



Sugar Research  
Australia

# DISTRICT PRODUCTIVITY PLAN – SOUTH JOHNSTONE 2023

## Introduction

This ***District Productivity Plan – South Johnstone 2023*** has been developed through consultation and engagement undertaken by SRA’s Industry Services team with stakeholders across the sugarcane industry supply chain to drive investment at a local, applied level. It is reviewed and updated annually.

Different sources of data have been used as inputs including grower ideas and contributions from past strategic workshops held with SRA, the industry ABARES survey, through the Local Expert Analysis (LEA) project, mill data, impact assessments where applicable and a range of targeted interviews and survey results.

The plan identifies constraints and proposes solutions and actions to address them. The key to success will be implementation which will require leadership, change, and focus. Reporting on progress will occur six monthly.

*Version control: August 2023*  
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## 1 Australian Sugar Industry Productivity Goal

The strategic intent for the Australian sugarcane industry is to; utilise the current area under cane to increase productivity by 10% which 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 \$210 million in gross revenue.

## 2 South Johnstone Overview

Sugarcane is grown in the South Johnstone cane supply area on approximately 22,000 hectares from Fishery Falls in the north to Feluga in the south. This area is supplied by growers from historically two different districts, Innisfail and Babinda.

Sugarcane is crushed through one mill in the region (South Johnstone). South Johnstone mill crushes an average of 1.6 million tonnes of cane per year to manufacture approximately 200,000 tonnes of raw sugar. South Johnstone mill optimal crushing capacity is 560 tonnes of cane per hour. The South Johnstone mill area has the potential to crush 1.8 million tonnes of cane per season.

This District Productivity Plan covers around two thirds (approx. 16,000 ha) of the South Johnstone cane supply area from roughly the North Johnstone River south to Feluga, this area will be referred to as the *South Johnstone District* throughout this document. Findings and recommendations from this plan will be applicable to the entire South Johnstone cane supply area.

## 3 Productivity Opportunities and Constraints

In mid-2021 a Local Expert Analysis (LEA) was initiated in the South Johnstone District. A general LEA industry reference group was formed for the area which included local industry scientists from agronomy, pathology, machinery, variety development and NIR. The group objectively considered local constraints influencing yield and milling operations. The reference group included representatives from MSF Sugar Pty Ltd, CANEGROWERS Innisfail, Innisfail Babinda Cane Productivity Service (IBCPS), Australian Cane Farmers Association (ACFA), the Department of Agriculture and Fisheries, Queensland (QDAF) and Sugar Research Australia (SRA).

In collaboration with industry representatives the LEA has now assembled targeted actions to address the known constraints while working alongside stakeholders to achieve an improvement in productivity and profitability.

## 4 Productivity data

SOUTH JOHNSTONE MILL	2017	2018	2019	2020	2021	2022
T Cane harvested	1,801,902	1,602,948	1,517,654	1,771,373	1,477,841	1,708,282
Ha harvested	22,708	22,205	21,527	21,708	21,437	21,040
Average T cane/ ha	79.4	72.2	70.5	81.6	68.9	81.2
Average CCS	12.08	13.69	12.95	12.33	11.47	11.65
Average tonnes CCS/ ha	9.6	9.9	9.1	10.1	7.9	9.4

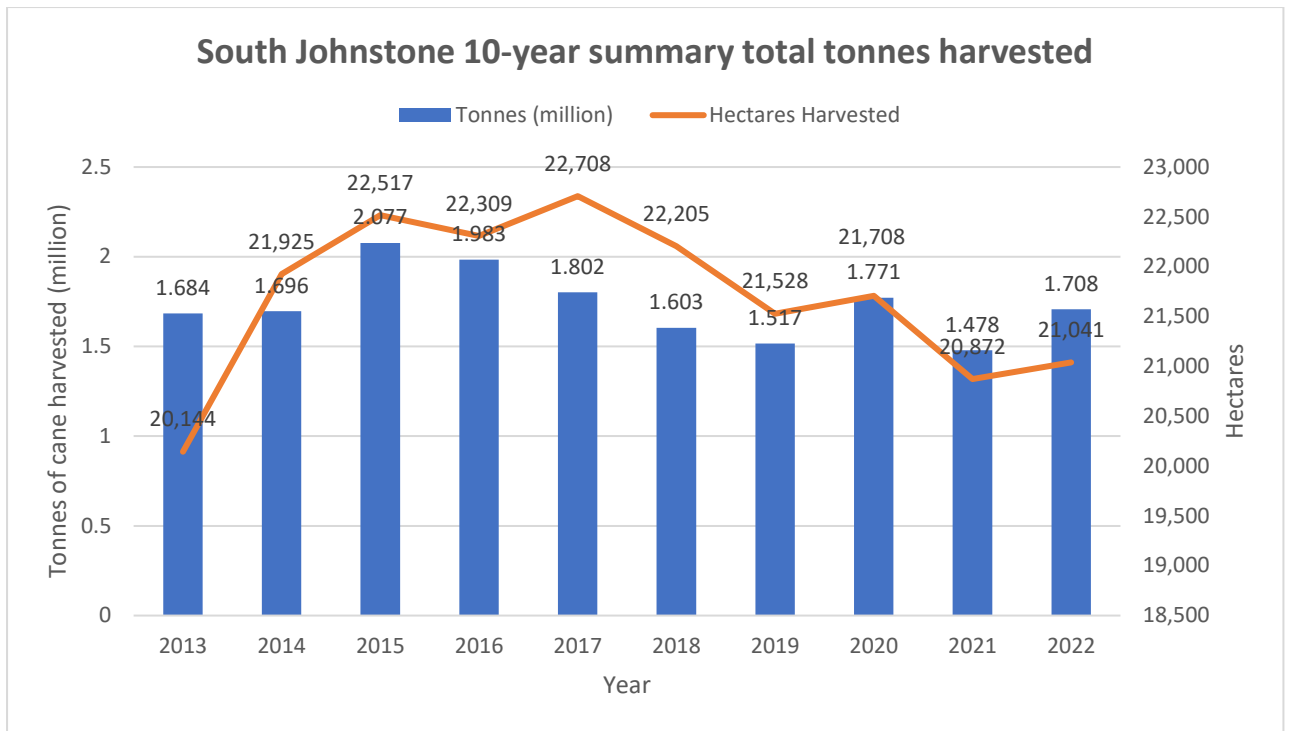


Figure 1: 10-year summary of total tonnes crushed compared to the hectares harvested for South Johnstone

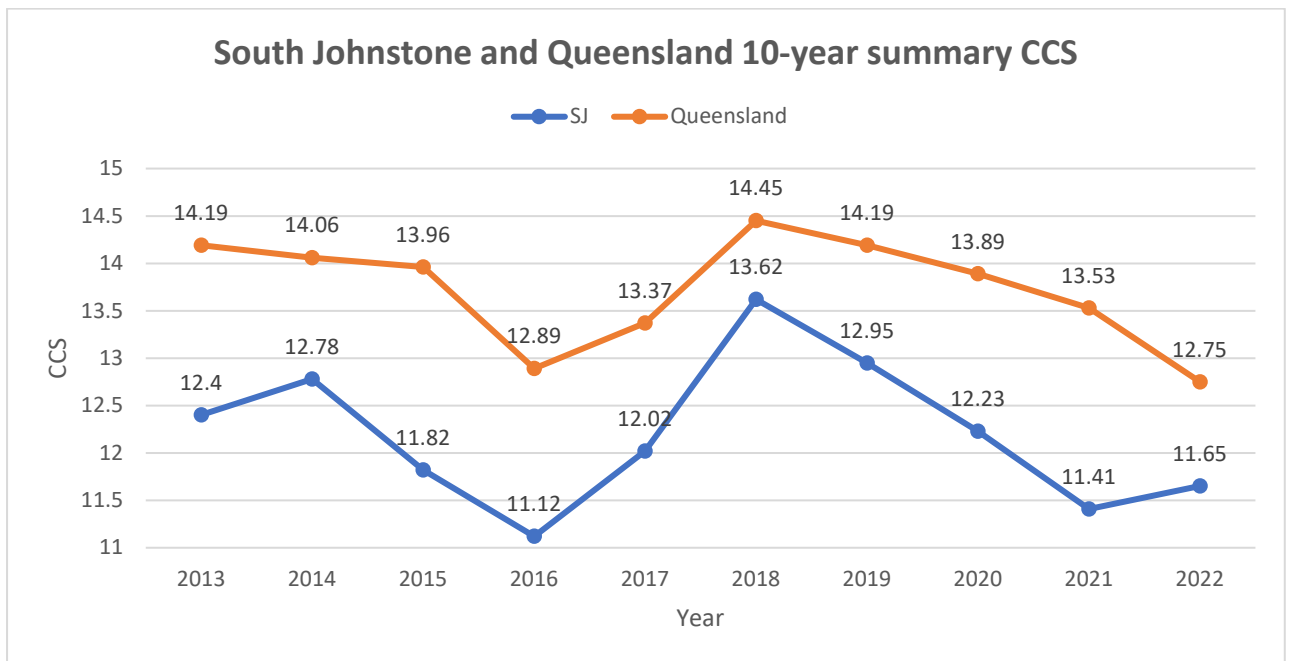


Figure 2: 10-year summary of CCS for South Johnstone compared to Queensland

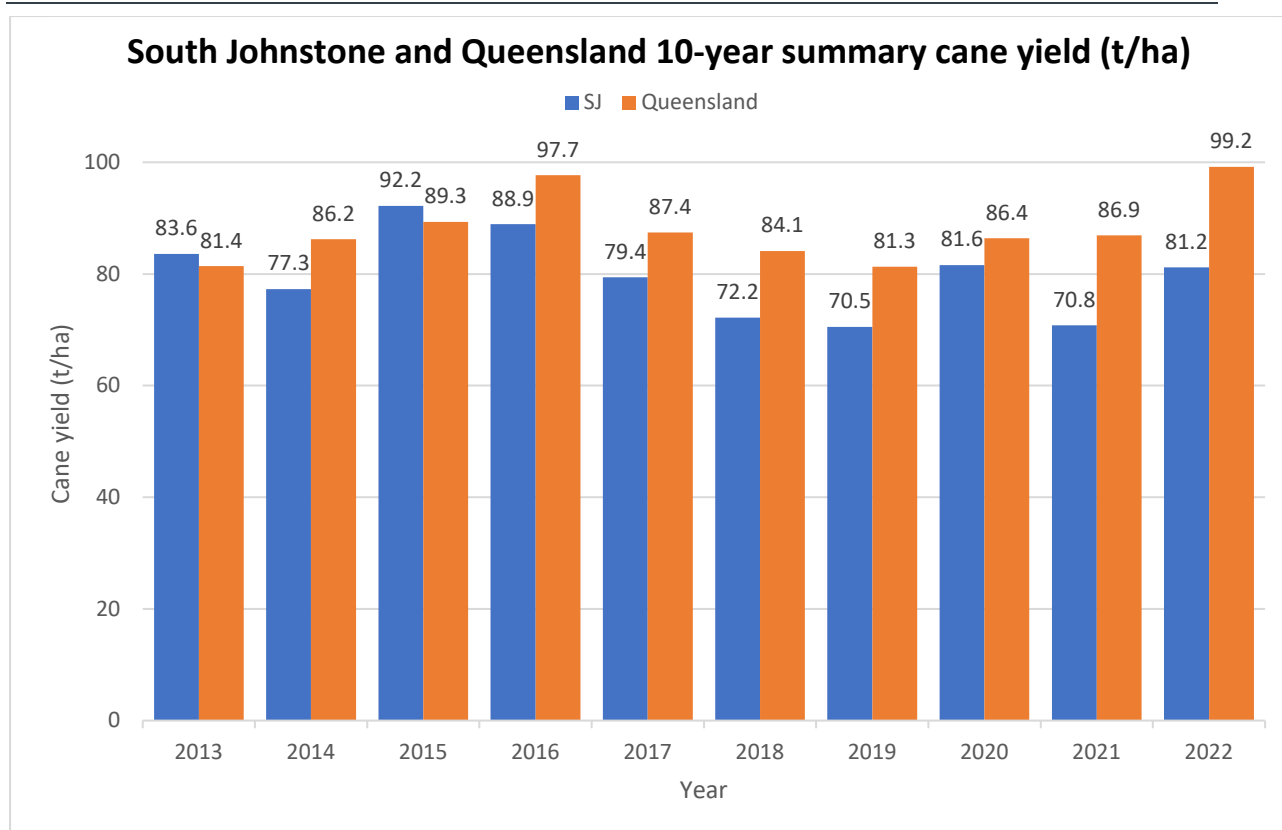


Figure 3: 10-year summary of South Johnstone cane yield (tonnes per hectare) compared to Queensland.

PRODUCTIVITY SNAPSHOT	5 YEAR AVERAGE	What is the target for the district to increase productivity?
<b><i>District - South Johnstone Mill area</i></b>		
T Cane harvested	1,634,343	1,862,945
Ha harvested	21,917	23,000
Average T cane/ha	74.5	85
Average Yield ratoon T cane/ha	73.4	82
Average CCS	12.45	12.50
Average tonnes CCS/ ha	9.31	10.6
Varieties Top 5 Total Tonnes / %	<ul style="list-style-type: none"> <li>- Q200 (23.4%, 75.8 t/ha)</li> <li>- Q208 (21.3%, 74.7 /ha)</li> <li>- Q253* (8.3%, 82.3 t/ha)</li> <li>- Q250 (7.4%, 73.0 t/ha)</li> <li>- Q231 (6.1%, 67.4 t/ha)</li> </ul> *Q253 has three years of data the others have five.	Suite of varieties for growers to choose from for a range of production environments that have higher yield and disease resistance than those currently grown.
# farming entities	220	220
# mills	1	1
Clean seed uptake (percent mill area planted to clean seed (%))		1%
Tissue culture uptake (seedlings) annually		50,000 seedlings (5 hectares)

## 5 South Johnstone productivity goal

It is critical the South Johnstone District productivity plan contributes to Australia’s targeted increase volume of cane to 34 million tonnes under current area. The South Johnstone District needs to improve productivity and target a minimum of 85 tonnes of sugarcane per hectare.

The initial LEA analysis suggested that the most significant constraints affecting productivity were poor nutrition in older ratoon crops (Skocaj 2023), severe Pachymetra root rot, widespread incidence of RSD, low uptake of Pachymetra resistant varieties, poor adoption of highly productive new varieties, less than ideal extension materials and insufficient quantities of approved seed (Magarey et al., 2023).

There is also opportunity to adopt harvesting tools, such as Harvest Mate, to optimise economic returns for industry (Magarey *et al.*, 2023). The split to achieve an additional 228,602 tonnes of cane per year in the South Johnstone region includes:

- 120,000 tonnes through sound agronomic practices and variety development, selection and adoption
- 60,000 tonnes through improved disease management
- 50,000 tonnes through better adoption of new technologies.

Through the entire District Productivity Plan, it is essential SRA is transparent and updates the South Johnstone District stakeholders regularly on progress of the program. Stakeholder events and activities include:

- General industry LEA team annual meeting (review plan)
- Quarterly LEA working group meetings
- Collaborative field days, open days and workshops for growers and millers (see Events Schedule, page 8).

## 6 District Priorities

The following constraints have been identified as productivity priorities for the South Johnstone region that that need to be the focus within current programs.

PRIORITY	OBJECTIVES
<b>Variety development, selection, and adoption</b>	<ul style="list-style-type: none"> <li>- Improving dissemination of research knowledge through the delivery of targeted and timely communication products, training packages and demonstration activities for growers, advisors, and planting contractors to enhance decisions influencing variety selection and adoption.</li> <li>- Implementation of variety satellite plots throughout the district to promote adoption of newly released varieties.</li> <li>- Open day at satellite plots in collaboration with release of variety guide (see Events Schedule).</li> <li>- Local data/observations supported by SRA, managed/planted/harvested by CANEGROWERS Innisfail Variety Management Group.</li> </ul>
<b>Sound agronomic practices</b>	<ul style="list-style-type: none"> <li>- Improving dissemination of research knowledge through the delivery of targeted and timely communication products, training packages and demonstration activities for growers, advisors, and contractors to enhance decisions influencing farming practices.</li> <li>- Improved nutrient management and soil health tools for the region.</li> <li>- Understanding of crop nutritional status through a soil and leaf survey.</li> </ul>

<b>Disease measurement and management</b>	<ul style="list-style-type: none"> <li>- Improve dissemination of research knowledge through the delivery of targeted and timely communication products, training packages and demonstration activities for growers, advisors, and planting contractors to enhance decisions influencing disease management.</li> <li>- Grower response to RSD crop reporting will be assessed and feedback gathered to improve data delivery and key messaging to maximising effective RSD management.</li> <li>- Adoption of the RSD assay technology by South Johnstone mill, with co-investment (as needed).</li> <li>- Development of sterilisation tools for harvesting and planting.</li> <li>- Adoption of Pachymetra resistant varieties.</li> <li>- Understanding of Pachymetra levels on farm.</li> </ul>
<b>Improved adoption of new technologies</b>	<ul style="list-style-type: none"> <li>- Improving dissemination of research knowledge through the delivery of targeted and timely communication products, training packages and demonstration activities for growers, advisors, and contractors to enhance decisions influencing adoption of new technologies.</li> <li>- Development and release of Harvest Mate.</li> <li>- Review of harvester front end to improve ratoonability.</li> </ul>

### 6.1 District Stakeholder Analysis

Snapshot of the growers in the region based on 2022 t/ha and mills, grower organisations and productivity companies that SRA works with to improve productivity for the region.

Stakeholder type	Number/ key stakeholders	South Johnstone (tonnes)	Total % of tonnes
X Large growers – over 100,000 T cane	1	176,021	13
Very large growers – over 50,000T cane	1	73,383	6
Large grower – over 20,000T cane	10	277,445	21
Medium grower – between 8,000T cane – 20,000T cane	30	259,668	27
Other growers < 8,000T	116	433,726	33
Milling companies	MSF Sugar	<b>Total Growers 158</b> <b>Average Farm Size 102</b> <b>Total Tonnes 1,320,243</b>	
Grower representative organisations	CANEGROWERS Innisfail and ACFA		
Productivity companies	Innisfail Babinda Cane Productivity Services		
Regional variety committees	Northern Regional Variety Committee		



## 7 Events Schedule

Quarter 1	Target constraint	Quarter 2	Target constraint	Quarter 3	Target constraint	Quarter 4	Target constraint
Pest workshop	Agronomy	SIX EASY STEPS Workshop	Sound agronomic practices	Variety walk through with Variety Management Group	Variety development, selection, and adoption	Weed workshop	
Variety walk with Variety Management Group	Variety development, selection, and adoption	Variety walk with Variety Management Group	Variety development, selection, and adoption	Regional Variety Trial Planting	Variety development, selection, and adoption	Soil testing	Sound agronomic practices
Harvest Mate Workshop	Improved adoption of new technologies	Disease workshop	Disease measurement and management			Variety walk with Variety Management Group	Variety development, selection, and adoption

## 8 Implementation strategy and actions

The following tables present activities and their corresponding strategic targets for the South Johnstone District. They summarise key activities with supporting detailed documents to be produced for each program.

All activities address the four priority areas:

1. Variety development, selection, and adoption
2. Sound agronomic practices
3. Disease measurement and management
4. Improved adoption of new technologies

Reporting on progress will occur regularly with key stakeholders, as highlighted in section 3 *South Johnstone productivity goal*.

This document will be updated to reflect current activities delivered through SRA, including in collaboration with other delivery partners, which will deliver impactful research and contribute towards achieving the district productivity goal.

### 8.1 Improving productivity through variety development, selection, and adoption

Investments in this priority will increase development, selection, and adoption of improved varieties. This will be achieved by:

- Improving dissemination of research knowledge through the delivery of targeted and timely communication products, training packages and demonstration activities for growers, advisors, and planting contractors to enhance decisions influencing variety selection and adoption.
- Implementing additional strategically located satellite seed plots throughout the district. Allowing growers greater access to improved varieties within the district.
- Increasing area planted to clean seed to 1% by 2026.
- Increasing adoption of tissue culture to plant an average area of 5 ha per annum (approximately 50,000 seedlings) by 2026.
- Portfolio of information captured on local variety performance for different production environments by 2026 through the local variety management group.

Activities will be delivered in collaboration with growers, MSF Sugar, CANEGROWERS Innisfail and IBCPS over the period of February 2023 to June 2026.

Table 1 Actions, outcomes, and measures for the priority 'increasing yield through better variety management'.

INVESTMENT RATIONALE	ACTIVITY/ PROJECT	OUTPUT/ SOLUTION	SHORT-TERM OUTCOMES	MEDIUM-TERM OUTCOMES	LONG-TERM OUTCOMES
<p>Adoption of improved varieties will combine disease resistance with improved productivity.</p>	<p>Establish strategically located satellite plots of new varieties throughout the region.</p>	<p>Establishment of satellite plots using tissue culture to allow growers to access clean seed of new varieties throughout the region.</p> <p>Radical program to provide larger quantities of newer varieties faster (e.g., tissue culture).</p> <p>Develop variety transition plans.</p> <p>Extension materials (e.g., targeted variety profile) and events.</p> <p>Support local variety management group.</p>	<p>Increased rate of new variety adoption = improved disease resistance, productivity, and profitability.</p> <p>Improved grower confidence in selecting new/more productive varieties.</p>	<p>Increased adoption of improved varieties measured through area planted.</p>	<p>Improved awareness of the benefits of improved varieties.</p> <p>Increase area planted to clean seed to 1% by 2026.</p> <p>Increase adoption of tissue culture to plant an average area of 5 ha per annum (approximately 50,000 seedlings) by 2026.</p>

## **8.2 Increasing profitability through increased uptake of sound agronomic practices**

This investment will contribute towards increasing yield and profitability through adoption of improved agronomic practices. This will be achieved by:

- Improving dissemination of research knowledge through the delivery of targeted and timely communication products, training packages and demonstration activities for growers, advisors, and contractors to enhance decisions influencing farming practices.
- Improved nutrient management and soil health tools for the region.
- Understanding of crop nutritional status through a soil and leaf survey.

Activities will be delivered in collaboration with growers, MSF Sugar, CANEGROWERS Innisfail and IBCPS over the period of February 2023 to June 2026.

Table 2 Actions, outcomes, and measures for the priority 'improving profitability through increased uptake of targeted practices.'

INVESTMENT RATIONALE	ACTIVITY/ PROJECT	OUTPUT/ SOLUTION	SHORT-TERM OUTCOMES	MEDIUM-TERM OUTCOMES	LONG-TERM OUTCOMES
<p>On-farm nutrient management has a key role in farm and industry sustainability, and in ensuring minimal off-site impacts occur.</p> <p>The SIX EASY STEPS® nutrient management program is recognised as industry best practice.</p> <p>The key to sustainable sugarcane nutrition is the application of the correct nutrients in the recommended quantities at the right time to the right place (according to spatial and placement needs) (Calcino et al. 2018).</p>	<p>Review Calcium (and Magnesium) deficiency in older ratoons.</p>	<p>Demonstration strip trials to showcase yield improvements and importance of assessing soil nutrient status in older ratoons.</p> <p>Develop useful extension messages and resources.</p>	<p>Improve (or maintain) the performance of older ratoon crops.</p> <p>Increased industry knowledge of good fallow management principles.</p>	<p>Reduce replanting frequency and help improve profitability.</p> <p>Improvement in productivity due to improved soil fertility and optimal timing of operation.</p>	<p>Increased adoption of full SIX EASY STEPS®.</p> <p>Increased knowledge on the economics of optimal operation timing.</p>
	<p>Assessment of crop nutrient status.</p>	<p>Leaf survey: Sample 100 crops (target 1R crops vs <math>\geq 4R</math> crops) with corresponding soil test results and nutrient application records.</p> <p>Analyse results and identify required follow up activities.</p> <p>Assess leaf disease severity at the same time.</p>	<p>Check on the adequacy of nutrient inputs, identify nutrient deficiencies and/or hidden hunger occurring at different spatial scales. Identify opportunities to improve balanced nutrition for enhanced productivity and profitability.</p>	<p>Refined nutrient management.</p> <p>Grower and advisor upskilling.</p> <p>Better focus targeted extension efforts and/or identify future research activities.</p>	<p>Increased knowledge on the economics of balanced nutrition.</p> <p>Advisors are more confident in providing advice on nutrient management including tailored strategies for specific circumstances.</p>
	<p>Improved soil testing to determine crop nutrient requirements.</p>	<p>Inter-laboratory soil exchange program.</p> <p>Investigate the establishment of a local industry hosted soil testing results database.</p> <p>Demonstrate correct soil sampling practices and support growers develop farm specific soil sampling strategies.</p>	<p>Balanced nutrition = improved productivity/ profitability through:</p> <ul style="list-style-type: none"> <li>- Greater confidence in soil laboratory performance.</li> <li>- Increased soil testing (# blocks and frequency of sampling).</li> <li>- More efficient nutrient management planning.</li> <li>- Ongoing monitoring of soil nutrient status and chemical constraints.</li> </ul>	<p>Growers are adopting optimum practice for nutrient management to achieve balanced nutrition and increase yield.</p>	<p>Increased adoption full SIX EASY STEPS®.</p> <p>Increased knowledge on the economics of balanced nutrition.</p>

### **8.3 Improving productivity and profitability through Disease measurement and management**

Activities will be delivered in collaboration with growers, MSF Sugar, CANEGROWERS Innisfail and IBCPS over the period of February 2023 to June 2026.

For individual cane farmers, local knowledge of disease severity is important in guiding the selection of varieties to grow on their farm and for assessing the risk of high levels of disease developing in individual cane fields. Knowledge of disease severity in each district therefore remains an important on-going issue.

RSD From recent research conducted by Magarey et al (2021) approximately 34.3% of the cane in the South Johnstone region is infected with RSD, across an area of 5,597 hectares. The target is to reduce RSD infection to 5% or 1050 hectares. Controlling RSD can increase yield by approximately 1.8 tonnes per hectare across the mill area.

The distribution and effects of soil-borne diseases (Pachymetra) are often overlooked and under-estimated due to the non-specific nature of above ground symptoms and an inability to view the major effects of the disease (rotted roots).

The strategy is to increase awareness of disease incidence on impacted farms through monitoring/ measuring and demonstrations. Increased training will also be provided on the use of clean seed, improving farm hygiene and sterilisation of harvesting planting and fertilising equipment.

#### **Disease measurement and management**

- Automation and implementation of RSD through the mill – assess the incidence of RSD in commercial crops across the Mill area.
  - Once severely affected areas are identified a targeted extension strategy will be developed for local implementation.
- Understanding the level of Pachymetra diseased crops across the district through a survey of 1R and 4R blocks.
- Assess attendance at disease workshops and demonstration tours.
  - Target to have 50% of cane delivered to the mill by growers attending managing sugarcane diseases workshops.

Table 3 Actions, outcomes, and measures for the priority 'increasing yield through better disease management'.

INVESTMENT RATIONALE	ACTIVITY/ PROJECT	OUTPUT/ SOLUTION	SHORT-TERM OUTCOMES	MEDIUM-TERM OUTCOMES	LONG-TERM OUTCOMES
<p>RSD is estimated to cost the South Johnstone region \$2.1 million (34.3% infected area in 2020) Magarey et al. (2021). Reducing RSD infection to 5% of the area is the target. SRA is investing in novel technology to detect RSD in cane entering the mill. The RSD LAMP assay will raise miller and grower awareness of RSD diseased crops; this will allow for targeted RSD management.</p>	<p>Pre-commercial development, testing and validation of RSD LAMP assay for sugar mill roll-out. The technology will be refined to improve Mill application (ease of use). Grower response to RSD crop reporting will be assessed and feedback gathered to improve data delivery and key messaging to maximising effective RSD management. Adoption of the RSD assay technology by the MSF Sugar Mills, with co-investment (as needed).</p>	<p>LAMP assay adopted by mills so that specific farm and district-wide RSD crop reports are extended to farmers and available to extension staff. This will provide for greater awareness of RSD and targeted extension for better disease management.</p>	<p>Increased awareness of the RSD LAMP assay by MSF Sugar milling staff. Increased adoption of the LAMP assay technology by MSF Sugar Mills.</p>	<p>Increased awareness of RSD on-farm and the associated negative productivity and profitability outcomes. Improved RSD management by growers in response to specific RSD crop reports.</p>	<p>Increased adoption of approved seed by growers. Reduced prevalence of RSD at a regional level. RSD-associated production losses avoided resulting in increased productivity (tonnes cane/ha; tonnes sugar/ha).</p>
<p>Automation of the RSD LAMP assay will assist in the adoption of the technology by the Mills.</p>	<p>Rapid and cost-effective RSD assay of planting material.</p>	<p>LAMP assay for advisors that produces rapid and cost-effective RSD diagnostics.</p>	<p>Increase awareness of RSD in planting material and improved adoption of approved seed material.</p>	<p>Improved and timely RSD diagnosis of planting material.</p>	<p>Effective RSD assay of planting material resulting in reduced costs for the local industry. Increased proportion of farming entities requesting a plant source inspection (target is 70%).</p>

	Demonstration yield loss plots.	Implementation of demonstration yield loss plots; three sites throughout the region.	Base data for economic cost analysis for South Johnstone. Issue prioritisation for South Johnstone.	Annual walkthrough of plots attended by farmers representing 50% of the South Johnstone area and 50% of harvest contractors, collectively responsible for 11,000 hectares.	Reduced prevalence of RSD at a regional level.
	In collaboration with IBCPS and CANEGROWERS Innisfail, increase adoption of approved seed and improved farm hygiene.	Establishment of additional strategically located tissue culture seed plots. Facilitated training workshops with growers and extension providers.	Improved access to greater quantities of disease-free planting material. Increase awareness the impacts of major diseases in the district of RSD, and improved adoption of Approved seed.	Increased planting of clean seed and adoption of new/recently released varieties. Annual workshops attended by farmers representing 50% of the South Johnstone area and 50% of harvest contractors, collectively responsible for 11,000 hectares.	RSD-associated production losses avoided leading to increased productivity (tonnes cane/ha; tonnes sugar/ha).
	Engineering development of harvester sterilisation system.	Prototype sterilisation unit installed on South Johnstone commercial sugarcane harvester. Testing to follow.	Installation of the prototype sterilisation unit to a commercial harvester. Increase awareness of harvester RSD transmission with improved adoption of general machinery sterilisation.	Growers and harvest contractors invest in the new sterilisation system with routine application between blocks and farms. Increased purchase of sterilisation systems for harvesters.	Motivation and incentives for use of sterilisation are understood and incorporated into grower and contractor business.
	Understand Pachymetra impact in South Johnstone in conjunction with promoting Pachymetra resistant varieties.	Survey to assess severity/ predict losses in South Johnstone; 100 sites. Encourage growers to routinely assess severity in their crops (sample after harvesting 2R). Experimental testing to evaluate thresholds on samples collected for nutrient analysis; 3 sites. Cropping more resistant varieties	Tonnes lost/ economic cost to South Johnstone.	Growers accessing crop-specific information on Pachymetra to assist with variety selection.	Reduced crop losses.



#### **8.4 Improving profitability and productivity through adoption of new technologies**

Investments in this priority will increase yield and ratoonability through adoption of new technologies. This will be achieved by:

- Improving dissemination of research knowledge through the delivery of targeted and timely communication products, training packages and demonstration activities for growers, advisors, and contractors to enhance decisions influencing adoption of new technologies.
- Developed and release of Harvest Mate.
- Reviewing harvester front end to improve ratoonability

Activities will be delivered in collaboration with growers, MSF Sugar, CANEGROWERS Innisfail and IBCPS over the period of February 2023 to June 2026.

Table 4 Actions, outcomes, and measures for the priority 'improving profitability and productivity through improved harvesting practices.'

INVESTMENT RATIONALE	ACTIVITY/ PROJECT	OUTPUT/ SOLUTION	SHORT-TERM OUTCOMES	MEDIUM-TERM OUTCOMES	LONG-TERM OUTCOMES
<p>Significant opportunities to capture additional sugar yield from the paddock are available to the South Johnstone region. The work of producing the best crop prior to harvest has already been done by the grower – however, adopting an improved harvesting practice can potentially:</p> <p>Increase in productivity per hectare by approximately 5%, contributing to improved supply of cane to mills and improved mill viability.</p>	<p>Develop workshops for growers and harvesting contractors promoting the adoption of new technologies to improve productivity.</p>	<p>Increased adoption of yield and cane loss monitors.</p> <p>Adoption of yield/ cane loss monitors and improved harvesting practice.</p>	<p>Two workshops attended by 50% of area supplied by growers to the mill and 50% of harvest contractors, collectively responsible for 11,000 hectares.</p>	<p>Growers and harvest contractors are actively using yield/cane lose monitors and adjusting harvesting variables in real time to maximise yield and profitability.</p>	<p>Improvement in yield due to decrease harvesting and ratoon loss.</p>
	<p>Development of a Harvesting decision support tool (Harvest Mate) to improve harvesting contractors and growers' profitability.</p>	<p>Development of a harvesting decision support tool with corresponding demonstration days.</p>	<p>30% of area farmed in the South Johnstone region attending the workshops.</p> <p>Increased understanding of harvesting economics.</p>	<p>Growers and contractors use the tool to inform changes to operations which improve, productivity, profitability and cane supply.</p>	<p>Increase uptake of growers incentivising harvester contractors.</p> <p>Improvement in economic benefit to growers and harvesting contractors.</p>
	<p>Change in machinery to reduce damage to stools during harvesting and increase ratoonability.</p>	<p>Development in improvement of front-end of harvester to reduce impact to ratoonability.</p>	<p>Industry gains an understanding of the impact of the front-end of the harvester to ratoonability.</p>	<p>Improved harvester front-end design.</p>	<p>Harvester design reduces losses associated with poor ratooning by 50%</p>

## 9 SRA Research Projects

The following summary and objectives are research projects that complement the productivity plan. For more information on each project please refer to the SRA website. All three projects are in Research Mission 2 <https://sugarresearch.com.au/current-research-projects/>

### 9.1 Project 2022/006

#### **Development of a resistance screening method for chlorotic streak**

**Chief Investigator Dr Chuong Ngo, SRA**

##### **Summary**

Chlorotic streak (CS), caused by the protozoan *Phytocercomonas venantans* is an important disease of sugarcane that can cause up to 40 per cent yield loss if susceptible varieties are planted, costing the Australian sugarcane industry \$8 to \$10 million annually. The recent identification of the pathogen by SRA researchers provides an opportunity to better assess the resistance ratings of elite clones in the breeding program.

##### **Objectives**

To build on previous work to better understand relationships between clones, symptoms and pathogen load.

To develop an effective method of screening new and commercial clones for CS disease.

To determine if xylem samples can be reliably used for CS ratings and diagnostics.

##### **Specific aims**

1. Identify the most suitable inoculation method, in terms of symptom development and ease of operation.
2. Develop a rating method based on symptom assessment, qPCR quantification, and percentage of plant height compared to healthy control plants.
3. Relate resistance screening data to field reaction, in terms of symptoms development and yield loss.

### 9.2 Project 2022/007

#### **Development of a pest and disease diagnostic step change for the sugarcane industry (RSD - NIR)**

**Chief Investigators Dr Robert Magarey and Steve Staunton, SRA**

##### **Summary**

Ratoon Stunting Disease (RSD) is currently the most economically significant disease for the Australian sugarcane industry, causing an estimated \$25M in losses each season. RSD has been challenging to diagnose because there are no external symptoms (other than reduced yield), and while molecular diagnostic tests have been developed, they are relatively low-throughput, and so very few commercial crops are assessed for RSD. Management practices that minimise RSD are well established, but the "invisibility" of the disease means that there is poor adoption of the recommended practices because growers are unaware that they have a problem.

**Objectives**

This project aims to provide sugar mills with the capacity to measure the RSD levels in every rake of cane entering the mill, using near infra-red (NIR) spectroscopy. Building on technology developed in previous SRA-funded projects, the objective of the current research is to:

1. Further refine NIR calibrations for RSD, using molecular LAMP assays for validation.
2. Train and support staff in mills to undertake routine RSD screening.
3. Give mills the ability to provide growers with a summary of RSD status in every rake of cane.

In collaboration with UQ project team (2022/015) and industry, map RSD incidence across the South Johnstone, Tully, Mossman and Bundaberg mill areas.

**9.3 Project 2022/015**

**Pre-commercial development, testing and validation of RSD LAMP assay for sugar mill roll-out**  
**Chief Investigator Jimmy Botella, The University of Queensland**

**Summary**

Ratoon stunting disease (RSD) is a major disease limiting sugarcane profitability in Australia, yet the true extent has not been identified or actual monetary losses calculated. This is due to the lack of external symptoms in the field. Detection is typically limited to testing planting material, which requires a lengthy and costly process to identify/confirm RSD presence. In some regions, 30 per cent of crops may be diseased, but little is known about levels in commercial crops. Correct identification of RSD using a method that is timely and cost effective is the solution to detection and thus management. Application of a molecular RSD assay during milling would immediately provide information on the commercial crop distribution of RSD in the Australian industry.

In the Australian industry, every rake of cane has attached Geographic Information System (GIS) data relating yield, CCS and fibre to individual blocks, farms, sub-districts, planting and harvester contractor groups, soil types, crop cycle information and management practices. An RSD assay applied to first expressed juice at the mill would enable RSD incidence to be mapped for every mill area for every crop in every year and highlight the factors governing disease incidence. RSD incidence would be pinpointed, allowing focused management to eliminate this yield constraint.

**Objectives**

To finalise the RSD detection protocol for on-mill detection incorporating the inputs and suggestions obtained from several mill representatives.

**10 Ongoing review to measure impact**

This District Productivity Plan will be updated every 6 months with progress reports and reviewed annually to then determine the next plan, track progress and measure impact.



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