



Sugar Research
Australia

**SUGAR RESEARCH
AUSTRALIA
DISTRICT
PRODUCTIVITY PLAN –
FAR NORTH
QUEENSLAND**

Brief Introduction

The District Productivity Plans have been developed through consultation and engagement undertaken through the Industry Services SRA team, across the sugarcane industry supply chain to identify constraints. Different sources of data have been used as inputs including grower ideas and contributions from past strategic workshops held with SRA, the recent ABARES survey, mill data, impact assessments where applicable and a range of targeted interviews and survey results.

The plans highlight these issues with proposed solutions and actions to address them and will be updated and reviewed annually to drive investment at a local, applied level. Reporting on progress will occur six monthly. The key to success will be implementation which will require leadership, change and focus.

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1 Australian Sugarcane Industry Productivity Goal

The strategic intent for the Australian sugarcane industry is to; utilise the current area under cane to increase productivity by 10% over the next five years. This 10% increase in productivity equates to a 3 million tonne increase in production across Qld and NSW by 2026.

At a sugar price of \$500 and 13.5 CCS each tonne of cane has a gross value of \$70 per tonne (sugar and molasses). By achieving this productivity improvement goal, the industry will generate an additional \$210m in gross revenue.

2 Far North Queensland Overview

Sugarcane is grown in the Far North region on approximately 76,000 hectares. It is crushed through three milling companies across five sub sections of the district with a total milling capacity of approximately 7.9 million tonnes.

The Far North will seek to improve productivity by 600,000 tonnes by 2026.

At stakeholder request, the Far Northern productivity plan is focussed on the five different milling areas with a different process across the areas.

- South Johnstone and Tully – the Local Expert Analysis (LEA) process is being implemented
- Mossman, Tableland and Mulgrave have been individual stakeholder group meetings followed by representative industry group meetings
- Mill area activities plans have been developed for Mossman, Tableland and Mulgrave
- The completion of the LEA processes will direct the South Johnstone and Tully activities plans.

3 Productivity Constraints

The Far North Queensland district will ‘win’ over the next 12 months through focusing on addressing three main priorities – constraint identification through investigation and analyses to assist future prioritisation and planning, improving CCS through measuring, monitoring and managing crop maturity and ripening, and increased clean seed distribution and new variety adoption.

Key issues for the district:

- Understanding key agronomic drivers for productivity improvement based on local practices and systems,
 - By identifying constraints to productivity at the mill, farm and block levels, strategies can be developed and implemented to improve their management
- Reducing the impact of RSD, and other diseases, through the improvement of clean seed distribution systems and new variety adoption through management information,
- Improving CCS at harvest,
 - By measuring and monitoring crop maturity, management strategies, such as crop ripeners, which may offer opportunities to improve CCS at harvest.

These three key issues, whilst broad, enable the mill area differences in practices and systems to be acknowledged through a local mill area activities schedule. The activities schedules are currently under development, however some of the larger activities are referred to in section 10 with the implementation and action table. In summary, the main productivity constraints for 2022 are:

- Constraint identification - potential 454,000 tonnes
- Varietal management, clean seed distribution and new variety adoption – potential 117,000
- Improvement in CCS through measurement, monitoring and management of cane maturity - potential 39,000 tonnes

4 Productivity data

PRODUCTIVITY SNAPSHOT OF DISTRICT 2020

FAR NORTH QUEENSLAND	Tully	South Johnstone	Mulgrave	Tableland	Mossman (incl. Tableland)
T Cane harvested	2,463,558	1,771,356	1,002,143	486,217	757,788
Ha harvested	28,210	21,707	11,402	5,345	9,610
Average T cane / ha	87.3	81.6	87.9	91	78.9
5 year average T cane / ha	86.6	78.5	86.8	97.9	88.6
Average CCS	12.95	12.23	12.41	14.35	12.98
Average sugar yield	11.33	9.98	10.91	13.06	10.24
Varieties Top 3 Total Tonnes	Q208 ^A – 932,751 Q200 ^A – 431,634 Q250 ^A – 228,678	Q200 ^A – 402,467 Q208 ^A – 376,979 Q253 ^A – 263,146	Q208 ^A – 337,317 Q253 ^A – 155,787 Q240 ^A – 115,542	KQ228 ^A – 209,266 Q208 ^A – 149,907 Q183 ^A – 37,967	Q208 ^A – 363,619 KQ228 ^A – 131,012 Q240 ^A – 57,335
Varieties (top 3 average sugar yield)	Q200 ^A – 12.51 Q253 ^A – 12.29 Q252 ^A – 11.76	SRA6 ^A – 12.09 SRA3 ^A – 11.42 Q253 ^A – 10.98	SRA6 ^A – 12.28 Q253 ^A – 12.11 Q252 ^A – 12.11	Q240 ^A – 14.86 Q200 ^A – 14.19 KQ228 ^A – 13.32	KQ228 ^A – 14.48 Q208 ^A – 10.04 Q240 ^A – 10.01
Mill owners	COFCO	MSF Sugar	MSF Sugar	MSF Sugar	Far Northern Milling
Clean seed uptake (% hectares)	0.47	0.24	0.17	0	TCL – 1.12 MAS – 0.25
Tissue culture uptake (% hectares)	0.001	0.004	0	0.02	0

5 Far North Queensland productivity goal

By 2026 tonnes of cane harvested will increase from 31 million tonnes to 34 million tonnes across the Australian industry. The Far North will seek to deliver its proportionate share of this growth (approximately 600,000 tonnes) through the implementation of activities and strategies that address the three priority areas of focus identified for 2022 and beyond. These priorities will be reassessed annually with six monthly updates on progress.

The way that the Far North district will 'win' over the next 12 months is through focusing on addressing – constraint identification through investigation and analyses to assist future prioritisation and planning, improving CCS through measuring, monitoring and managing crop maturity and ripening, and increased clean seed distribution and new variety adoption.

6 District Priorities

PRIORITY	OBJECTIVES
Constraint identification	<p>Improve productivity through investigation and analysis of productivity constraints and develop and extend management strategies</p> <ul style="list-style-type: none"> ○ Local Expert Analysis – South Johnstone and Tully. Undergo detailed investigations in productivity, practices and systems in collaboration with industry to identify strategies to take advantage of productivity improvement opportunities by 2022 ○ Develop plans to implement strategies for productivity improvement in collaboration with industry through education, knowledge transfer and adoption of best practice and tools. ○ Establish baseline data for key pest, disease and weed prevalence through data collection and measurement <ul style="list-style-type: none"> ○ Develop weed management strategies for navua sedge, balsam pear, itch grass by 2024 to reduce impact of these weeds by 83,000 tonnes across these weeds. ○ Wet tropics soil management reference booklet and extension program ○ Murray RT7 investment to address on farm constraints ○ Tully GBRF investment to address on farm constraints ○ Irrigation management in collaboration with MSF Sugar and CANEGROWERS Tableland
Varietal management, clean seed distribution and new variety adoption	<p>Increased adoption of new varieties through variety management and improved clean seed distribution</p> <ul style="list-style-type: none"> ○ Development and support of effective clean seed distribution strategies through the adoption of best practice <ul style="list-style-type: none"> ○ Reduced impact from RSD on-farm by 220,000tonnes by 2026 through education, improved measurement and improved clean seed distribution systems. ○ Clean seed plot improvement through adoption of best practice ○ Building confidence to support the adoption of new varieties through the development and support of regional variety management groups and data collection for shared learning
Improvement in CCS through measurement, monitoring and management of cane maturity	<p>Understand factors influencing CCS variability and develop and extend management strategies</p> <ul style="list-style-type: none"> ○ Improve understanding of factors influencing CCS <ul style="list-style-type: none"> ○ Review of CCS variability in Mulgrave and improve problem definition by December 2022 ○ CCS improvement through ripeners <ul style="list-style-type: none"> ○ Improve understanding of ripener efficacy, crop parameters and management opportunities by December 2023 ○ Support an increased proportion of tonnes harvest at the optimum time and/or at <70% moisture through demonstrating measuring, monitoring and management strategies ○ Investigate novel approaches to sugarcane ripening <ul style="list-style-type: none"> ○ Identify efficacy and impacts of sugarcane desiccants to improve CCS at harvest without yield impacts from current ripener options by December 2024

6.1 District Stakeholder Analysis

Snapshot of the region grower organisations, mills and productivity companies that SRA works with to improve productivity for the region.

Stakeholder type	Tully	South Johnstone	Mulgrave	Tableland (total)	Mossman
Milling companies	COFCO	MSF Sugar	MSF Sugar	MSF Sugar	Far Northern Milling
Grower representative organisations	CANEGROWERS Tully	CANEGROWERS Cairns Region CANEGROWERS Innisfail ACFA	CANEGROWERS Cairns Region	CANEGROWERS Tableland	CANEGROWERS Mossman ACFA
Productivity companies	Tully Cane Productivity Services Limited (TCP SL)	Innisfail Babinda Cane Productivity Services Limited (IBCPS)	MSF Sugar	MSF Sugar CANEGROWERS Tableland	Mossman Agricultural Services (MAS)
Regional variety committees	Northern Regional Variety Committee				

7 Recent stakeholder engagement events and activities delivered for impact

Transforming research findings into tools, products and services that save the industry time and money and improve environmental performance is a strategic initiative for SRA.

The following recent engagement events delivered through SRA demonstrate the service model and are examples of where SRA works to effectively bridge the gap between research and practice to improve district productivity. Key stakeholder engagement has occurred with the following industry groups to develop the district productivity plan through a combination of one-on-one, group meetings or through the Local Expert Analysis processes in Tully and South Johnstone; CANEGROWERS Mossman, Mossman Agricultural Services, Far Northern Milling, CANEGROWERS Tableland, MSF Sugar, CANEGROWERS Cairns Region, CANEGROWERS Innisfail, ACFA, Innisfail Babinda Cane Productivity Services, Tully Cane Productivity Services Limited, Tully Sugar Limited, Cairns Region Young Grower Group, CANEGROWERS Tully and growers throughout the Far North.

	DELIVERED THROUGH SRA	DELIVERY PARTNER EXTERNAL TO SRA
Services and projects, assistance with growers provided through on farm trials	<p>Cane to Creek 2.0</p> <ul style="list-style-type: none"> • 2018 – 2021 • Improved knowledge of correct application of imidacloprid, the SIX EASY STEPS program, new herbicides and water quality monitoring processes and purposes. 	<ul style="list-style-type: none"> • Australian Government's Reef Trust • Queensland Department of Agriculture and Fisheries • Burdekin Bowen Integrated Floodplain Management Advisory Committee

		<ul style="list-style-type: none"> Burdekin Productivity Services Mossman Agricultural Services Tully Sugar / COFCO
	<p>Mackay Whitsunday Cane to Creek</p> <ul style="list-style-type: none"> 2020 – 2023 Improved knowledge of correct application of imidacloprid, the SIX EASY STEPS program, and water quality monitoring processes and purposes. 	<ul style="list-style-type: none"> Australian Government's Reef Trust Great Barrier Reef Foundation Mackay Area Productivity Services Plane Creek Productivity Services
	<p>Complete nutrient management planning for the Russell-Mulgrave and Lower Barron catchments</p> <ul style="list-style-type: none"> 2020 - 2022 Agronomic service and nutrient management plans developed for 100 farms over two years Achieve the adoption of all six steps of the SIX EASY STEPS Knowledge of paddock-scale nutrient budgets and their effect on water quality Improved water quality outcomes in the Russell-Mulgrave Catchment through nutrient management planning 	<ul style="list-style-type: none"> Australian Government's Reef Trust Queensland Department of Environment and Science
	<p>Burdekin irrigation: Increasing industry productivity and profitability through transformational, whole of systems sugarcane approaches that deliver water quality benefits</p> <ul style="list-style-type: none"> 2020 - 2024 Transition growers to proven world class scalable, sustainable and technologically advanced practices in irrigation management Take a whole-of-systems approach that includes water quality monitoring to ensure other priority issues such as improving nutrient and pesticide management are captured Maximise industry profitability through smarter irrigation practices Standardise the process of grower engagement, to a powerful, multi-partnered and cooperative approach that will deliver more value to growers, investors and industry stakeholders Work across organisations to maximise outcomes from strategic coordination, collaborative linkages and consistent messaging 	<ul style="list-style-type: none"> Australian Government's Reef Trust Great Barrier Reef Foundation Farmacist AgriTech Solutions Burdekin Productivity Services Burdekin Bowen Integrated Floodplain Management Advisory Committee James Cook University Queensland Department of Agriculture and Fisheries NQ Dry Tropics
	<p>Smarter Irrigation for Profit – Phase 2</p> <ul style="list-style-type: none"> 2019 – 2022 Improved irrigation knowledge and skills of sugar extension and productivity staff by building their capacity to measure and assess irrigation systems Establishment of irrigation innovation training hubs across four sugarcane regions – Tableland, Burdekin, Central and Southern A readily accessible resource bank storing participant materials, case studies, information sheets, instructional videos, workbooks and webinar series – https://smarterirrigation.com.au/industry/sugar/ Establishment of demonstration sites in the Bundaberg region, which can be used to evaluate 	<ul style="list-style-type: none"> Australian Government Department of Agriculture, Water and the Environment (Rural R&D for Profit) Queensland Department of Agriculture and Fisheries Cotton Research and Development Corporation

	<p>and demonstrate precision automated furrow irrigation</p> <ul style="list-style-type: none"> • Development of design guidelines and indicative system costs and benefits • Tools which can interrogate and analyse the data collected by the automation system for improved irrigation decisions 	
	<p>Support of cane farmer trials of enhanced efficiency fertilisers in the catchments of the Great Barrier Reef</p> <ul style="list-style-type: none"> • 2016 - 2022 • To identify when and where enhanced efficiency fertilisers (EEFs) can provide a significant increase in nitrogen use efficiency (NUE) and reduction in nitrogen losses, resulting in a more profitable and sustainable farming business • To generate data on the performance of commercial EEF products on farm productivity, economics, NUE, N rates • Produce robust information for inclusion in industry fertiliser recommendations through decision support tool • Case studies that demonstrate the economic returns of EEFs vs. conventional fertilisers 	<ul style="list-style-type: none"> • Australian Government's Reef Trust • Great Barrier Reef Foundation
	<p>On ground testing and modelling of the effectiveness of enhanced efficiency fertilisers in the Wet Tropics catchments of the Great Barrier Reef</p> <ul style="list-style-type: none"> • 2020 - 2022 • Knowledge about when and where to use EEFs in place of urea that will lead to reduced N losses while at least maintaining and potentially improving yield • Agronomic and economic information growers can use to make informed decisions on how best to utilise EEF's in their farming systems • Decision support tool developed to guide growers on selecting appropriate EEFs • An industry publication that summarises key findings and guide for growers 	<ul style="list-style-type: none"> • Australian Government's Reef Trust • Great Barrier Reef Foundation • CSIRO • CANEGROWERS • Productivity Service Companies
	<p>Advancing techniques for diagnosis of Yellow Canopy Syndrome</p> <ul style="list-style-type: none"> • 2019 – 2023 • In-field epidemiology and dynamics of both yellow canopy syndrome and likely causal agents at species level • Development of a molecular diagnostic approach to characterise the insect species likely to be involved as causal agents • Rapid in-field diagnostics for the causal agent and/or YCS symptom expression. 	<ul style="list-style-type: none"> • Australian Government Department of Agriculture, Water and the Environment (Rural R&D for Profit) • Grains Research Development Corporation • Cotton Research & Development Corporation • Hort Innovation • Wine Australia • Forest & Wood Products Australia
	<p>Beyond imidacloprid – Chemical and biorational alternatives for managing canegrubs</p> <ul style="list-style-type: none"> • 2020 – 2025 	<ul style="list-style-type: none"> • Queensland Department of Agriculture and Fisheries

	<ul style="list-style-type: none"> • Build on existing commercial relationships with three agrochemical companies to select and screen alternative compounds to imidacloprid canegrub control • Evaluate novel and existing insecticidal compounds against canegrubs in selected cane-growing regions • Evaluate the run-off loss risk of the compounds in the wet season and irrigated conditions • Engage with all stakeholders to generate support for a new approach to control canegrubs • Develop a field data set that supports the registration of effective compounds 	
	<p>SIX EASY STEPS – continuing perspectives in time and space</p> <ul style="list-style-type: none"> • 2017 - 2022 • Establish a mechanism to update the SIX EASY STEPS knowledge base and guidelines (specifically N) when sound scientifically based information becomes available from various R&D sources. • Link to other current and planned projects to develop sets of district-specific guideline tables that indicate when and how to adjust the baseline SIX EASY STEPS guidelines away from 'normal' circumstances. • Provide specific N guidelines and nitrogen use efficiency (NUE) data from continuing for new field trials associated with aspects of temporal/spatial management options. • Update the SIX EASY STPES technology transfer mechanisms. 	<ul style="list-style-type: none"> • University of Southern Queensland
	<p>Harvester losses assessment by real-time Machine Vision Systems</p> <ul style="list-style-type: none"> • 2019 – 2022 • Identify machine vision sensing technologies that could be used for real-time estimation of harvester losses. • Proof-of-concept cane loss sensing equipment and algorithms • Proof-of-concept sensing technology to detect cane losses 	<ul style="list-style-type: none"> • University of Southern Queensland
	<p>Maximising cane recovery through development of a harvesting decision support tool</p> <ul style="list-style-type: none"> • 2020 – 2023 • An updated base agronomic/economic model • An online, freely available decision support tool with an easy-to-use interface • Knowledge from analysis of additional burned cane data which allows industry to make economic decisions in a burned cane environment 	<ul style="list-style-type: none"> • Queensland Department of Agriculture and Fisheries
	<p>Australian sugarcane industry soil health benchmarking in the Wet Tropics region of QLD – increasing profit and transforming soil health practices through cooperative industry research, extension and adoption</p> <ul style="list-style-type: none"> • 2019 – 2021 • Provide evidence of the benefits of adopting improved farming system practices on soil health and subsequent advantages to business productivity, profitability and sustainability. 	<ul style="list-style-type: none"> • Australian Government Department of Agriculture, Water and the Environment (National Landcare Program) • Queensland Department of Agriculture and Fisheries • T.R.A.P Services

	<ul style="list-style-type: none"> Establish soil health benchmarks to be used in soil, pest and root test interpretation. Verify a subset of soil chemical, physical, and biological indicators to describe soil health and measure soil response to practice adoption. Create a network of more knowledgeable soil health service providers, led by engaged trusted private technical specialists to improve capability to transfer knowledge, skills and solution strategies to growers. Provide training and local validation of the “Soil Health Ute Toolkit”, to be used in-field with growers. Identify soil, production and profit constraints caused by current practices and build capability to address impediments. 	
	<p>Developing an integrated device for on-farm detection of sugarcane diseases</p> <ul style="list-style-type: none"> 2020 – 2023 A hand-held diagnostic device that can accurately detect specific pathogens in sugarcane samples in the field. Validation of integrated device as an on-farm diagnostic tool for surveillance and monitoring, focussing on RSD as a target disease. 	<ul style="list-style-type: none"> Australian Research Council Griffith University

8 Events scheduled

Month	Events (as at 31.1.22)
January	
February	<ul style="list-style-type: none"> District Productivity Plan launch
March	<ul style="list-style-type: none"> SIX EASY STEPS Toolbox – Legume biomass workshops Northern Regional Variety Committee meeting <i>Balsam pear knockdown trial completed</i>
April	<ul style="list-style-type: none"> SIX EASY STEPS Toolbox – Legume biomass workshops EEF60 industry workshops <i>Balsam pear pre-emergent trial completed</i>
May	<ul style="list-style-type: none"> SRA Tully Field Day (5th May) SRA Meringa Field Day (10th May) Variety Guide launch SIX EASY STEPS workshop (Mossman) EEF60 industry workshops <i>Navua sedge management trial completed</i>
June	<ul style="list-style-type: none"> Report on progress and update District Productivity Plan EEF60 industry workshops <i>Ripener demonstration harvests</i>

	<ul style="list-style-type: none"> • <i>Itch grass pre-emergent trial – issues with germination, trial postponed until a replacement site is established in the second half of the calendar year</i>
July	<ul style="list-style-type: none"> • Variety ID Workshop (Meringa) • <i>Ripener demonstration harvests</i>
August	<ul style="list-style-type: none"> • Final Assessment Trial field walks • SIX EASY STEPS Toolbox – Plant cane after legumes workshops • SIX EASY STEPS Toolbox – Waterlogged soils workshops
September	<ul style="list-style-type: none"> • Final Assessment Trial field walks
October	<ul style="list-style-type: none"> • Final Assessment Trial field walks • Herbicide trial/demonstration field walks • SIX EASY STEPS Toolbox – Late season ratoons and final ratoon workshops
November	<ul style="list-style-type: none"> • Fallow crop management workshops • Herbicide trial/demonstration field walks
December	<ul style="list-style-type: none"> • Herbicide trial/demonstration field walks

*Activities and events in italics denotes non-invitational activities, indicating planned timing of research or demonstration activities.

9 Implementation Strategy and Actions

The table below presents activities and their corresponding strategic targets, which are common across some or all of the mill areas within the Far North. This table is not an exhaustive list of activities, with a second working document to be produced where necessary with greater detail to support collaborating organisations to deliver agreed upon activities at a local level and sub region.

All activities will address the three prioritised constraint areas.

- Constraint identification,
- Varietal management, clean seed distribution and new variety adoption,
- Improvement in CCS through measurement, monitoring and management of cane maturity.

Reporting on progress will regularly with key stakeholders. SRA will update this document to reflect current activity delivered through SRA, including in collaboration with other delivery partners, that will deliver research and contribute towards achieving the district productivity goal.

9.1 Constraint identification

Investments in this priority will improve productivity through investigation and analysis of productivity constraints and develop and extend management strategies. Activities include:

- Local Expert Analysis – South Johnstone and Tully. Undergo detailed investigations in productivity, practices and systems in collaboration with industry to identify strategies to take advantage of productivity improvement opportunities by 2022
- Develop plans to implement strategies for productivity improvement in collaboration with industry through education, knowledge transfer and adoption of best practice and tools.
- Establish baseline data for key pest, disease and weed prevalence through data collection and measurement
 - Develop weed management strategies for navua sedge, balsam pear, itch grass by 2024 to reduce impact of these weeds by 83,000 tonnes across these weeds.
 - Wet tropics soil management reference booklet and extension program
 - Murray RT7 investment to address on farm constraints
 - Tully GBRF investment to address on farm constraints
- Irrigation management in collaboration with MSF Sugar and CANEGROWERS Tableland

Activities will be delivered in collaboration with ACFA, Innisfail Canegrowers, IBCPS, MSF Sugar, Tully Canegrowers, TCPSL, Tully Sugar Limited, Growers, USQ, Mossman Agricultural Services, Far Northern Milling, IBCPS and other collaborators TBC.

Targeted Practices	How will we do it? <i>Measurement of the issue; Education and knowledge transfer; Planning, Industry engagement, New practices; Product; or Service</i>	What is the activity?	What outputs will be produced?	Which MEE outcomes are most relevant?	Investment Outcome	Investment measures
Local Expert Analysis project to investigate local productivity constraints and promote pathways for R&D outcomes for the South Johnstone and Tully industries (December 2022)	Measurement of the issue	Undergo detailed investigations into productivity, practices, and systems in collaboration with industry to identify strategies to take advantage of opportunities	Identification of constraints	Improved problem definition	Outputs from Local Expert Analysis activities will direct future initiatives and investment for productivity improvement plans <i>Increased understanding of productivity constraints</i>	Adoption of recommendations from Local Expert Analysis projects within industry strategic plans and SRA District Plan
	Planning	Develop plans to implement strategies for productivity improvement in collaboration with industry through education, knowledge transfer and adoption of best practice and tools.	Identification of opportunities for improvement	Improved solution design	Catalyst to develop evidence-based productivity improvement plans <i>Improved constraint remediation strategies</i> <i>Improved local RD&E investment strategies</i>	

Targeted Practices	How will we do it? <i>Measurement of the issue; Education and knowledge transfer; Planning, Industry engagement, New practices; Product; or Service</i>	What is the activity?	What outputs will be produced?	Which MEE outcomes are most relevant?	Investment Outcome	Investment measures
	Measurement of the issue	Establish baseline data for key pest, disease, weed prevalence through data collection and measurement	Development of useful information and strategies to manage identified constraints	Improved problem definition	Impact is strongly linked to follow-up activities / projects that may be new or add value to existing local industry programs <i>Build on and add value to local initiatives</i>	
Development of useful information and strategies to manage identified weed management constraints (December 2022)	Research	Navua sedge chemical control field trials Balsam pear chemical control pot trial and field trials Itch grass management trials	Develop management strategies for emerging weed issues including navua sedge, balsam pear and itch grass	Research, breeding and solution development	Reduction in area impacted by navua sedge, balsam pear and itch grass Change in productivity from weed control <i>Negate yield losses from emerging weed issues</i>	These weeds are emerging issues. Avoided production losses 83,000 tonnes
Identification of soil constraints Identification of opportunities for improvement Development of useful information and strategies to manage identified soil constraints (December 2023)	Education and knowledge transfer	Collation, communication, and extension of previously collected data	Small Farms / Smart farms; soil health (grant funding required) Wet Tropics soil management reference booklet and extension program	Increased solution uptake	<i>Increased understanding of soil characteristics and management strategies for Wet Tropics – Coastal areas</i>	Attendees at soil extension events Uptake of the Wet Tropics soils management booklet Change in environmental metrics – e.g. nutrient run off
Reduced impact from RSD on-farm	Education and knowledge transfer	RSD focussed workshops, Integrated Disease Management communication and extension programs (December 2021)	RSD workshop delivered by SRA	Solution deployment	Reduced RSD incidence in plant source inspections (seed cane) Reduced RSD incidence in commercial crops <i>Information and resources for industry to develop IDM strategies</i>	Reduce RSD incidence in seed cane sources to <5% by 2026
		RSD focussed workshops, Integrated Disease Management	Delivery of communication materials on IDM strategies	Solution deployment	Reduced RSD incidence in plant source inspections (seed cane)	Reduce RSD incidence in seed cane sources to <5% by 2026

Targeted Practices	How will we do it? <i>Measurement of the issue; Education and knowledge transfer; Planning, Industry engagement, New practices; Product; or Service</i>	What is the activity?	What outputs will be produced?	Which MEE outcomes are most relevant?	Investment Outcome	Investment measures
		communication and extension programs (December 2022)			Reduced RSD incidence in commercial crops <i>Information and resources for industry to develop IDM strategies</i>	
Trialling of novel RSD technologies at the mill	Product	Development RSD detection technology at the mills to support RSD incidence benchmarking and data collection (December 2024)	Novel RSD detection technology	Solution deployment	RSD incidence mapping and survey data	Adoption of technology at the mill

9.2 Sugarcane maturity and CCS improvement

Investments in this priority will enable understanding of the factors influencing CCS variability and develop and extend management strategies. Activities will include:

- Improve understanding of factors influencing CCS
 - Review of CCS variability in Mulgrave and improve problem definition by December 2022
- CCS improvement through ripeners
 - Improve understanding of ripener efficacy, crop parameters and management opportunities by December 2023
- Support an increased proportion of tonnes harvest at the optimum time and/or at <70% moisture through demonstrating measuring, monitoring and management strategies
- Investigate novel approaches to sugarcane ripening
 - Identify efficacy and impacts of sugarcane desiccants to improve CCS at harvest without yield impacts from current ripener options by December 2024

Activities will be delivered in collaboration with Canegrowers Cairns Region, MSF Sugar, growers and other collaborators to be confirmed and are encouraged to contact the district manager, Gavin Rodman.

Targeted practices (Details of required action)	How will we do it? <i>Measurement of the issue; Education and knowledge transfer; Planning, Industry engagement, New practices; Product; or Service</i>	What is the activity?	What outputs will be produced? (include targets)	Which MEE outcomes are most relevant?	Investment outcome/s	Investment measure
Undergo investigations into the factors that are driving CCS variation, particularly in Mulgrave to identify opportunities for CCS improvement (December 2022)	Research	Review of CCS variability in Mulgrave	Recommendations to improve CCS in Mulgrave	Research, breeding and solution development	Opportunities identified to improve CCS <i>Improved understanding of factors influencing CCS fluctuations in Mulgrave</i>	Adoption of recommendations from CCS review by industry and incorporation into local strategic plans and SRA District Plan Potential gain in CCS if recommendations adopted
Demonstrate opportunities for ripeners and build upon previous work (December 2022)	Research	Demonstrations on the appropriate use of ripeners	Local case studies on the use of ripeners	Research, breeding and solution development	Increased CCS at harvest Improved confidence in harvest decisions Opportunities for alternative management approaches through chemical ripening <i>Improved understanding of factors influencing ripener efficacy and management opportunities</i>	Adoption of maturity sampling and ripening programs prior to harvest Change in CCS from use of ripeners (\$/ha change) Number of growers and area using ripeners (gross economic benefit)
Trial novel approaches to sugarcane ripening (December 2022)	Research	Innovative pilot research trials to develop an understanding of the effectiveness and opportunities for sugarcane desiccants	New R&D outcomes and opportunities for sugarcane desiccants	Research, breeding and solution development	New R&D <i>Trials to investigate opportunities for further R&D on sugarcane desiccants</i>	CCS increase and profitability improvement compared to controls

9.3 Increased clean seed distribution and variety adoption

Investments in this priority will increase adoption of new varieties through variety management and improved clean seed distribution. Activities will include:

- Development and support of effective clean seed distribution strategies through the adoption of best practice
 - Reduced impact from RSD on-farm by 220,000tonnes by 2026 through education, improved measurement and improved clean seed distribution systems.
- Clean seed plot improvement through adoption of best practice
- Building confidence to support the adoption of new varieties through the development and support of regional variety management groups and data collection for shared learning

The activities will be implemented in collaboration with Mossman Agricultural Services, Tablelands Canegrowers, MSF Sugar, IBCPS, TCPSL, Tully Sugar Limited and other collaborators to be confirmed.

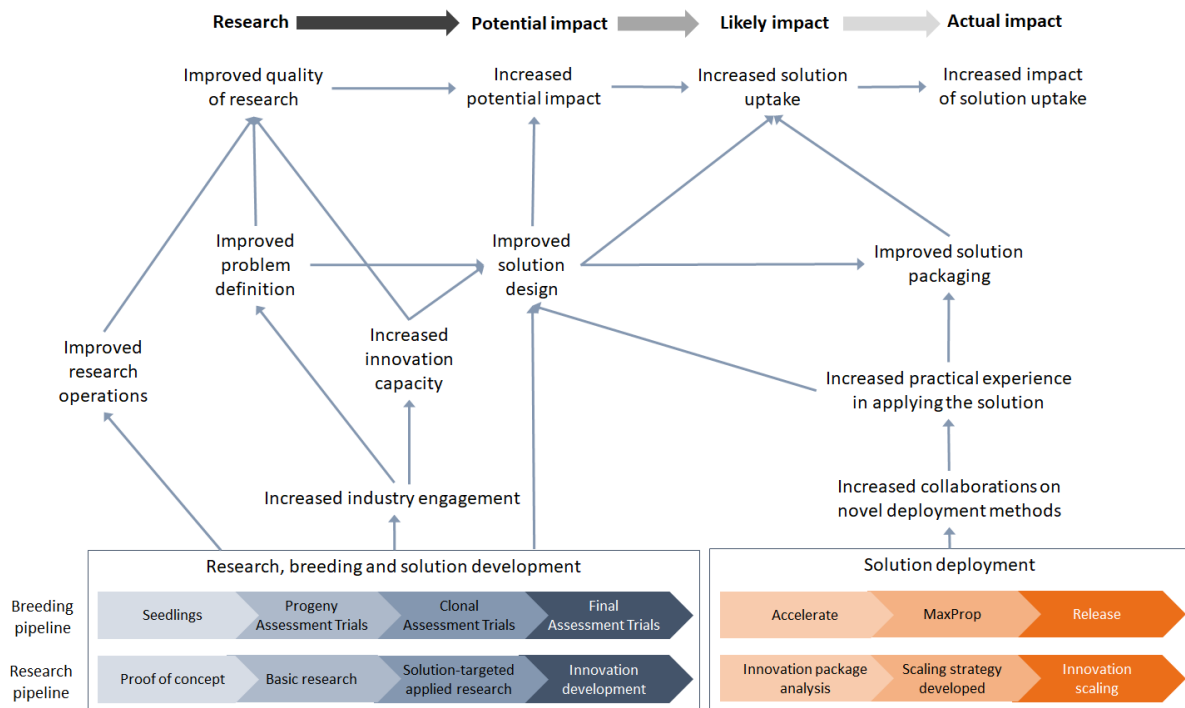
Targeted practices (Details of required action)	How will we do it? <i>Measurement of the issue; Education and knowledge transfer; Planning, Industry engagement, New practices; Product; or Service</i>	What is the activity?	What outputs will be produced? (include targets)	Which MEE outcomes are most relevant?	Investment outcome/s	Investment measure
Clean seed plot improvement through adoption of best practice (June 2022)	Education and knowledge transfer	Implementation of "Procedures for the Establishment and Operation of Approved-Seed Plots"	Clean seed distribution program upgrade roadmap (IBCPS)	Improved solution packaging	Development of a roadmap to support the implementation of approved seed plot guidelines where required <i>Increased clean seed distribution</i>	Clean seed sales increased to 0.5% of mill area by 2026. Industry best practice benchmark is 1%.
	Planning	Development of effective clean seed distribution strategies	Renewal of Cane Variety Management, Propagation and Distribution Agreements			
Development of new and support of existing regional variety management group and data collection for shared learning across Far North (and other districts) (Ongoing)	Education and knowledge transfer	Establishment of variety management groups where necessary Support existing variety management groups	Local information on variety management and performance	Increased industry engagement	Building confidence to support the adoption of new varieties <i>Increased confidence in new variety performance</i> <i>Increased adoption of new varieties</i> <i>Improved on-farm variety selection</i>	Greater adoption of new varieties where appropriate Measure and report pre and post variety adoption

10 Monitoring, evaluation and economics (MEE)

The intention with impact framework is that best practice MEE informs decision making and drives learning and improvement and enables SRA to demonstrate the value provided from investments to industry and its investment partners.

Cascading through from district productivity plans to the research investment plans and linking to the strategic plan, indicators will be commonly applied and focused on outcomes. Monitoring, evaluation and economics serves different functions and provides accountability, demonstrates worthiness or merit of an investment or action, identifies improvements and informs decision-making to deliver greater value from investments.

It is focused on delivery to impact and the following outcomes map has been developed to show how the different investments and activities contribute to achieving the endpoints of productivity, profitability and sustainability and progress towards these points. It is aimed on the end desired outcomes as shown by the top line charting from 'Research' to 'Potential Impact' to 'Likely Impact' to Actual Impact.



The district productivity plans will be updated every 6 months with progress reports and reviewed annually to then determine the next plan, track progress and measure impact.



Gavin Rodman | District Manager Far North

T 07 4056 4508 **M** 0476 807 355

Meringa Office 71378 Bruce Highway Gordonvale QLD 4865 Australia

Postal Address PO Box 122 Gordonvale QLD 4865 Australia

sugarresearch.com.au