

# DISTRICT PRODUCTIVITY PLAN – BURDEKIN 2023

## Introduction

This **District Productivity Plan – Burdekin 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, 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.

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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. The net impact is an increase in value on the industry of \$117 million.

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 66 200 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 crushing capacity is 7,900,000 tonnes , nominally producing 1.2 million 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, this plan has been reviewed after further review with stakeholders in the 1<sup>st</sup> quarter of 2023.

## 3 Productivity Constraints

The key productivity constraints for the Burdekin region are;

1. Irrigation: Improve management of water, energy and record keeping.
2. Variety management: Maximise variety performance.
3. Soil Health: Improve soil health by increasing carbon in our soils.
4. Pest and Disease: Adopt technologies to reduce pesticide and monitor disease.
5. Harvesting: Investigate and trial new technology, green cane harvesting.

## 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	8,213,576
Ha Harvested	68,754	69,037	67,824	66,201	65,505	
T cane/ Ha	118	116	116	119	120	
Farming entities	553	550	551	537	528	
Average CCS	14.02	15.02	14.97	14.62	14.4	
Average sugar yield	16.54	17.42	17.36	17.39	17.34	

The number of farming entities has slightly reduced overtime; Ha harvested has significantly reduced. T cane/Ha and sugar yield has remained consistent. Higher sugar prices in 2022 has resulted in increased area planted to sugarcane in 2022. Input costs, freight, LA Nina weather pattern and lower prices in alternative crops has reduced the amount of area growing alternative crops in the Burdekin region.

PRODUCTIVITY SNAPSHOT	2020/21	What is the target for the district - to increase productivity?
<i>District - BURDEKIN</i>		
T Cane harvested	7,905,092	8,275,125 > 8,500,000
Ha harvested	66,201	66,201 > 68,000
Average T cane / ha	119	125
5 year average T cane / ha	117	123
Average CCS	14.62	14.5
Average sugar yield	17.39	18.12
Varieties Top 5 Total Tonnes / %	Q240 – 3,119,965 – 39.5% KQ228 - 1,707,417 – 21.6% Q183 – 1,248,063 – 15.8% Q208 – 916,132 – 11.6% Q232 – 690,931 – 8.7%	
Varieties Ha	Q240 – 25153 KQ228 – 13417 Q183 – 11039 Q208 – 8346 Q232 – 5893	
# farming entities	528	528
# mills	4	4
Clean seed uptake	0.9%	1%
Tissue culture uptake	2 growers 8000 seedlings + 4000 in individual orders	20,000 seedlings

## 5 Burdekin Productivity Goal

The Burdekin district has the potential to crush 8.6 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.
- 100,000 tonnes maximise variety performance.
- 86,000 tonnes improve soil health by introducing carbon to the system.
- 90,000 tonnes RSD measurement and management.
- 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, Burdekin Cane Agriculture Organisation, 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.

- 1) **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.

- 2) **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;
    - Variety by soil type, harvest date, drydown etc.
    - Promoting tissue culture as a clean seed source and
    - Investigating the use of ripeners to improve CCS across all released varieties
  
- 3) **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 out to soils away from the mills.
    - Improve soil carbon via mixed species fallows.
  
- 4) **Pest and disease.** 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. 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.
  - 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
    - Introduce Lamp test to mills (Identify areas that are RSD positive)
    - Promote the use of clean seed source.
  
- 5) **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 district 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.

PRIORITY	OBJECTIVES
<p><b>1. Irrigation</b></p>	<p><b>Improve irrigation and energy management</b></p> <ul style="list-style-type: none"> <li>○ Apply water volumes that closely match soil water holding capacity of soils.</li> <li>○ Increase yields by 3.5 tonnes/ha via correct timing and application of irrigation</li> <li>○ Increase adoption of automation and smart technologies across the district               <ul style="list-style-type: none"> <li>○ Automation of irrigation systems and record keeping (Irrigweb) by adopting new technologies</li> </ul> </li> <li>○ Training, events and workshops and demonstration sites will be used               <ul style="list-style-type: none"> <li>○ 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</li> </ul> </li> <li>○ Irrigation management (BIP) technology, automation, factsheets, workshops and training, measurement</li> </ul>
<p><b>2. Variety management</b></p>	<p><b>Increase development, selection and adoption of improved varieties</b></p> <ul style="list-style-type: none"> <li>○ Maintain high % of clean seed uptake and increase adoption of tissue culture to 20,000 seedlings</li> <li>○ Improve grower adoption of QCANE select</li> <li>○ Speed up the process to get new varieties out to growers and increase adoption.</li> <li>○ Development of varieties suited to Burdekin region and potential different income streams from sugarcane</li> <li>○ Variety management maximising performance</li> <li>○ Investigate growth regulators to improve CCS</li> <li>○ Clean seed distribution review</li> </ul>
<p><b>3. Soil health</b></p>	<p><b>Increase yield and sustainability through adoption of improved farming systems</b></p> <ul style="list-style-type: none"> <li>○ Develop methods of increasing and introducing carbon into soil               <ul style="list-style-type: none"> <li>○ Mixed species fallow</li> <li>○ Smart technology that measures soil health indicators</li> </ul> </li> <li>○ Increase productivity by 1.3t/ha across 50% of the Burdekin</li> <li>○ Address rising groundwater in the BRIA and its effect on production</li> <li>○ Utilise mil mud ash at low rates to address poor performing soil types.               <ul style="list-style-type: none"> <li>○ Cost effective sub surface mill by products application</li> </ul> </li> <li>○ Address over use of pesticides in legume fallow crops</li> </ul> <p>Understanding phosphorous requirements</p> <ul style="list-style-type: none"> <li>○ Soil science challenge</li> <li>○ Research program to address               <ul style="list-style-type: none"> <li>○ Soil assay available P</li> <li>○ P fertilizer recovery</li> <li>○ Yield and economic response</li> </ul> </li> <li>○ Placement impact</li> </ul>
<p><b>4. Pest and disease</b></p>	<p><b>Improve yield by wider adoption of IPM, IWM and IDM</b></p> <ul style="list-style-type: none"> <li>○ Implementation of RSD LAMP testing in mills               <ul style="list-style-type: none"> <li>○ Structured strategy targeting severely infected subdistricts</li> </ul> </li> </ul>



	<ul style="list-style-type: none"> <li>○ Reduce yield constraints by spatially identifying areas of pest/disease/weed pressure and severity</li> <li>○ Strategic pesticide application (spot versus broadcast spraying) <ul style="list-style-type: none"> <li>○ Support spray technology that only applies pesticides where needed</li> </ul> </li> <li>○ Reduce reliance on a single crop protection to treat canegrubs <ul style="list-style-type: none"> <li>○ Develop a decision support tool coupled with alternative strategies</li> </ul> </li> <li>○ Investigate strategic tillage practise vs herbicide application practises</li> </ul>
<b>5. Harvesting</b>	<p><b>Increase yield and profitability through adoption of new harvesting technology</b></p> <ul style="list-style-type: none"> <li>○ Increase productivity by 2 t/ha on 50% of the district</li> <li>○ 30% adoption of yield and cane loss monitors</li> </ul> <p>Conduct more harvest trials in the Burdekin</p> <ul style="list-style-type: none"> <li>○ Develop a pilot group of growers, harvester operators and millers to trial a payment system based off the HDST</li> <li>○ Coordinate changes to the harvesting payment system</li> <li>○ Investigate grain harvester technology for autonomous harvesting</li> <li>○ 10% adoption of green cane harvesting in the district</li> <li>○ Development and rollout of SRA DAF harvesting decision support tool</li> </ul>

### 6.1 District Stakeholder Analysis

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

Stakeholder type	
<b>Productivity Services</b>	<p>Burdekin Productivity Services (BPS is a voluntary levy funded organisation with levies paid by both growers and the miller.</p> <p>BPS has 11 staff who deliver core BPS services including distribution or approved seed cane, pest and disease surveys and advice, on farm agronomic support and collection and interpretation of industry data to improve productivity and profitability. Key focus areas of agronomic support include variety management, soil health and farming systems, irrigation, and adoption of technology. BPS work closely with SRA at the district level to identify locally relevant issues that impact on productivity and profitability.</p>
<b>Millers</b>	<p>Wilmar owns and operate all four mills in the Burdekin and crush the combined 8 million tonnes annually with potential to crush 8.6 million tonnes.</p> <p>Wilmar has their own plant breeding operation that works closely with SRA to generate highly productive varieties for the industry.</p> <p>Wilmar is one of the largest farming entities in the Burdekin with farms spread across three of the four regions.</p>
<b>Grower representative organisations</b>	<ul style="list-style-type: none"> <li>• CANEGROWERS Burdekin Limited</li> <li>• Burdekin Cane &amp; Agriculture Organisation LTD</li> <li>• Kalamia Canegrowers Organisation</li> <li>• Agforce Cane</li> </ul>
<b>Regional variety committees</b>	<p>Burdekin Regional District Variety Committee</p>

Cane growers in the district	Number	Total area under cane	
X Large growers – over 100,000 T cane	8	13,460 ha	20.3%
Very large growers – over 50,000T cane	15	8119 ha	12.3%
Large grower – over 20,000T cane	57	14,298 ha	21.6%
Medium grower – between 8,000T cane – 20,000T cane	154	16,562 ha	25%
Other growers < 8,000T	225	13,762 ha	20.8%

## 7 Events Scheduled

Quarter 1	Target constraint	Quarter 2	Target constraint	Quarter 3	Target constraint	Quarter 4	Target constraint
10 <sup>th</sup> February BIP demonstration sites field walk	4	6 <sup>th</sup> April Irrigation Field Day	4	5 <sup>th</sup> July Weeds & Pest Workshop	3	October Subsurface field day	3
22 <sup>nd</sup> February Tissue Culture Walk	1,2,3,4	24 <sup>th</sup> May Burdekin Field Day	1,2,3,4	30 July Harvest loss monitor demonstration	4		
March Shed meetings x12	1,2,3,4			August Harvester demonstration	4		
22 <sup>nd</sup> March Regional Variety Committee Meeting	1			September Shed meetings X12	1,2,3,4		

## 8 Implementation Strategy and Actions

### 8.1 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

The following tables present the key actions to address identified priorities

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. SRA leads a consortium of	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.
	Promote automation of irrigation systems and smart tools.	Automation plans developed. Irrigation automation installs.	Adoption of baseline assessment findings. Install of smart tools.	Fill existing labour shortage gap. Reduce farm and labour inputs.	Imagery technology be adapted to measure crop growth and fine tune scheduling.	Over 1500 hectares of smart tools and automation systems have been installed

<p>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.</p>		<p>Growers access to funding by way of a tools rebate. BBIFMAC install WQ measurements on sites. Grower learnings.</p>	<p>Increased awareness of improved irrigation practices.</p>		<p>New investment into a sustainable long-term irrigation program.</p>	<p>and are fully operational. Three fully automated demonstration sites across the district are completed.</p>
	<p>Develop demonstration sites, field walks and training workshops.</p>	<p>Demos &amp; field days. Economic case studies. Presentations to industry and other irrigated cropping regions around Australia.</p>	<p>Project presentation @ shed meetings</p>	<p>Demonstration trial sites improve existing irrigation models.</p>	<p>Improved environmental outcomes. Wider adoption of project outcomes.</p>	<p>Five field walks have taken place on both demonstration sites and early adopters farms. Numerous articles and presentations have been delivered to industry and other agriculture sectors.</p>

## 8.2 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
<p>Adoption of new varieties that improve productivity.</p> <p>Maximise productivity by planting and harvesting by variety trait and crop age.</p> <p>Monitor tissue culture adoption. Evaluate potential \$ generated.</p> <p>Develop a range of varieties for different soil types and income streams.</p>	<p>Promotion of new varieties.</p> <p>Evaluate and participate in variety strip trial implementation and data analysis with the local productivity services.</p>	<p>Increase development, selection, and adoption of improved varieties.</p> <p>Strip trial data is analysed and presented at shed meetings.</p> <p>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.</p>	<p>New varieties in FAT trials that consistently have a high rEGV score be released through the Regional Variety Committee.</p>	<p>New varieties with outstanding rEGV results be fast-tracked via tissue culture to Burdekin Productivity Services mother plots.</p> <p>Investigate business cases for alternative income streams.</p>	<p>Uptake / adoption of new improved varieties.</p> <p>Maintain a high percentage of approved seed cane sales within the district.</p> <p>Increase percentage of tissue culture throughout the region. Compliments the bulk distribution system that the productivity services promote.</p> <p>Develop varieties that can tolerate and increase productivity in high salinity soil types.</p>	<p>Support Burdekin Productivity Services and promote the adoption of approved seed cane sales in the district.</p> <p>Maintain a high percentage of approved seed cane sales within the district. 6861 tonnes of seed cane sold in 2022, sales are equivalent to 1.3% of the mill area.</p>
	<p>Monitor grower uptake of approved seed and potential productivity gains created.</p>	<p>Maintain a high percentage of approved seed cane sales within the district.</p>	<p>Monitor productivity data and promote on farm variety distribution across productivity groups.</p>	<p>Investigate new technology to improve quality of cane planting precision ag</p>	<p>Annually, every grower has a percentage of approved seed source</p>	<p>Two grower field day walks on farm, telling their story about establishing tissue culture as an approved</p>

	Promote tissue culture in conjunction with industry.	Increase adoption of tissue culture as an alternative approved seed source.			on their individual farms. Reduction in disease across the district and a productivity increase obtained directly linked to seed source.	seed source.45 growers attended. 20,000 tissue culture seedlings planted in 2022.
	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.

### 8.3 Soil health

The objectives for this priority are to:

- Develop methods of increasing carbon in our soils.
- Utilise mill 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 objectives will be achieved in collaboration with growers, BPS, Agriculture Consultants, NQDT, DAF, BRIA, Sunwater, Lower Burdekin Water Board, Council and Wilmar.

Investment Rationale	Activity / Project	Output / Solution	Short-Term Outcomes	Medium-Term Outcomes	Long-Term Outcomes	Achievement In 12 Months
<p>Increase yield and sustainability through adoption of improved farming systems.</p> <p>Increase carbon input.</p> <p>Develop simple smart tools that use technology to measure soil health indicators.</p> <p>Mitigate production losses by addressing rising groundwater issue.</p> <p>Measure system changes and potentially lower input costs to the farming system whilst maintaining or improving production.</p>	<p>Develop soil health long term indicators.</p> <p>Add value to existing soil health long term sites.</p>	<p>Agronomists and extension staff using and testing the current soil health toolkit.</p>	<p>Wider use of the soil health toolkit by extension staff and agronomists.</p>	<p>Simplistic easy to use soil health indicators under development.</p>	<p>Improved soil health indicators developed and wider adoption of the soil health toolkit amongst growers.</p>	<p>Productivity services and consultants using and testing the current soil health toolkit.</p>
	<p>Growing and harvesting legume crops promotes good agronomic practices whilst providing an alternative income source.</p> <p>Investigate intercropping and multispecies cropping. Which species are compatible with sugarcane and provides soil health benefits?</p>	<p>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.</p>	<p>Support DAF in promoting the use of legume crops in the farming system.</p> <p>Collaboration with all stakeholders to achieve the best possible outcome addressing the rising groundwater issue.</p>	<p>Wider adoption of minimum till cane planting practice on existing legume beds.</p> <p>Continual support and collaboration to address the rising groundwater issue.</p>	<p>Small % of growers trialling intercropping in ratoons. Large % of growers have a rotation crop in the fallow.</p> <p>Mitigate production losses by addressing rising groundwater issue.</p>	<p>Presented legume trial results to growers via shed meetings.</p> <p>Presented to industry &amp; service providers via the Burdekin Cane Extension Group.</p> <p>ASSCT poster developed in collaboration with DAF.</p> <p>Collaboration with all irrigation stakeholders. Presentations on the irrigation project framework to all irrigation stakeholders.</p>
	<p>Investigate sub surface mill by-products at low rates in the outer regions of</p>	<p>Mill by products and other ameliorants applied sub surface at low rates on marginal</p>	<p>Establish trials applying mill by products at low rates in the outer regions to</p>	<p>Apply nitrogen rates via 6ES guidelines</p>	<p>Economic study completed on mill by product application at low rates. Develop a</p>	<p>Collaboration with DAF to establish two low-rate mill by-product trials in the</p>

	the district. Measure the response and evaluate profitability.	soil types in the outer regions of the district. Improving productivity and address the economic barriers.	collect data for industry analysis.	and lower to establish economic threshold.	plan with the mill to use the existing rail network to distribute by products to the outer regions of the district.	outer regions of the Burdekin.
	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 two 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



### 8.4 Pest and disease

The objectives for this priority are:

- RSD testing at the mill
- Reduce the reliance on a single pesticide
- Investigate strategic tillage practise vs herbicide application practises
- 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
<p>Improve yield by wider adoption of IPM, IWM and IDM</p> <p>RSD is estimated to be costing the Burdekin district \$4.5 million.</p> <p>Detecting RSD in cane at the mill. Automation of the RSD LAMP assay will assist in the adoption of the technology by the Mills.</p> <p>Strategic pesticide application (spot versus broadcast spraying)</p> <p>Reduce reliance on a single crop</p>	<p>Support development, testing and validation of RSD LAMP assay for the Herbert mills.</p> <p>High level Demonstration site infecting plots. These demonstration sites will verify yield reductions.</p>	<p>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.</p>	<p>Support adoption of the RSD LAMP assay in the Herbert mills.</p>	<p>Wider adoption of good farm hygiene practices. Data to guide growers and contractors to mitigate spread of RSD.</p>	<p>RSD LAMP assay to be installed at Burdekin mills.</p> <p>Increase in productivity due to a reduction in RSD infection.</p> <p>Automated sterilisation units on commercial cane harvesters and cane planters.</p>	<p>High level demonstration site to be established.</p> <p>Shed meeting presentations to 50% of the growers in the region.</p>
	<p>Conduct trials across the district comparing spot spray system and blanket application.</p>	<p>Reduction in pesticide use for targeted weed species. Apply residuals herbicides only on areas with historical weed pressure.</p>	<p>Establish trials to test efficacy and economic value of robotic spot spraying technology.</p>	<p>Adaptation of the technology to small spray equipment and large contractor equipment. Ability to be used in multiple cropping situations.</p>	<p>Commercialised product for the Australian sugar industry.</p> <p>Reduction in pesticide use across the district resulting in improved profitability and environmental outcomes.</p>	<p>Six trials completed in a multiple of situations. Plant cane, ratoons, and fallow crops. Reductions in herbicide use as high as 60% with 95% efficacy. WQ results show a similar trend.</p>

protection to treat canegrubs.	Investigate applying granular imidacloprid at planting.	Apply granular imidacloprid at planting to get a more precise application above the cane sett. Current timing of application and methods are not meeting standards.	Set up a billet planter in the Burdekin to gain confidence from growers and planting contractors.	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.	6861 tonnes of seed cane sold by BPS in 2022, sales are equivalent to 1.3% of the mill area. 20,000 tissue culture seedlings planted in 2022.

## 8.5 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

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
<p>Increase yield and profitability through adoption of new harvesting technology.</p> <p>Increase productivity by 2 t/ha on 50% of the district.</p>	<p>New harvesting manufacturers to industry.</p>	<p>Competition to the current manufacturers reducing costs.</p> <p>Potential new technology from increased competition.</p>	<p>Initial adoption of new competitors.</p>	<p>Introduction of new parts and sales to the region. More investment back into the community.</p>	<p>Competition to reduce capital outlay.</p> <p>Incentive to make large scale improvements / efficiency gains.</p>	<p>Support demonstration of the LiuGong S935TA harvester in a large plant cane crop in the Delta.</p> <p>Display of the harvester at the Burdekin Field day in May 2023.</p>
	<p>Demonstration of cane loss monitors to grower and harvesting sector.</p> <p>Coordinate small groups of harvesting contractors and growers</p>	<p>Increased adoption of yield and cane loss monitors.</p>	<p>Conduct more burnt cane trials in the Burdekin. Data collected to improve Harvest Mate.</p>	<p>Collaborate with SRA agriculture machinery specialist to develop workshops for growers and harvesting contractors.</p>	<p>Commercial harvesters have yield and loss monitors as standard equipment. This data can be used to inform HDST (Harvest Mate)</p>	<p>Installed Schlot live loss monitor onto commercial harvester. Completed mass balance trial with loss monitor comparison.</p> <p>Presented findings to shed meetings.</p>
	<p>Economic benefits of multirow harvesters to the district.</p>	<p>Reduced passes of heavy machinery across our fields.</p> <p>Improve harvesting efficiencies.</p>	<p>Reduction in labour requirements.</p>	<p>Inform Harvest mate with data captured from multi row harvester loss monitor.</p>	<p>Harvesting efficiency gains created on large paddocks. Increase in production due to slower forward speed. Extra ratoons due to more precise</p>	

		Increase controlled traffic adoption.			basecutter height and forward speed matching basecutter speed.	
	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. .	

## 9 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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