Sugar Research Australia

SUGAR RESEARCH AUSTRALIA DISTRICT PRODUCTIVITY PLAN – BURDEKIN 2024

Introduction

The ***District Productivity Plan – Burdekin 2024*** has been developed through consultation and engagement undertaken by SRA's Industry Services team, with stakeholders across the sugar 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 recent ABARES survey, mill data, impact assessments where applicable and a variety of 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.

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1 Australian Sugar Industry Productivity Goal

The strategic intent for the Australian sugar 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 $210m in gross revenue.

2 Burdekin Overview

The Burdekin has just over 80 000 Ha of irrigated farming land with a large range of crops grown in the area including horticulture, tree crops and cereal crops. Sugarcane is the dominant crop with current area under cane approximately 66,340 Ha. The sugar industry is responsible for 30% of all employment in the area.

The Burdekin sugarcane crop is split between two areas differentiated by water source and soil characteristics.

1) The Delta area has typically smaller size farms that are high yielding, grown on sandy/ loam high permeable soils and utilise the underground aquifer. The irrigation scheme is managed by Lower Burdekin Water which has a board of directors who are local growers and millers.
2) The Burdekin River Irrigation Area (BRIA) was originally developed in the early 50's. The area expanded significantly after the construction of the Burdekin Falls dam. Farms are larger, soils are more clay based and irrigation water is supplied through a channel system scheme supplied by Sunwater.

Sugarcane is crushed via four mills. These mills are owned and operated by Wilmar with three mills on the northern side of the Burdekin River and one on the southern side. Total mill capacity is 7,900,000 tonnes and 1,190,770 tonnes of raw sugar.

- Invicta Mill located at Giru is the largest of the four mills and crushes around 3 million tonnes annually producing 440,000 tonnes of raw sugar.
- Pioneer mill crushes 1.7 million tonnes annually manufacturing 260,000 tonnes of raw sugar. Pioneer also boasts Australia's largest biomass generator.
- Kalamia Mill is the smallest of the four mills crushing 1.5 million tonnes per year.
- Inkerman Mill on the southern side crushes the same as Pioneer Mill, around 1.7 million tonnes annually.

Whilst ongoing stakeholder engagement is key to updating the District Productivity Plans the engagement for the first iteration occurred from July 2021 to December 2021 for the Burdekin region. Recent engagement occurred

3 Productivity Constraints

SRA conducted an intensive stakeholder engagement process in the Burdekin region from 20th November 2023 to 15th March 2024 to review the 2023 Burdekin 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.

The key productivity constraints for the Burdekin region are:

1. Irrigation: Improve management of water, energy and record keeping.
2. Pest and Disease: Adopt technologies to reduce pesticide and monitor disease.
3. Variety management: Maximise variety performance and adoption.
4. Soil Health: Improve soil health by increasing carbon in our soils and following best practice guidelines.
5. Harvesting: Investigate and trial new technology, multiple row harvesting, investigate impacts from green cane harvesting large yielding crops.

4 Productivity data

BURDEKIN	2017	2018	2019	2020	2021	2022
T Cane harvested	8,120,897	8,023,650	7,909,756	7,905,092	7,887,668	8,210,000
Ha Harvested	68,754	69,037	67,824	66,201	65,505	66,339
T cane/ Ha	118	116	116	119	120	123
Farming entities	553	550	551	537	528	520
Average CCS	14.02	15.02	14.97	14.62	14.4	13.6
Average sugar yield	16.54	17.42	17.36	17.39	17.34	16.8

The number of farming entities has slightly reduced overtime; Ha harvested are trending upwards. T cane/Ha and sugar yield has remained consistent. High sugar prices have meant that more sugarcane area has been planted in 2021 / 2022. Input costs, freight, LA Nina weather pattern and lower prices have reduced the amount of area that alternative crops are grown on.

PRODUCTIVITY SNAPSHOT	5 YEAR AVERAGE	What is the target for the district - to increase productivity?
District - BURDEKIN		
T Cane harvested	7,987,233	8,500,000
Ha harvested	66,981	68,000
Average T cane / ha	119	125
Average CCS	14.52	14.5
Average sugar yield	17.30	18.12
Varieties Top 5 Total Tonnes / %	Q240 – 43.3% KQ228 – 22.8% Q183 – 12.6% Q208 – 10.6% Q232 – 8.6%	New Varieties SRA 23, WSRA 17 & SRA32 have had excellent adoption and make up for 15% of new seed sales.
Varieties Top 5 Ha	Q240 – 28,363 KQ228 – 14,935 Q183 – 8,254 Q208 – 6,944 Q232 – 5,633	
# farming entities	537	
# mills	4	4
Clean seed uptake	1.2%	1%
Tissue culture uptake	1 grower	1,000 seedlings

5 Burdekin productivity goal

The Burdekin district has the potential to crush 8.5 million tonnes.

Through the industry analysis and engagement process undertaken in the development of the District Productivity Plans; the Burdekin district goal is to increase average T cane harvested from 8 million tonnes to 8.25 million tonnes by 2025 and target an average of 125t/ha.

Priority rank increase tonnes of cane per annum in the region:

- 230,000 tonnes improved irrigation management.
- 90,000 tonnes RSD measurement and cane grub management.
- 100,000 tonnes maximise variety performance through adoption of new varieties and placement.
- 86,000 tonnes improve soil health by introducing carbon to the system.
- 130,000 tonnes introduce new technology to harvesting, monitor and increase efficiency.

- 636,000 tonnes. Assume 50% adoption across the district = extra 318,000 tonnes.

Throughout the entire program it's essential SRA is transparent and continues to update the Burdekin region stakeholders regularly on progress of the program. Stakeholders include:

- Quarterly meetings with Burdekin Productivity Services, Burdekin Bowen Integrated Floodplain Management Advisory Committee, North Queensland Dry Tropics, Department of Agriculture and Fisheries, James Cook University and Agriculture consultants.
- Half yearly meetings with Canegrowers Burdekin Limited, Agforce, Queensland Cane Agricultural & Renewable, Kalamia Canegrowers Organisation Limited and Wilmar.
- Annual meetings with Burdekin Shire Council, Sunwater, Lower Burdekin Water Board and Burdekin River Irrigation Area Committee
- 24 shed meetings held across the district, twice a year with growers from all productivity groups.

6 District Priorities

In priority order the following have been identified as the focus for the Burdekin area over the next four years.

- **Irrigation** is seen as both a constraint and an opportunity. It is ranked as the main priority in the district and has the potential to make the biggest improvement in productivity and overall profitability. Calculated on the basis of:
  - Average of 3.5T/Ha increase in yield over 68,000Ha = 238,000 T.
  - Production value $11,600,000
  - Input cost reduction based on a decrease in megalitres used across the district $10,500,000.
  - Total value = $22,400,000
  - Subgoal is to use less water to grow the sugarcane crop. Three main components of irrigation are driving practise change across the Burdekin farming community.
    - Water costs, energy costs and the lack of skilled labour.
    - To make these changes SRA and a consortium of service providers are utilising smart technology to automate irrigation.
    - Demonstration sites across the district will showcase productivity and profitability impacts of irrigation practice change via automation and technology.

- On farm field visits, presentations, factsheets, and detailed data analysis of demonstration sites will be made public.
- On farm irrigation practice change will form part of a framework helping address the rising groundwater table across the Burdekin.

- **Weeds, Pest & Disease.** Industry stakeholders are aware of the risk in relying on a single crop protection option to treat cane grubs particularly with the APVMA review of all neonicotinoids, currently the only options available.
  - Support industry, coordinate research & stakeholder meetings to find solutions to alternative canegrub control.
    - Monitor and measure best practice imidacloprid application.

  - Recent upward trends of Ratoon Stunting Disease (RSD) on farms have prompted the district to review its current strategic plan. It is estimated that RSD is costing the Burdekin district $4.5 million. 11.25 t/Ha increase in yield over 8000 Ha = 90,000T
  - Production value $4,500,000
  - Reduce RSD in commercial cane farms.
    - Improve hygiene on farms and machinery.
    - Support delivery of a pest and disease diagnostic step change for the sugarcane industry (NIR)(Lamp)
    - Install and monitor prototype harvester sterilisation unit on a commercial harvester.
    - Assist Burdekin Productivity Services to promote the use of clean seed source and plant source inspections.
  - Support Burdekin Productivity Services to coordinate and promote Itch grass and wild sorghum mitigation.
    - SRA weed researcher to develop strategies on itch grass herbicide control.

- **Variety management.** Overall growers and industry are happy with the current varieties however there is a need to manage these more efficiently. Adjustments to clean seed distribution and the opportunity for growers to utilise tissue culture to adopt new varieties quicker will lead to increases in yield.
  - 1.5 T/ha increase in yield over 68,000Ha = 102,000 T.
  - Production value $5,000,000
  - Maximise the potential of current varieties in the Burdekin through focusing on:
    - Promotion of new varieties and their agronomic management.
    - Variety by soil type, harvest date, drydown.
    - Promoting tissue culture as a clean seed source.
    - Investigating the use of ripeners to improve CCS across all released varieties:
    - Ensure machinery and appropriate equipment is available for growers to trial new practices.

- **Soil health improvement** was also identified as an opportunity. Improving carbon input into our systems and utilise mill by-products more efficiently on farm. Constraints were identified as rising groundwater in some areas and overuse of crop protection techniques in legume fallows.
  - 1.33 t/Ha increase in yield over 68000 Ha = 90,440T
  - Production value $4,300,000
  - Improve soil health overtime
    - Get millmud ash and ash out to soils away from the mills.

- Improve soil carbon via adoption minimum till practices of legume and mixed species fallow crops.
- Promotion of sustainable soil health practices.
- Investigate opportunities to incentivise grower practice change.

- **Harvesting technology** and opportunities to increase adoption – multiple row harvesting and harvest loss monitors to improve harvesting efficiencies and the use of autonomous machines to remove human error and increase quality/efficiency were identified by the disitrct.as a priority.
  - 2 t/Ha increase in yield over 68000 Ha = 136000 T
  - Production value $6,600,000
  - Improve billet quality and reduce harvest losses
    - Trial harvesting payment system based on quality. (HPT)
    - Autonomous harvesting. Remove human error.
    - Assess multiple row harvesting and its impacts on profitability.
    - Use multiple row harvesting trial results to inform harvesting decision support tool.

PRIORITY	OBJECTIVES
Irrigation	**Improve irrigation and energy management** ○ Apply water volumes that closely match soil water holding capacity of soils. ○ Increase yields by 3.5 tonnes/ha via correct timing and application of irrigation ○ Increase adoption of automation and smart technologies across the district ○ Automation of irrigation systems and record keeping (Irrigweb) by adopting new technologies ○ Training, events and workshops and demonstration sites will be utilised ○ Introduce i-RAT (irrigation rapid assessment tool) to advisors and growers. It will enable assessment and comparison of irrigation practices and improve record keeping, monitoring and measurement: ○ Irrigation management (Projects 2020805, 2022801, 2022802) technology, automation, factsheets, workshops and training, measurement.
Weed, Pest & disease	**Improve yield by wider adoption of IPM, IWM and IDM** ○ Reduce reliance on a single crop protection to treat canegrubs. ▪ Develop a decision support tool coupled with alternative strategies. ○ Implementation of RSD (LAMP, NIR) testing in mills ▪ Structured strategy targeting severely infected subdistricts. ▪ Install and trial harvester sterilization unit. ○ Reduce yield constraints by spatially identifying areas of pest/disease/weed pressure and severity. (itch grass and wild sorghum) ○ Strategic pesticide application (spot versus broadcast spraying) ▪ Support spray technology that only applies pesticides where needed Investigate strategic tillage practise vs herbicide application practises

Continued… Variety management	**Increase development, selection, and adoption of improved varieties.** ○ Collaborate with Burdekin variety development team and productivity services to promote variety performance. ○ Maintain high % of clean seed uptake and increase adoption of tissue culture to 20,000 seedlings. ○ Improve grower adoption of new varieties. ○ Accelerate the process to get new varieties out to growers. ○ Development of varieties suited to Burdekin region and potential different income streams from sugarcane. ○ Variety management maximising performance ○ Investigate growth regulators to improve CCS. Clean seed distribution review
Soil health	**Increase yield and sustainability through adoption of improved farming systems** ○ Develop methods of increasing and introducing carbon into soil ▪ Minimum till legume & mixed species fallow practices. ▪ Smart technology that measures soil health indicators ○ Increase productivity by 1.3t/ha across 50% of the Burdekin. ○ Utilise mil mud ash at low rates to address poor performing soil types. ▪ Cost effective sub surface mill by- products application. ○ Address overuse of pesticides in legume fallow crops by testing new technologies in field. Understanding phosphorous requirements ○ Research program to address. ○ Soil assay available Phosphorous ○ Phosphorous fertilizer recovery ○ Yield and economic response. ○ Placement impact ○ Develop trial sites across the district.
Harvesting	**Increase yield and profitability through adoption of new harvesting technology** ○ Increase productivity by 2 t/ha on 50% of the district. ○ 30% adoption of yield and cane loss monitors Conduct more harvest trials in the Burdekin. ○ Develop a pilot group of growers, harvester operators and millers to trial a payment system based off the HDST. ○ Measure & monitor impacts of multiple row harvesting. ○ Investigate grain harvester technology for autonomous harvesting. ○ 10% adoption of green cane harvesting in the district ○ Development and rollout of SRA DAF harvesting decision support tool

7 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 stakeholder entities	Total Area	
X Large growers – over 100,000 T cane	7	17,112 ha	20%
Very large growers – over 50,000T cane	17	12,521 ha	14%
Large grower – over 20,000T cane	67	21,966 ha	25%
Medium grower – between 8,000T cane – 20,000T cane	179	24,608 ha	28%
Other growers < 8,000T	246	11,769 ha	13%
Milling companies	Wilmar		
Grower representative organisations	CANEGROWERS Burdekin Limited Queensland Cane Agriculture & Renewables Kalamia Canegrowers Organisation Agforce Cane		
Productivity companies	Burdekin Productivity Services		
Regional variety committees	Burdekin Regional District Variety Committee		

8 Events scheduled

QUARTER 1	Target constraint	QUARTER 1 / 2	Target constraint	QUARTER 3	Target constraint	QUARTER 4	Target constraint
17 January – Cross regional Industry Autonomous vehicle and spot spray field day	1,2,5	26 March – Burdekin Post emergent Workshop	1,2	4 June – Burdekin Harvesting sterilisation unit demonstration	2	6 November – Burdekin Harvest Mate demonstration	4
07 February – 21 February Burdekin Shed meetings. Irrigation Greyback grub control New varieties Itch grass & wild sorghum control	1,2,4	4-5 April – Burdekin / Herbert Nth Qld field days	1,2,4	10 July – Burdekin SIX EASY STEPS online workshop	1,4	27 November – Burdekin farming systems and fallow demonstration / workshop	4
22 February – Cross regional Industry Mackay / Northern Irrigation bus field days (automation & technology)	1,4	16 April – Industry ASSCT ag field day Irrigation (automation) Autoweed spot spray	1,2,4	8 August – Burdekin Pre – Emergent Workshop	2,4		
7 March – Burdekin Rising groundwater stakeholder advisory group.	1,4	23 April – Burdekin Regional variety committee meeting	1				
11 March – Cross regional Industry Proserpine young growers irrigation bus field day (automation & technology)	1,4	9 May – Burdekin FEAT Workshop	1,4				
19 March – Burdekin / Herbert Regional Milling Seminar	4,5	21 May – Burdekin Burdekin Sugarcane Industry Strategic Plan	1,2,3,4,5				

9 Implementation Strategy and Actions

The tables below present the key actions to address these priorities.

9.1 Irrigation

The objectives for this priority are:

- Improve irrigation and energy management
- Record keeping, monitoring and measurement
- Adapt automation
- Training and workshops

These objectives will be achieved in collaboration with Growers, BPS, Wilmar, BBIFMAC, Agriculture Consultants, LBW, Sunwater, Universities and NQDT

INVESTMENT RATIONALE	ACTIVITY / PROJECT	OUTPUT / SOLUTION	SHORT-TERM OUTCOMES	MEDIUM-TERM OUTCOMES	LONG-TERM OUTCOMES	ACHIEVEMENT IN 12 MONTHS
Improving irrigation management has the potential to increase production value in the Burdekin region by $11.6 million. By reducing input costs across the district to the value of $10.5 million. Total value to the Burdekin industry is estimated at $22.4 million.	Measure baseline irrigation volumes & energy use.	Consortium engaging one on one taking initial measurements.	Grower participation in the Burdekin Irrigation Project. Baseline assessment achieved.	Grower participants expand better irrigation practices to whole farm area.	Better use of water and energy. Improved productivity due to less over and under irrigation. (Improved NUE & WUE)	Over 60 growers participating in the Burdekin Irrigation Project. $2 million of investment has been secured to expand the current irrigation project.
	Promote the use of IrrigWeb, Opti cane and i - Rat.	IrrigWeb training provided.	Adoption of IrrigWeb.	Automate record keeping.	Remove human error. Improve grower lifestyle.	i-Rat developed and testing for the region.

Continued… SRA leads a consortium of delivery providers known as the Burdekin Irrigation Project. Adoption of smart tools assists growers to reduce water and energy cost whilst improving long term sustainability.	Promote automation of irrigation systems and smart tools.	Automation plans developed. Irrigation automation installs. Growers access to funding by way of a tools rebate. BBIFMAC install WQ measurements on sites. Grower learnings.	Adoption of baseline assessment findings. Install of smart tools. Increased awareness of improved irrigation practices.	Fill existing labour shortage gap. Reduce farm and labour inputs.	Imagery technology be adapted to measure crop growth and fine tune scheduling. New investment into a sustainable long-term irrigation program.	Over 6000 hectares of smart tools and automation systems have been installed and are fully operational. Four fully automated demonstration sites across the district are completed.
	Develop demonstration sites, field walks and training workshops.	Demos & field days. Economic case studies. Presentations to industry and other irrigated cropping regions around Australia.	Project presentation @ shed meetings	Demonstration trial sites improve existing irrigation models.	Improved environmental outcomes. Wider adoption of project outcomes.	Ten field walks have taken place on demonstration sites. Numerous articles and presentations have been. delivered to industry and other agriculture sectors

9.2 Pest & disease

The objectives for this priority are:

- Reduce reliance on a single crop protection to treat canegrubs.
- Investigate strategic tillage practise vs herbicide application practices.
- Coordinate trials to reduce spread of itch grass and wild sorghum.
- Reduce pesticide use by adapting a smart spot spraying machine that detects weeds from soil and sugarcane.

These objectives will be achieved in collaboration with growers, BPS, Consultants, Wilmar and universities. The activities below are ongoing (not timebound).

INVESTMENT RATIONALE	ACTIVITY / PROJECT	OUTPUT / SOLUTION	SHORT-TERM OUTCOMES	MEDIUM-TERM OUTCOMES	LONG-TERM OUTCOMES	ACHIEVEMENT IN 12 MONTHS
Improve yield by wider adoption of IPM, IWM and IDM RSD is estimated to be costing the Burdekin district $4.5 million. Detecting RSD in cane at the mill. Automation of the RSD LAMP assay will assist in the adoption of the technology by the Mills. Strategic pesticide application (spot versus broadcast spraying)	Support development, testing and validation of RSD LAMP assay for the Herbert mills. High level Demonstration site infecting plots. These demonstration sites will verify yield reductions. Install harvester sterilization unit. Small scale demo to contractors	RSD LAMP assay at the mill will provide farm level district wide maps/ reports. A tool that will inform growers and extension staff of RSD infected cane. Prioritisation of specific farms targeting disease management. Annual monitoring can track progression of management.	Support adoption of the RSD LAMP assay in the Herbert mills. More harvesting contractors sterilising between blocks.	Wider adoption of good farm hygiene practices. Data to guide growers and contractors to mitigate spread of RSD.	RSD LAMP assay to be installed at Burdekin mills. Increase in productivity due to a reduction in RSD infection. Automated sterilisation units on commercial cane harvesters and cane planters.	High level demonstration site to be established. Shed meeting presentations to 50% of the growers in the region. Harvester sterilisation unit installed on a commercial harvester. Continual monitoring
	Conduct trials across the district comparing spot spray system and blanket application.	Reduction in pesticide use for targeted weed species. Apply residuals herbicides only on areas with historical weed pressure.	Continue to establish trials to test efficacy and economic value of robotic spot spraying technology.	Adaptation of the technology to small spray equipment and large contractor equipment. Ability to be used in multiple cropping situations.	Commercialised product for the Australian sugar industry. Reduction in pesticide use across the district resulting in improved	Twelve trials completed in a multiple of situations. Plant cane, ratoons, and fallow crops. Reductions in herbicide use as high as 60% with 95%

Continued… Reduce reliance on a single crop protection to treat canegrubs.					profitability and environmental outcomes.	efficacy. WQ results show a similar trend.
	Investigate applying liquid imidacloprid in early plant cane as an alternative to granular products.	. Speak at shed meetings explaining the removal of granular imidacloprid and discuss possible interim solutions.	Coordinate stakeholder meetings to address the issue of early planted cane without a granular option.	Assess field trials and demonstrate to growers and contractors correct placement of product.	Reduction in greyback cane grub damage across the district. Improved production and environmental outcomes.	
	Support BPS and maintain high adoption of approved seed source in the district.	Promote and support high adoption of approved seed cane by growers in the region. Promote tissue culture to growers as an alternative to the bulk distribution system.	Monitor annual seed sales trends. Increase awareness of RSD preventative measures and uptake of approved seed.	Seed cane and tissue culture presentations at productivity groups across the district. Generating awareness.	Improved productivity by maintaining high adoption of approved seed source in the district. Adoption of tissue culture as an alternative approved seed source.	8277 tonnes of seed cane sold by BPS in 2023, sales are equivalent to 1.6% of the mill area. 1000 tissue culture seedlings planted in 2023.

9.3 Variety management

The objectives for this priority are to:

- Speed up the process to get new varieties out to growers.
- Varieties Bred for purpose
- Variety management maximising performance
- Clean seed distribution review

These objectives will be achieved in collaboration with growers, Wilmar and BPS.

INVESTMENT RATIONALE	ACTIVITY / PROJECT	OUTPUT / SOLUTION	SHORT-TERM OUTCOMES	MEDIUM-TERM OUTCOMES	LONG-TERM OUTCOMES	ACHIEVEMENT IN 12 MONTHS
Adoption of new varieties that improve productivity. Maximise productivity by planting and harvesting by variety trait and crop age. Monitor tissue culture adoption. Evaluate potential $ generated. Develop a range of varieties for different soil types and income streams.	Promotion of new varieties. Evaluate and participate in variety strip trial implementation and data analysis with the local productivity services.	Increase development, selection, and adoption of improved varieties. Strip trial data is analysed and presented at shed meetings. Large random replicated strip trials implemented by the prod services on different soil types around the district with direct comparison to the current industry standards.	New varieties in FAT trials that consistently have a high rEGV score be released through the Regional Variety Committee.	New varieties with outstanding rEGV results be fast-tracked via tissue culture to Burdekin Productivity Services mother plots. Investigate business cases for alternative income streams.	Uptake / adoption of new improved varieties. Maintain a high percentage of approved seed cane sales within the district. Increase percentage of tissue culture throughout the region. Compliments the bulk distribution system that the productivity services promote. Develop varieties that can tolerate and increase productivity in high salinity soil types.	Support Burdekin Productivity Services and promote the adoption of approved seed cane sales in the district. Maintain a high percentage of approved seed cane sales within the district. 8,277 tonnes of seed cane sold in 2023, sales are equivalent to 1.6% of the mill area.

Continued…	Monitor grower uptake of approved seed and potential productivity gains created. Promote tissue culture in conjunction with industry.	Maintain a high percentage of approved seed cane sales within the district. Increase adoption of tissue culture as an alternative approved seed source.	Monitor productivity data and promote on farm variety distribution across productivity groups.	Investigate new technology to improve quality of cane planting precision ag Ensure machinery and appropriate equipment is available for growers to trial new practices.	Annually, every grower has a percentage of approved seed source on their individual farms. Reduction in disease across the district and a productivity increase obtained directly linked to seed source.	1000 tissue culture seedlings planted in 2023.
	Promotion of adoption of approved seed source at shed meetings and field days.	QCANE select upgrade and wider use of this product as a decision support tool.	Promotion of good on farm hygiene practices through shed meetings and field days.	Uptake of new varieties by growers and a plan to improve variety distribution across farms to maximise production.	QCANE select is upgraded to an app so that growers can easily use it as a decision support tool.	Presentations at 24 shed meetings held twice a year reaching approx. 50% of the district.

9.4 Soil health

The objectives for this priority are to:

- Develop methods of increasing carbon in our soils.
- Utilise mil mud ash at low rates to address poor performing soil types.
- Promote the benefits of harvested legume fallow crops in the sugarcane farming system.

These will be achieved in collaboration with Growers, BPS, Agriculture Consultants, NQDT, DAF, BRIA, Sunwater, Council and Wilmar.

INVESTMENT RATIONALE	ACTIVITY / PROJECT	OUTPUT / SOLUTION	SHORT-TERM OUTCOMES	MEDIUM-TERM OUTCOMES	LONG-TERM OUTCOMES	ACHIEVEMENT IN 12 MONTHS
Increase yield and sustainability through adoption of improved farming systems. Increase carbon input. Develop simple smart tools that use technology to measure soil health indicators. Mitigate production losses by addressing rising groundwater issue.	Develop soil health long term indicators. Add value to existing soil health long term sites.	Agronomists and extension staff using and testing the current soil health toolkit.	Wider use of the soil health toolkit by extension staff and agronomists.	Simplistic easy to use soil health indicators under development.	Improved soil health indicators developed and wider adoption of the soil health toolkit amongst growers.	Productivity services and consultants using and testing the current soil health toolkit.
	Growing and harvesting legume crops promotes good agronomic practices whilst providing an alternative income source. Investigate intercropping and multispecies cropping. Which species are compatible with sugarcane and provides soil health benefits?	Field days, case studies, and presentations on results from trial work recently completed. Demonstrating a profitable, productive outcome by combining harvested legumes and the following plant cane crop.	Support DAF in promoting the use of legume crops in the farming system. Collaboration with all stakeholders to achieve the best possible outcome addressing the rising groundwater issue.	Wider adoption of minimum till cane planting practice on existing legume beds. Continual support and collaboration to address the rising groundwater issue.	Small % of growers trialling intercropping in ratoons. Large % of growers have a rotation crop in the fallow. Mitigate production losses by addressing rising groundwater issue.	Presented legume trial results to growers via shed meetings. Presented to industry & service providers via the Burdekin Cane Extension Group. ASSCT paper presented in collaboration with DAF. Collaboration with all irrigation stakeholders. Presentations on the irrigation project framework to all

Continued… Measure system changes and potentially lower input costs to the farming system whilst maintaining or improving production. .						irrigation stakeholders.
	Investigate sub surface mill by-products at low rates in the outer regions of the district. Measure the response and evaluate profitability.	Mill by products and other ameliorants applied sub surface at low rates on marginal soil types in the outer regions of the district. Improving productivity and address the economic barriers.	Establish trials applying mill by products at low rates in the outer regions to collect data for industry analysis.	Apply nitrogen rates via 6ES guidelines and lower to establish economic threshold.	Economic study completed on mill by product application at low rates. Develop a plan with the mill to use the existing rail network to distribute by products to the outer regions of the district.	Collaboration with DAF to establish two low-rate mill by-product trials in the outer regions of the Burdekin. Harvested two legume crop trials assessing disease, yield and economics. Mungbeans and a new variety of soybeans.
	Phosphorous trials evaluating yield & economic response on alkaline soils.	Determine P application rates and placement in alkaline soils to maximise production.	Establish phosphorous research trials in high alkaline soils in three locations across the region.	Development of best practice P fertiliser guidelines within the 6ES nutrient management program.	P research trial results will determine placement and rate for Burdekin alkaline soils, maximising productivity	SRA research project proposal on P application and placement led by D.Skocaj established three sites.

9.5 Harvesting

The objectives for this priority are:

- Conduct more harvest trials in the Burdekin.
- Help coordinate changes to the harvester payment method.
- Autonomous Harvesting
- Green cane harvesting
- Measure & monitor impacts of multiple row harvesting.

These objectives will be achieved in collaboration with growers, harvesting operators, Wilmar and DAF.

INVESTMENT RATIONALE	ACTIVITY / PROJECT	OUTPUT / SOLUTION	SHORT-TERM OUTCOMES	MEDIUM-TERM OUTCOMES	LONG-TERM OUTCOMES	ACHIEVEMENT IN 12 MONTHS
Increase yield and profitability through adoption of new harvesting technology. Increase productivity by 2 t/ha on 50% of the district.	New harvesting manufacturers to industry.	Competition to the current manufacturers reducing costs. Potential new technology from increased competition.	Initial adoption of new competitors.	Introduction of new parts and sales to the region. More investment back into the community.	Competition to reduce capital outlay. Incentive to make large scale improvements / efficiency gains.	Support demonstration of the LiuGong S935TA harvester in a large plant cane crop in the Delta.
	Demonstration of cane loss monitors to grower and harvesting sector. Coordinate small groups of harvesting contractors and growers	Increased adoption of yield and cane loss monitors.	Conduct more burnt cane trials in the Burdekin. Data collected to improve Harvest Mate.	Collaborate with SRA agriculture machinery specialist to develop workshops for growers and harvesting contractors.	Commercial harvesters have yield and loss monitors as standard equipment. This data can be used to inform HDST (Harvest Mate)	Installed Schlot live loss monitor onto commercial harvester. Completed mass balance trial with loss monitor comparison. Presented findings to shed meetings.
	Economic benefits of multirow harvesters to the district.	Reduced passes of heavy machinery across our fields.	Reduction in labour requirements.	Inform Harvest mate with data captured from multi row	Harvesting efficiency gains created on large paddocks. Increase in	Burdekin harvester trial conducted on various extractor

Continued…		Improve harvesting efficiencies. Increase controlled traffic adoption.		harvester loss monitor.	production due to slower forward speed. Extra ratoons due to more precise basecutter height and forward speed matching basecutter speed.	speeds and forward speeds.
	Introduce green cane harvest trials in older ratoons where irrigation isn't seen as an impediment.	Green cane harvest of older ratoons increases moisture retention and supplies organic material back into the farming system. Improving soil health.	Develop trials on specific soil types with gradients that allow furrow irrigation through trash blanket.	Adoption of growers to uptake green cane harvesting. Percentage of growers with non-permeable soil types and gradients that are suited to furrow irrigation.	Guidelines for growers who want to try green cane harvesting within the industry. .	

10 Additional activities outside of the current constraints of the Burdekin District Management Plan

10.1 Continual support of education and training for the next generation of growers

- Collaboration with CANEGROWERS Burdekin Limited, Burdekin Shire Council and Burdekin Productivity Services
    - Burdekin Sweetest Schools project allows students at local schools to be mentored by collaborators in the project. As well as learning the theory of growing sugarcane using sustainable profitable practices. The students are growing cane in a designated section of the school grounds where they will learn how plants grow and what is needed to maintain healthy plants. Initial soil tests have been taken and the six easy steps guidelines have been used to establish the plants.

10.2 Understanding Phosphorous Requirements in the Burdekin.

- Collaboration with SRA, Wilmar, and Burdekin Productivity Services
    - Response after initial stakeholder consultation was completed. Uncertainty about Phosphorous requirements in alkaline soils and very high PBI soils. Research program is to address Phosphorous fertiliser recovery, yield and economic response and placement impact.

10.3 Implement and Coordinate Strategies with Industry to Mitigate Rising Groundwater

- Collaboration with all Burdekin stakeholders, federal and state governments, DAF & Sunwater
    - A member of the Burdekin Haughton Customer Advisory Committee. Group meets regularly to discuss the groundwater issues.
    - Project 2020805 learnings of on ground irrigation practice change in conjunction with dewatering options are some of the solutions to mitigate the rising groundwater.
    - Project 2020805 and 2022801 demonstration sites have provided collaborators with detailed data to show positive yield, economic and environmental impacts.

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).
- Reducing herbicide usage on sugarcane farms in reef catchment areas with precise robotic weed control (30.06.24)
- Increasing industry productivity and profitability through transformational, whole of systems sugarcane approaches that deliver water quality benefits (30.06.24)
- Delivery of a pest and disease diagnostic step change for the sugarcane industry (RSD - NIR)
- 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)
- XXXX Lower Burdekin Smart Irrigation Project (01.05.25)
- Lower Burdekin Cane Major Grants Project (01.05.24)

- 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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