Sugar Research Australia

SUGAR RESEARCH AUSTRALIA DISTRICT PRODUCTIVITY PLAN – HERBERT 2024

Introduction

This ***District Productivity Plan – Herbert 2024*** 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, 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: March 2024
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Contents

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 threemillion tonne increase in production across Queensland and New South Wales 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 Herbert Overview

Sugarcane is grown in the Herbert region over approximately 65,000 hectares. Sugarcane is crushed through two mills in the region (Victoria and Macknade). Victoria mill crushes an average three million tonnes of cane per year to manufacture approximately 400,000 tonnes of raw sugar (Wilmar Sugar Pty Ltd, 2020). Macknade mill crushes an average 1.5 million tonnes of cane per year, to manufacture approximately 191,000 tonnes of raw sugar (Wilmar Sugar Pty Ltd, 2020). The Herbert district has the potential to crush fivemillion tonnes of cane per season.

3 Productivity Constraints

SRA conducted an intensive stakeholder engagement process in the Herbert region from 6November 2023 to 1 March 2024 to review the 2023 Herbert District Productivity Plan. This process included revising the key constraints, reviewing the 2023 activities, and establishing the activities for 2024. The process was to gain an understanding of key constraints that were limiting productivity and profitability. The revised key constraints have now been developed into projects for 2024 and are detailed in this *District Productivity Plan*.

In order of importance industry constraints included:

- Variety development, selection and adoption
- Sound agronomic practices (fallow and weed management, nutrient management, and soil health)
- Disease measurement and management
- Improving adoption of new technologies.

In collaboration with industry representatives SRA has now assembled targeted campaigns to address these constraints while working alongside industry stakeholders to achieve an improvement in productivity and profitability.

4 Productivity Data

HERBERT	2017	2018	2019	2020	2021	2022
T Cane harvested	5,033,396	4,718,178	4,055,702	4,250,399	3,797,257	4,531,004
Ha Harvested	57,119.70	57,043.20	56,365.70	55,224,.40	54,985.47	49,495.80
Average T cane/ Ha	88.1	82.7	72.0	77.0	69.0	91.5
Farming entities	558	553	548	535	510	510
Average CCS	12.95	14.24	13.89	13.19	12.73	11.59
Average tonnes CCS/ ha	11.4	11.8	10.0	10.2	8.8	10.6

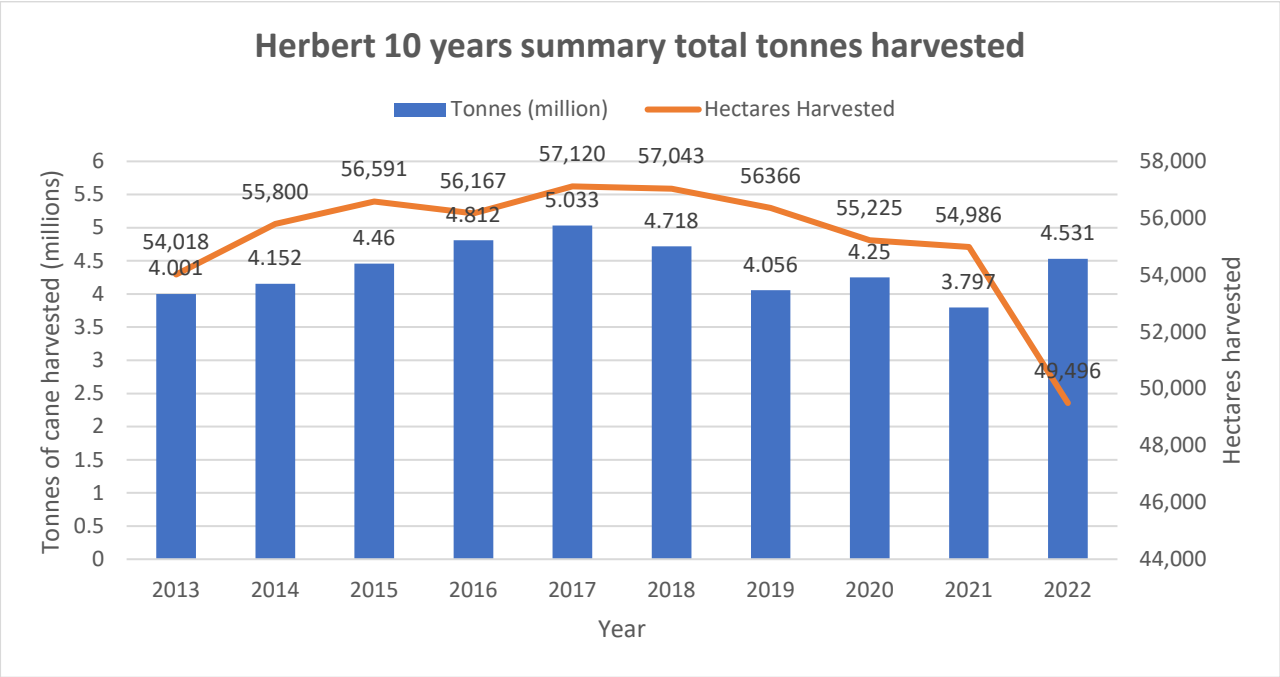

Figure 1: Herbert region 10-year summary of total tonnes crushed compared to hectares harvested

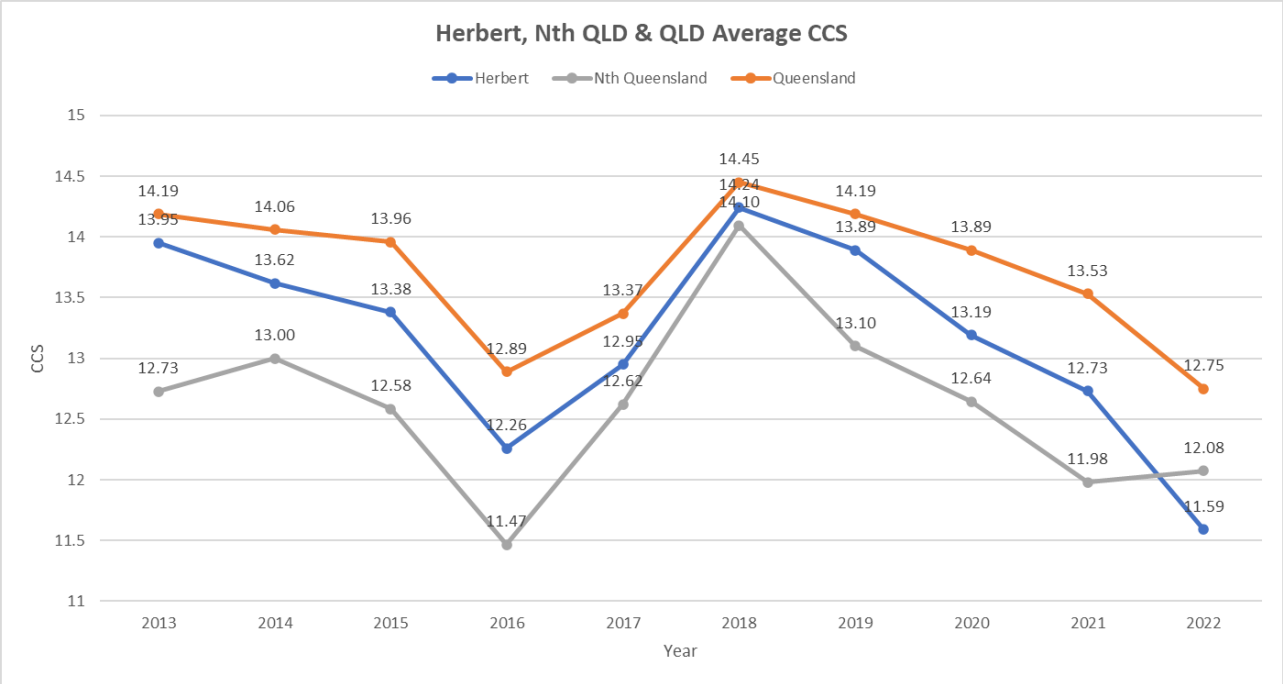

Figure 2: 10-year summary of CCS for Herbert, North Queensland, and Queensland

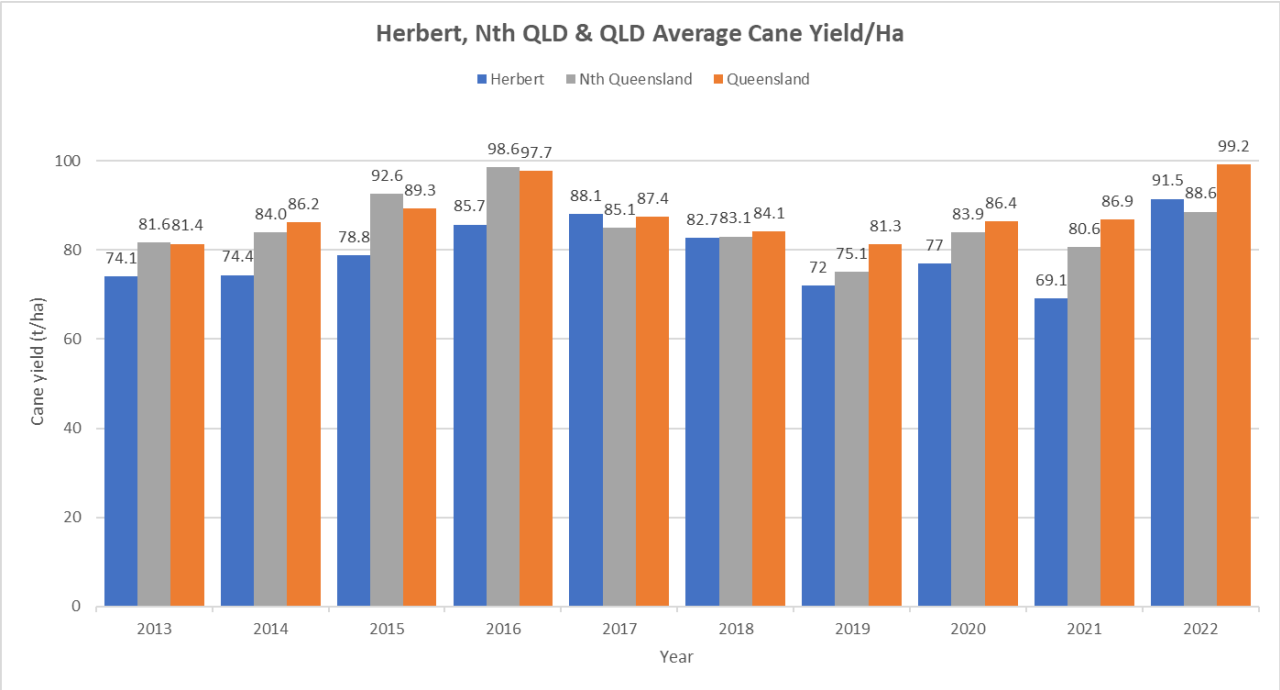

Figure 3: 10 year summary of Herbert, North Queensland, and Queensland average cane yield (tonnes per hectare)

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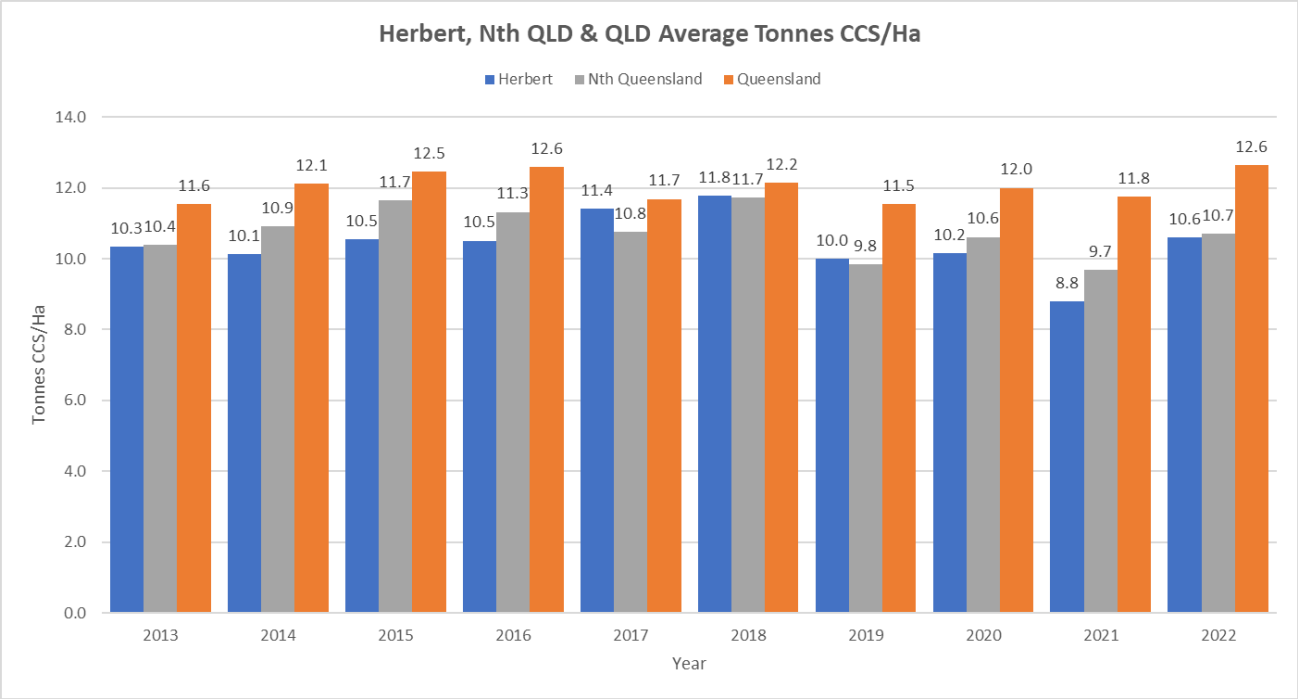

Figure 4: 10 year summary of Herbert, North Queensland, and Queensland average tonnes CCS (tonnes per hectare).

PRODUCTIVITY SNAPSHOT	5 YEAR AVERAGE	What is the target for the district to increase productivity?
District - HERBERT		
T Cane harvested	4,370,987	4,814,000
Ha harvested	56,148	56,148
Average T cane/ha	78	85
Average Yield ratoon T cane/ha	3	4
Average CCS	13.4	13.3
Average tonnes CCS/ ha	10.4	11.3
Varieties Top 5 Total Tonnes / %	- Q208 (30.2%, 75 t/ha) - Q253 (15.2%, 85 t/ha) - Q232 (9.5%, 75 t/ha) - Q240 (8.2%, 85 t/ha) - Q200 (7.6%, 80 t/ha)	Suite of varieties for growers to choose for a range of production environments that have higher yield and disease resistance than those currently grown
# farming entities	535	535
# mills	2	2
Clean seed uptake (percent mill area planted to clean seed (%)	0.5%	1%
Tissue culture uptake (seedlings) annually	17,000 seedlings	50,000 seedings (5 hectares)
Major Disease (RSD)	Ratoon Stunting Disease (RSD) - 15% infected - Area affected 8,455 ha Tonnes affected: 154,275	The target is 146,000 tonnes for the Herbert region (less than 2% RSD infection rate).

5 Herbert Productivity Goal

It is critical the Herbert *Productivity District Plan* contributes to Australia's target of increasing the volume of cane to 34 million tonnes under current area. The Herbert region needs to improve productivity and target an average of 85 tonnes of sugarcane per hectare. The priorities for the Herbert region include variety development, selection and adoption (including clean seed uptake), sound agronomic practices, disease measurement and management (measuring, adoption of clean seed material and improved farm hygiene) and improving adoption of new technologies.

The split to achieve an additional 444,000 tonnes of cane per year in the Herbert region includes:

- 180,000 tonnes through variety development, selection and adoption and sound agronomic practices.
- 146,000 tonnes disease measurement and management.
- 118,000 tonnes improved adoption of new technologies.

Through the delivery of the plan, it is essential SRA is transparent and updates stakeholders regularly on progress against the objectives.

Stakeholders and engagement activities include:

- Monthly meetings with Herbert River CANEGROWERS, Queensland Cane Agricultural & Renewables (QCAR) and Australian Cane Farmers Association (ACFA)
- Bi-yearly director's updates to Herbert Cane Productivity Services Limited (HCPSL)
- Scheduled field days, open days and workshops with growers and millers (see Events Calendar).

6 District Priorities

The following constraints have been identified as productivity gaps for the Herbert region that are not addressed within current programs.

PRIORITY	OBJECTIVES
Variety development, selection and adoption	- In collaboration with the Herbert Variety Development Team the following activities occur: • 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. • Implementation of variety agronomic assessment trials throughout the district. • An Open Day of variety agronomic assessment trials in collaboration with release of variety guide (see events calendar). • Development of CCS maturity curves for all new varieties released. • Establishment of Regional Variety Trials (RVT) in marginal productivity environments. • Establishment of Smut Trial in the Herbert.
Sound agronomic practices	- 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 sound agronomic practices. - Continuation of SIX EASY STEPS validation trial in the drier climate zone. - Refining nutrient recommendations following application of subsurface banded mill by-products to manage the effect on yield and CCS. - Development of nutrient management and soil health tools. - Strategy based on targeting mid-range productivity groups: o 75-85 t/ha target group - 34% of area (based on 2014 – 2019 season).
Disease measurement and management	- 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 measurement and management. - Development of two research projects:

Continued…	○ **Delivery of a pest and disease diagnostic step change for the sugarcane industry (NIR)** ○ **Delivery of a pest and disease diagnostic step change for the sugarcane industry (LAMP).** - Develop a harvester sterilisation unit. - Understanding Pachymetra incidence and severity (DES123133) ○ District survey ○ Increase adoption of resistant varieties - Understanding RSD incidence and severity (DES123133) ○ District survey - Assist HCPSL in promoting uptake of clean seed plant source and PSI.
Improved adoption of new technologies	- 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. - Continuous development and increased adoption of Harvest Mate. - Field days to increase adoption of new and improved technologies.

6.1 District Stakeholder Analysis

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

Stakeholder type	Number/ key stakeholders	Herbert (tonnes)	Total % of tonnes
X Large growers – over 100,000 T cane			
Very large growers – over 50,000T cane	4	247,373	5.9
Large grower – over 20,000T cane	18	482,041	11.4
Medium grower – between 8,000T cane – 20,000T cane	100	1,141,724	27.0
Other growers < 8,000T	704	2,354,758	55.7
Milling companies	Wilmar	**Total Growers** 948 **Average Farm Size** 117ha **Total Tonnes** 4,225,897	
Grower representative organisations	Herbert River CANEGROWERS, QCAR, ACFA, HQCR		
Productivity companies	Herbert Cane Productivity Services Limited (HCPSL)		
Regional variety committees (RVC)	Herbert District Regional Variety Committee		

7 Events Schedule

QUARTER 1	Target constraint	QUARTER 2	Target constraint	QUARTER 3	Target constraint	QUARTER 4	Target constraint
01 March – Industry Workshop to Review District Productivity Plan	1,2,3,4	5 April – Regional Variety Committee Meeting	1	5 July - Variety showcase (Ingham show)	1	2 October - SIX EASY STEPS Toolbox (Fertilising late ratoons)	4
26 March – Herbert Walk and Talk	1,2,3,4	15 April – RSD Workshop	2	17 July – Pre-Emergent Workshop	4	19 November - Farming Systems and Fallow Management Workshop	4
25 March – Assessing cover crops	4	7 May – Smut Workshop	2	30 July - SIX EASY STEPS Demo workshop (Plant and early ratoons)	4		
27 March – Post Emergent Workshop	1			15 August – Harvest Mate Demonstration	3		
29 March – Regional variety trial field walk	4						

8 Implementation Strategy and Actions

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

All activities address the four priority areas:

- Variety development, selection and adoption
- Sound agronomic practices
- Disease measurement and management
- Improved adoption of new technologies.

Reporting on progress regularly with key stakeholders (as highlighted in section *3 Herbert productivity goal*).

SRA will update this document to reflect current activity 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. In collaboration with the Herbert Variety Development Team 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 agronomic assessment trials throughout the district.
    - Field walk of agronomic assessment trials in collaboration with release of variety guide (see events calendar).
- Developing CCS maturity curves for released standards and accelerated varieties.
- Increase area planted to clean seed to 1% by 2026.
- Increase adoption of tissue culture to plant an average area of five hectares per annum (approximately 50,000 seedlings) by 2026.
- Capture a portfolio of information on variety performance on different production environments by 2026.

Activities will be delivered in collaboration with growers, Wilmar Sugar, HCPSL and industry representatives between March 2024 to June 2026.

Table 1: Actions, outcomes and measures for the priority 'improving productivity through variety development, selection, and adoption

INVESTMENT RATIONALE	ACTIVITY/ PROJECT	OUTPUT/ SOLUTION	SHORT-TERM OUTCOMES	MEDIUM-TERM OUTCOMES	LONG-TERM OUTCOMES	ACHIEVEMENT IN 12 MONTHS
Adoption of improved varieties will combine disease resistance with improved productivity.	Implement agronomic assessment trials and Regional Variety Trials (RVTs) of new varieties and older more common varieties throughout the region.	Agronomic assessment trials and RVTs established with the aim of 50% of cane supplied to the mill by growers attending the plots. Improvements in solution packaging that will be trialled include: • Showcasing agronomic assessment trials/ RVTs and discussing data performance. • Improved extension packages. Herbert Variety Development Team and SRA industry services team to collect data on commercial variety performance on different productivity environments.	Local agronomic assessment trials and RVTs on different production environments highlighting the benefits of planting improved varieties. Information to be reported back to the Variety Development Team.	Increased adoption of improved varieties measured through clean seed purchase. Data collected will complement current variety trial data which will highlight the benefits of selecting improved varieties on a range of productivity environments.	Improved awareness of the benefits of improved varieties. Suite of information captured of variety performance on different production environments. Additional data to incorporate into information packages and increased adoption of improved varieties.	Implementation of two agronomic assessment trials and one RVT. SRA Herbert station, Abergowrie. and Stone River.
	Establishment of CCS maturity curves for optimum harvesting.	SRA industry services team with assistance of the SRA variety development team to produce CCS maturity curves for	Increase Herbert region awareness of CCS maturity curves for different varieties.	Provide the tools to growers to enable optimal harvesting time of new varieties.	Additional data for information sheets and Herbert region variety guide	Collection of CCS curves of standard and newly released varieties in two productivity environments over

Continued…		newly released varieties and accelerated clones. Data will be captured from the FATs and agronomic assessment trials.	Presentation of maturity curves in revamped information sheets and variety guide.			three crop classes (Plant, 2R, 3R). Information will be presented at the Herbert Regional Variety Committee meeting and presented in the Herbert Variety Guide.
	Improved marketing of varieties	SRA's Industry Services Team to assist the SRA Herbert Variety Development team on improving its marketing strategy. Improved information packaging will present data in a practical way to assist growers in adopting improved varieties. Improvements in solution packaging that will be trialled include: • Updating and improving presentation of variety guide and information sheets. • Facilitated workshops, variety demonstration walkthroughs.	Provide the Herbert region with "eye catching" and informative information sheets on newly released varieties. Provide marketing tools (i.e., large posters of newly released variety information) to be presented at workshops and agronomic assessment trials.	In collaboration with HCPSL, increase adoption of planting clean seed material.	Improved awareness of the benefits of improved varieties. In collaboration with HCPSL increase clean seed sales to 1% of planted area.	Improved information sheets. Varieties completed included (SRA6, SRA26, SRA28, SRA36 and SRA40)

8.2 Increasing profitability through improved 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.
- Developing nutrient management and soil health tools for the region.
- Facilitated program to target 75-85t/ha sector to increase by 2.5t/ha by 2026

Activities will be developed and delivered in collaboration with growers and industry partners between March 2024 to June 2026.

Table 2: Actions, outcomes, and measures for the priority 'increasing profitability through improved uptake of sound agronomic practices.'

INVESTMENT RATIONALE	ACTIVITY/ PROJECT	OUTPUT/ SOLUTION	SHORT-TERM OUTCOMES	MEDIUM-TERM OUTCOMES	LONG-TERM OUTCOMES	ACHIEVEMENT IN 12 MONTHS
On-farm nutrient management has a key role in farm and industry sustainability, and in ensuring minimal off-site impacts occur. The SIX EASY STEPS® nutrient management program is recognised as industry best practice. 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).	In collaboration with HCPSL, improve timing of pest and weed management. Facilitated workshops showcasing effective timing of operations for pests and weeds.	Facilitated workshops showcasing effective operation timing for local pest and weeds.	Increased industry knowledge of good farming practices including timing of operation.	Improvement in productivity due to optimal timing of operation.	Increased knowledge on the economics of optimal operation timing	Workshop conducted at the 2023 Herbert Field Day.
	In collaboration with productivity services improve fallow management. Knowledge transfer between growers and SRA researchers including grower peer-to-peer information exchange.	Two facilitated workshops per annum. One showcasing important fallow management principles (with on-farm grower demonstration activities) and another explaining the SIX EASY STEPS toolbox guidance for circumstances including following legume cover crops.	Increased industry knowledge of good fallow management principles.	Improvement in productivity due to optimal timing of operation	Increased knowledge on the economics of optimal operation timing	Two workshops conducted on a grower's farm led by SRA Principal Agronomist and supported by SRA Herbert DDO. Workshops attended by 30% of Herbert region sugarcane farming area.
	Knowledge transfer between growers and SRA researchers including grower peer-to-peer	Two workshops delivered and established demonstration trials measured.	Improved industry attendance to workshops, shed meetings and field days.	Growers are adopting optimum practice for nutrient management to achieve balanced nutrition and increase yield.	Increased knowledge on the economics of balanced nutrition.	Data collected from SIX EASY STEPS validation trial in the dry zone. Workshop conducted at SIX EASY STEPS

Continued…	information exchange on balanced nutrition.	SIX EASY STEPS validation demonstration trial/s established. Improved nitrogen product formulation research trial Workshops will be facilitated to enhance peer-to-peer learning. Extension packages will be tailored to deliver useful information and practical advice.				validation trial in the dry zone. Established trial for refining nutrient recommendations following application of subsurface banded mill by-products to manage the effect on yield and CCS.
	Refining nutrient recommendations following application of subsurface banded mill by-products to manage the effect on yield and CCS.	To test and refine the SIX EASY STEPS recommendations for modifications to nitrogen application rates where the mill by-product mud is surface applied in ratoon crops. To develop a better understanding of the long-term impacts of surface applied mud at a rate of 80 wet t/ha on CCS for ratoon crops.	Increased industry knowledge of balanced nutrition.	Improvement in productivity, profitability and sustainability due to balanced nutrition.	Increased knowledge on the economics of balanced nutrition.	Trial implemented at the Orient (mud/ash was subsurface banded in fallow at 80 wet t/ha and then planted in 2021). Two trials implemented (banded application on ratoon cane) in 2023.

Continued…	Develop training programs with complementary demonstration sites for advisors	The training package provides technical information and practical experience supported by local research/ demonstration sites.	100% attendance by advisors in the district.	Increasing advisor knowledge of nutrient management	Advisors are more confident in providing advice on nutrient management including tailored strategies for specific circumstances.	Implementation of demonstration sites for balanced nutrition (see above). Presentation of SIX EASY STEPS validation trial in the dry zone presented to advisors.
	In collaboration with DAF, actively promote FEAT online.	Increased promotion of FEAT encourages growers to use the tool. No additional support or training in using the tool, or refinement to the tool is required.	30% of area farmed in the Herbert region attending the workshops.	Improved industry uptake of FEAT online.	Growers are assessing and monitoring their farm economics.	Two workshops conducted during the 2022 season.
	Development of decision support tools to improve nutrient management and soil health.	Decision support tool that is relevant for the Herbert soil types and environmental conditions.	The decision support tools bring together trusted information and evidence, are easy to use and the results make a significant difference to grower lifestyle (time), profitability and/or productivity.	Improved industry uptake of decision support tools. Improvements in balanced nutrition for growers by using the decision support tools.	Decision support tools used by growers as a regular tool on the farm.	Release of SIX EASY STEPS Smart Phone app in 2024.

8.3 Improving productivity and profitability through disease measurement and management

From recent research approximately 15% of the cane in the Herbert is infected with RSD, across an area of 8,455 hectares. The target is to reduce RSD infection to 2% or 1,127 hectares. Controlling RSD can increase yield by approximately 2.6 tonnes per hectare.

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.

Activities will be delivered in collaboration with growers, Wilmar Sugar, HCPSL and grower representatives over the period of March 2024 to June 2026.

Targets:

Clean seed adoption

- Increase to 1% of planted area to clean seed by 2026.
- Increase adoption of tissue culture to plant an average area of five hectares per annum (approximately 50,000 seedlings) by 2026.

Disease measurement and management

- RSD assessment 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.
- Survey identifying attendance to RSD workshops and demonstration tours.
    - Target to have 50% of cane delivered to the mill by growers attending RSD events.
- Understanding the level of RSD and Pachymetra diseased crops across the district through a survey of 1R and 4R blocks.

Table 3: Actions, outcomes and measures for the priority 'iImproving productivity and profitability through disease measurement and management'

INVESTMENT RATIONALE	ACTIVITY/ PROJECT	OUTPUT/ SOLUTION	SHORT-TERM OUTCOMES	MEDIUM-TERM OUTCOMES	LONG-TERM OUTCOMES	ACHIEVEMENT IN 12 MONTHS
RSD is estimated to cost the Herbert region $5.5 million (15% infected area in 2019) Magarey et al. 2021. Reducing RSD infection to 2% of the area is the target.	Two research projects: Delivery of a pest and disease diagnostic step change for the sugarcane industry (NIR) Delivery of a pest and disease diagnostic step change for the sugarcane industry (LAMP)	Research completed and adopted by mills to allow for specific farm and district-wide RSD crop reports. This will provide for greater awareness of RSD and targeted extension for better disease management.	Research completed to utilise novel technology to identify RSD at the mill.	Increased adoption of the novel technology by Herbert Mills. 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.	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).	Two research projects commenced: Delivery of a pest and disease diagnostic step change for the sugarcane industry (NIR) Delivery of a pest and disease diagnostic step change for the sugarcane industry (LAMP).
	Rapid and cost-effective RSD assay of planting material	Novel technology for advisors that produces rapid and cost-effective RSD diagnostics.	Increase awareness of RSD in planting material and improved adoption of approved seed material.	Improved and timely RSD diagnosis of planting material.	Effective RSD assay of planting material resulting in reduced costs for SRA/HCPSL. Increased proportion of farming entities requesting a plant source inspection – target is 70%.	HCPSL sold 4,335 tonnes of clean seed material in 2022. HCPSL also sold 19,250 plants of tissue culture.
	In collaboration with HCPSL, increase adoption of approved seed and improved farm hygiene.	Facilitated training workshops with growers and extension providers.	Increase awareness of RSD and improved adoption of Approved seed.	Annual workshops attended by farmers representing 50% of the Herbert area and 50% of harvest and planting contractors, collectively responsible for 30,000 hectares.	RSD-associated production losses avoided leading to increased productivity (tonnes cane/ha; tonnes sugar/ha).	RSD workshop conducted with the distribution of the RSD information package for growers and contractors.

Continued…	Understanding Pachymetra incidence and severity (DES123133) Understanding RSD incidence and severity (DES123133)	Understanding Pachymetra incidence and severity (DES123133) • District survey Increase adoption of resistant varieties • Understanding RSD incidence and severity (DES123133) • District survey	Understand the district severity of Pachymetra and RSD affecting yield.	Increase awareness of RSD and improved adoption of approved seed and hygiene. Increase awareness of Pachymetra and the importance of resistant varieties.	RSD and Pachymetra associated production losses avoided leading to increased productivity (tonnes cane/ha; tonnes sugar/ha).	Program to commence 2024
	Engineering development of harvester sterilisation system.	Prototype sterilisation unit development and installed on harvester. Testing to follow.	Installation of the prototype sterilisation unit to an SRA and commercial contractors' 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.	Two prototype harvester sterilisation units fitted on SRA and commercial harvesters. Refinement of the prototype for more efficient and effective operation in the 2024 season.

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.
- Continuous development and increased adoption of Harvest Mate.
- Conducting field days to increase adoption of new and improved technologies in the Herbert region.

Activities will be delivered in collaboration with growers, harvesting contractors and industry representatives from March 2024 to June 2023.

Table 4: Actions, outcomes, and measures for the priority 'improving profitability and productivity through adoption of new technologies.'

INVESTMENT RATIONALE	ACTIVITY/ PROJECT	OUTPUT/ SOLUTION	SHORT-TERM OUTCOMES	MEDIUM-TERM OUTCOMES	LONG-TERM OUTCOMES	ACHIEVEMENT IN 12 MONTHS
Significant opportunities to capture additional sugar yield from the paddock are available to the Herbert 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: Increase cane yield by 5 tonnes per hectare and 700 kg of sugar per hectare. Increase in productivity per hectare by approximately 5%, contributing to improved supply of cane to mills and improved mill viability.	Develop workshops for growers and harvesting contractors promoting the adoption of new technologies to improve productivity.	Increased adoption of new technologies to improve productivity.	Two workshops attended by 50% of area supplied by growers to the mill and 50% of harvest contractors, collectively responsible for 30,000 hectares.	Growers and harvest contractors are actively adopting and using new technologies to maximise yield and profitability.	Improvement in yield due to decrease harvesting and ratoon loss.	Demonstration of new technologies at the 2023 Herbert Walk and Talk, and the Herbert Field Day.
	Continuous development of Harvest Mate to improve harvesting contractors and growers' profitability.	Continuous development and adoption of Harvest Mate with corresponding demonstration days.	30% of area farmed in the Herbert region attending the workshops. Increased understanding of harvesting economics.	Growers and contractors adopt Harvest Mate to inform changes to operations which improve productivity and profitability.	Improvement in economic benefit to growers and harvesting contractors.	Development completed of Harvest Mate. Demonstration workshops will be conducted in the Herbert region during 2024.

9 Additional activities outside of the current constraints of the Herbert District Management Plan

To mitigate against the increase in rat population causing a yield reduction in the Herbert region, Sugar Research Australia (SRA) and Herbert Cane Productivity Services Limited (HCPSL) implemented a program focusing on Research, Development and Extension.

The process was to apply for a permit to enable aerial application of RATTOFF on young ratoon cane to increase baiting at a subdistrict level. The permit was approved for emergency use of a registered AGVET chemical product for control of Australian native ground rats in ratooning sugarcane crops (PER94189). The following information attains to the permit.

- Permit Holder:
  - QUEENSLAND CANE GROWERS ORGANISATION LTD
- Products to be used:
  - RATTOFF Zinc Phosphide bait sachets (APVMA No. 58041)
  - Containing: 25 g/kg ZINC PHOSPHIDE as the only active constituent.
- Directions for Use:
  - Distribute sachet baits using helicopter or an unmanned aerial vehicle (UAV) only.
  - Ratooning sugarcane crops.
  - Australian Native Ground Rat (Rattus sordidus).
  - 100 sachets/ha.
  - DO NOT apply bait to bare ground or other areas with minimal vegetation where baits are likely to be seen by birds.
  - DO NOT apply more than 2 applications per crop.
  - DO NOT apply less than 31 days after the initial treatment.
- This permit is in force from 10 November 2023 to 30 November 2024

9.1 Coordinated Baiting Program

HCPSL and Liddles Air Service have offered growers the opportunity to participate in a coordinated district wide aerial baiting program.

Growers will need to provide the following:

- A map with blocks to be baited (ratoon only).
- Consent and contact details.

HCPSL will provide the following:

- Collect and collate maps and grower details.
- Provide Liddleswith regularly updated district wide application maps.

Liddles Air Services will provide the following:

- Supply and apply the rat baits.

The cost (per hectare) to growers will be provided prior to HCPSL taking details. HCPSL will be taking grower details from 8 January 2024. Baiting will likely commence mid-late January. The aim of targeting this time is during the breeding onset (see Figure 4 below)

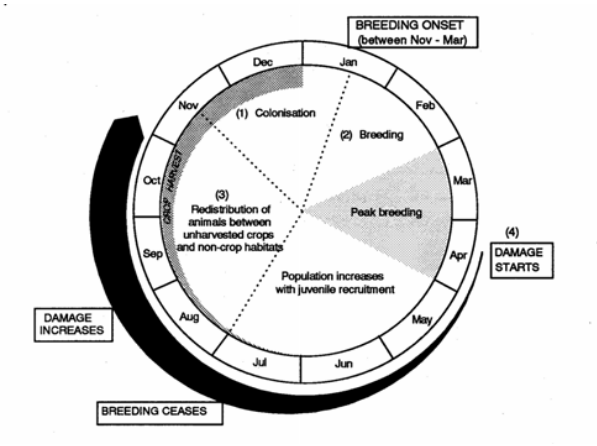

Figure 5: Breeding and damage cycle (source: SRA information sheet)

9.2 Research and Development Strategy

SRA to assess different attractants on RATTOFF Zinc Phosphide bait sachets to improve uptake by Australian Native Ground rat (Rattus Sordidus). The program is in partnership with Animal Control Technologies Australia (ACTA). Five trials to be completed in different Herbert Climate Zones (Figure 5) which includes differences in variety and crop class.

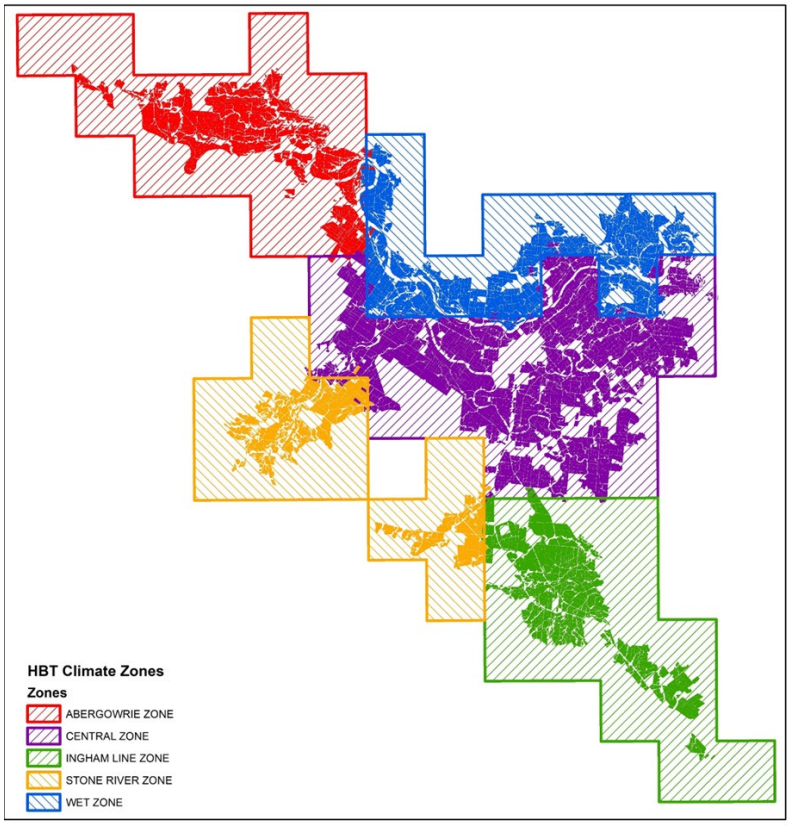

Figure 6: Herbert Climate Zones

Trial procedure includes identifying suitable sites and ensuring that holes are active. Once holes are identified as being active 35 – 45 holes are established with the five different types of attractants (one being the standard) labelled A, B, C, D, E. Each active hole is surrounded with one of each of the different baits in an individually different randomised order. Each bait is marked with a wire mounted tag. The site is assessed 24 hours after the

baits are applied and then day four after the baits are applied. Assessments include whether the baits have been opened, moved or removed entirely.

The data will be statistically analysed and presented back to ACTA. If attractants do work on the sachet, recommendation will be to develop them for commercial operation.

In addition to the five trials, ACTA have supplied SRA with six buckets of 5kg (500 sachets) with the RATTOFF sachets coated with the new attractant. The baits will be distributed to six different growers in different climate zones. The purpose is to observe a change in a commercial situation.

10 DES1231311: Sugarcane practice change program

In collaboration with HCPSL this project aims to identify productivity constraints affecting individual crops and more broadly across the catchment.

The project aims to:

- Improve farm management practices to alleviate productivity constraints.
- Increase adoption of the full SIX EASY STEPS® nutrient management program.
- Assist with whole-of-farm management plans (i.e., weed, disease, variety, nutrition management plans).
- District survey on Pachymetra and RSD.

The project will allow industry science to be translated into improved land management practices by maximising the provision of one-on-one expert agronomic advice to growers engaged in the program.

The aim is to target 5,500 hectares (or approximately 20 growers) with below-average productivity (75-85 t/ha).

11 Current SRA funded research projects

Production Focus

- Implementing and validating genomic selection in SRA breeding programs to accelerate improvements in yield, commercial cane sugar, and other key traits (01.10.23).
- Moth borers - how are we going to manage them when they arrive? (01.06.25)
- Development of a resistance screening method for chlorotic streak (21.03.24)
- Delivery of a pest and disease diagnostic step change for the sugarcane industry (RSD - NIR) (01.12.25)
- Delivery of a pest and disease diagnostic step change for the sugarcane industry (RSD-LAMP) (01.05.26)
- Beyond imidacloprid – Chemical and biorational alternatives for managing canegrubs (31.01.24)
- Developing an integrated device for on-farm detection of sugarcane diseases (21.03.24)
- Environmental DNA Technologies and Predictive Modelling for Rapid Detection and Identification of Sugarcane Priority Pests and Diseases (01.06.24)
- Transformational crop protection – Innovative RNAi biopesticides for management of sugarcane root feeding pests (30.06.24)
- Updating the Sugarcane Industry Biosecurity Plan (01.06.27)

- Soldier fly diagnostics, distribution, and development of an artificial diet (01.05.25)
- Viruses to aid biological control of major root-feeding pests of sugarcane (01.08.27)
- Soil specific management for sugarcane production in the Wet Tropics (23.04.24)
- Industry wide leaf and soil survey to detect hidden macro and micronutrient constraints (31.03.24)

Milling focus:

- Australian Sugar Industry – Development of factory training modules – Phase 3 (01.03.27)
- Use of machine learning to determine the extraneous matter and billet length in cane consignments (01.02.27)
- Bagasse fly ash system performance benchmarking (30.06.24)
- Billet Quality Assessment (30.06.24)

For further information on the above listed projects select the link **https://sugarresearch.com.au/current-research-projects/**

12 Review to measure impacts

This *District Productivity Plan* will be updated per annum with progress reports and reviewed every six months to determine the next plan, track progress and measure impacts.

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