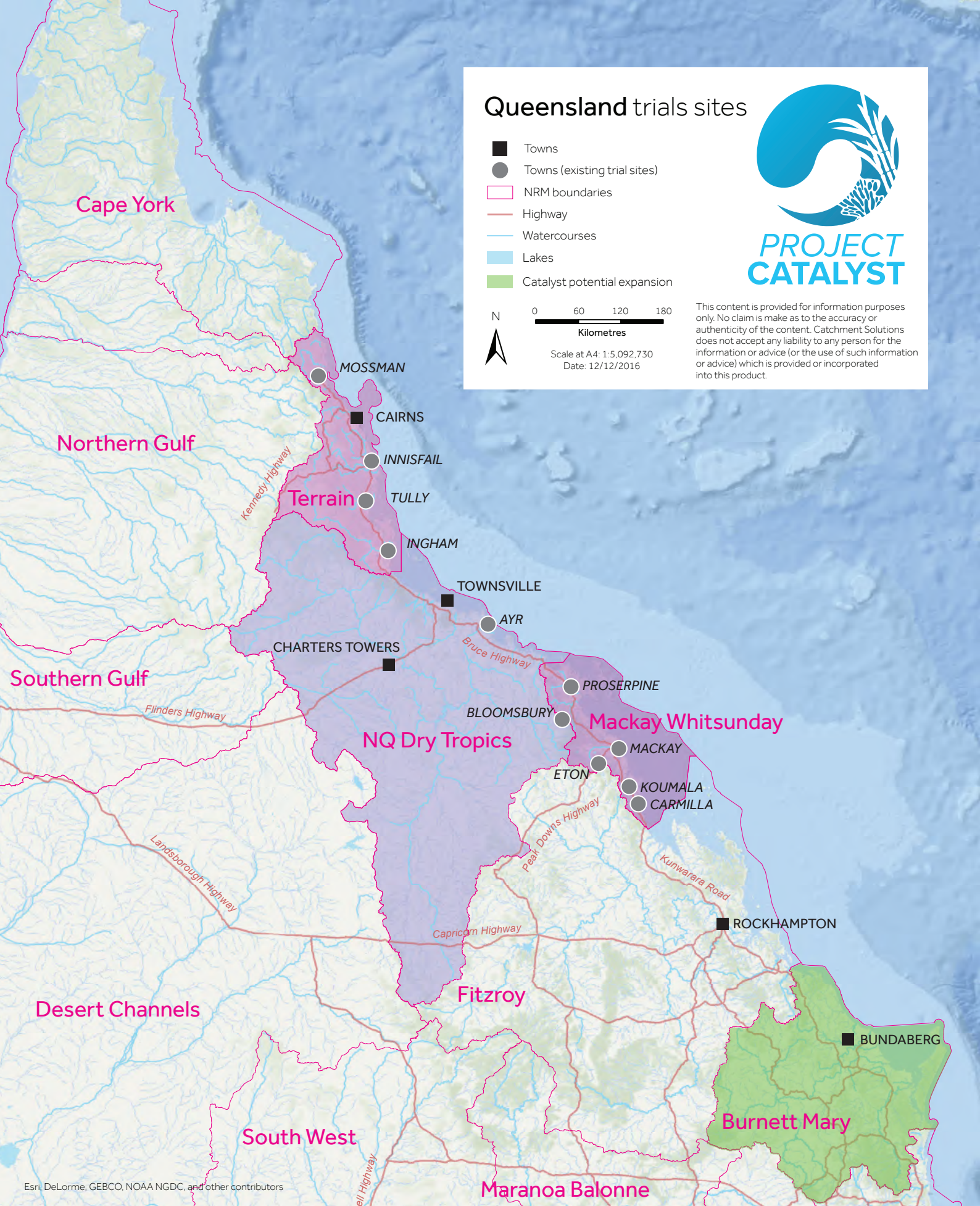


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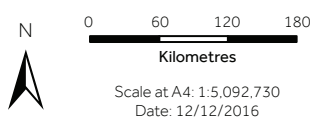




Queensland trials sites



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



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