



Sugar Research
Australia

**SUGAR RESEARCH
AUSTRALIA**

**DISTRICT
PRODUCTIVITY
PLAN – BURDEKIN**

Brief Introduction

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

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

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1 Australian 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 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.

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
T Cane harvested	8,120,897	8,023,650	7,909,756	7,905,092	7,887,668
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. Dependent on the sugar price, growers will continue to look for alternative crops. The impact of Fall Army Worm on some of these alternative crops is resulting in a reversion back to sugarcane.

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	537	
# mills	4	4
Clean seed uptake	0.9%	
Tissue culture uptake	2 growers 8000 seedlings + 4000 in individual orders	Value is higher than cost of \$1.30 with productivity gains and a year advantage

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.

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 & 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
Irrigation	<p>Improve irrigation and energy management</p> <ul style="list-style-type: none"> ○ 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 <ul style="list-style-type: none"> ○ Automation of irrigation systems and record keeping (Irrigweb) by adopting new technologies ○ Training, events and workshops and demonstration sites will be used <ul style="list-style-type: none"> ○ 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 (BIP) technology, automation, factsheets, workshops and training, measurement
Variety management	<p>Increase development, selection and adoption of improved varieties</p> <ul style="list-style-type: none"> ○ Maintain high % of clean seed uptake and increase adoption of tissue culture to 20,000 seedlings

	<ul style="list-style-type: none"> ○ Improve grower adoption of QCANE select ○ Speed up the process to get new varieties out to growers and increase adoption. ○ 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	<p>Increase yield and sustainability through adoption of improved farming systems</p> <ul style="list-style-type: none"> ○ Develop methods of increasing and introducing carbon into soil <ul style="list-style-type: none"> ○ Mixed species fallow ○ Smart technology that measures soil health indicators ○ Increase productivity by 1.3t/ha across 50% of the Burdekin ○ Address rising groundwater in the BRIA and its effect on production ○ Utilise mil mud ash at low rates to address poor performing soil types. <ul style="list-style-type: none"> ○ Cost effective sub surface mill by products application ○ Address over use of pesticides in legume fallow crops <p>Understanding phosphorous requirements</p> <ul style="list-style-type: none"> ○ Soil science challenge ○ Research program to address <ul style="list-style-type: none"> ○ Soil assay available P ○ P fertilizer recovery ○ Yield and economic response ○ Placement impact
Pest & disease	<p>Improve yield by wider adoption of IPM, IWM and IDM</p> <ul style="list-style-type: none"> ○ Implementation of RSD LAMP testing in mills <ul style="list-style-type: none"> ○ Structured strategy targeting severely infected subdistricts ○ Reduce yield constraints by spatially identifying areas of pest/disease/weed pressure and severity ○ Strategic pesticide application (spot versus broadcast spraying) <ul style="list-style-type: none"> ○ Support spray technology that only applies pesticides where needed ○ Reduce reliance on a single crop protection to treat canegrubs <ul style="list-style-type: none"> ○ Develop a decision support tool coupled with alternative strategies ○ Investigate strategic tillage practise vs herbicide application practises
Harvesting	<p>Increase yield and profitability through adoption of new harvesting technology</p> <ul style="list-style-type: none"> ○ Increase productivity by 2 t/ha on 50% of the district ○ 30% adoption of yield and cane loss monitors <p>Conduct more harvest trials in the Burdekin</p> <ul style="list-style-type: none"> ○ Develop a pilot group of growers, harvester operators and millers to trial a payment system based off the HDST ○ Coordinate changes to the harvesting payment system ○ 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

Prod Services	Burdekin Productivity Services (BPS)	<p>Manager, Rob Milla</p> <p>BPS is a voluntary levy funded organisation with levies paid by both growers and the miller. BPS has 11 staff who deliver core BPS services including distribution of 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>
Millers	<p>Wilmar owns and operate all 4 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>	

Stakeholder type	Number/ key stakeholders	Total Area	
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%
Milling companies	Wilmar		
Grower representative organisations	CANEGROWERS Burdekin Limited Pioneer Canegrowers Organisation Kalamia Canegrowers Organisation Agforce Cane		
Productivity companies	Burdekin Productivity Services		
Regional variety committees	Burdekin Regional District Variety Committee		

7 Recent stakeholder engagement events

	DELIVERED THROUGH SRA	DELIVERY PARTNER EXTERNAL TO SRA
Education/Training	<p>Presented data on two SRA projects to 170 growers across 12 shed meetings.</p> <p>PowerPoint presentation to GBRF for Burdekin Irrigation project.</p> <p>PowerPoint presentation on Burdekin irrigation project at Bbifmac AGM.</p> <p>Coordinated and facilitated the first regional RSD workshop in the Burdekin.</p> <p>Coordinated and assisted the delivery of Group A herbicide resistance information to a small group of growers.</p> <p>Factsheets created for growers involved in the Burdekin Irrigation project</p> <p>Presented to CBL board on the Burdekin Irrigation project.</p> <p>Coordinated 75 year 3 Burdekin primary students to visit the Brandon station</p> <p>Coordinated and facilitated 26 year 5 students from a Townsville state school to a local farm in Giru.</p> <p>Coordinated and supervised partially a year 11 student for work experience on the station for a week.</p> <p>Coordinated Autoweed managing director to be guest speaker at BPS AGM.</p> <p>Attended project Bluewater spray dye night</p> <p>Attended and represented SRA at Burdekin Cane Extension Group meeting.</p>	<p>Burdekin Productivity Services & Farmassist</p> <p>Bbifmac</p> <p>Burdekin Productivity Services</p> <p>CQ University</p> <p>CQ University</p> <p>Autoweed and Burdekin productivity Services</p> <p>Farmacist</p> <p>DAF, BPS, Farmacist, Agritech Solutions, NQDT, CBL, PCGO, KCGO, Agforce Wilmar.</p>
Marketing and promotion of new varieties in region	<p>Presented and promoted data on new variety SRA32 to 170 growers at 12 shed meetings.</p> <p>One small grower has purchased and received tissue culture. Recently convinced a large grower to purchase tissue culture.</p> <p>Accompanied Pioneer canegrowers manager on a tour of the plant breeding facilities on station.</p> <p>Regular drone flights over PATS for the first three months until canopy cover. CATS and FATS flown monthly looking for variation between plant health, height, and growth patterns.</p>	<p>Burdekin Productivity Services and Farmacist</p>
Assist growers with on farm trials	<p>Harvested a nitrogen response trial on one of the Burdekin's largest family-owned cane farm.</p> <p>Coordinated and assisted the installation of Schlott hardware on a grower's harvester.</p> <p>Coordinated and assisted Herbert DM with harvesting Mass Biomass trial and Schlott harvester losses.</p> <p>Implemented a trial plan, calibrated fertiliser box for a nutrient response trial.</p> <p>Selected paddocks and coordinated Autoweed data collection and trials on various growers' paddocks.</p>	<p>Smartcane BMP</p> <p>Norris ECT</p> <p>Smartcane BMP an extension of Cane 2 Creek</p> <p>Autoweed and JCU</p>

Investigate and promote complementary income streams for industry	Investigated the opportunity for Burdekin growers to grow and sell industrial hemp as a fallow crop, alternatives to sugarcane crystals. B Green assistance in choosing a variety.	DAF Growers, Burdekin
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8 Events scheduled

Month	Events (As at 8.04.2022)
January	
February	Autoweed spray trial Grower station field walk
March	Shed meetings x 12 FEAT workshop Autoweed trial Weed resistance workshop RVA meeting
April	Rotary North Qld Field Day BCEG meeting
May	Irrigation field walk demonstration Irrigation workshop Grower station field walk Grower field day planning tissue culture
June	Young grower group
July	SRA Field Day Harvester loss monitor trial SHP grower update SRA phosphorous trials
August	SRA nutrient harvest trial Harvester decision support tool workshop
September	Irrigation field walk demo Nutrient trial
October	SHP Field Day Subsurface field day
November	Irrigation field walk demonstration SRA 6ES Toolbox SHP Field Day
December	Mixed species fallow field day FAW in sugarcane

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

Targeted Practices	How will we do it? <i>Measurement of the issue; Education and knowledge transfer; Planning, Industry engagement, New practices; Product; or Service</i>	What is the activity?	What outputs will be produced?	Which MEE outcomes are most relevant?	Investment Outcome	Investment measures
Burdekin Irrigation Project Volumes applied before and after. Measure yield improvement on demonstration sites and extrapolate data across district. Present to June 2024	Education and knowledge transfer	Measure baseline irrigation volumes & energy use Promote the use of Irrigweb and Opticane Promote automation of irrigation systems Develop demonstration sites and training workshops	Consortium engaging one on one taking initial measurements. Irrigweb training provided Automation installs. Growers access to funding by way of a tools rebate. Bbifmac install WQ measurements on sites. Grower learnings. Project presentation @ shed meetings. Demos & field days Case studies Presentations to industry.	Increased solution uptake	Better use of water and energy. Improved productivity due to less over and under irrigation. (Improved NUE & WUE) Remove human error. Improve grower lifestyle Automate record keeping Fill existing labour shortage gap.	High input demonstration sites. Replicated strip trials will demonstrate grower irrigation practice vs improved irrigation practise. Yield will be recorded over the life of the project. 26 growers initial EOI 1 28 growers EOI 2 Larger growers opting for this technology. (Large Ha)

9.2 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.

Targeted Practices	How will we do it? <i>Measurement of the issue; Education and knowledge transfer; Planning, Industry engagement, New practices; Product; or Service</i>	What is the activity?	What outputs will be produced?	Which MEE outcomes are most relevant?	Investment Outcome	Investment measures
Investigate other crops / technology Develop a range of niche varieties for different income streams. Maximise productivity by planting and harvesting by variety trait and crop age. Monitor grower using tissue culture. Evaluate potential \$ generated (Ongoing)	Education and knowledge transfer	Promotion of new varieties. Evaluate and participate in variety strip trial implementation and data analysis with BPS	Variety strip trial data	Increased solution uptake	Improved adoption of new varieties. High percentage of grower clean seed / tissue culture uptake. Improved yields across the district. Grower knowledge / understanding of variety selection, placement, and harvest time. Variety development for different income streams	Grower uptake. Variety strip trial data Increase tonnage through mills
	Education and knowledge transfer	Monitor grower using tissue culture. Evaluate potential \$ generated		Increased solution uptake	Larger uptake of clean seed and tissue culture	Grower uptake.
	Product	Help design or review of an app or something like QcaneSelect for mobile phones.	QCane App	Improved solution packaging		Commercial interest

9.3 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.
- Address over use of pesticides in legume fallow crops

These will be achieved in collaboration with Growers, BPS, Agriculture Consultants, NQDT, DAF, Wilmar through to June 2022

Targeted Practices	How will we do it? <i>Measurement of the issue; Education and knowledge transfer; Planning, Industry engagement, New practices; Product; or Service</i>	What is the activity?	What outputs will be produced?	Which MEE outcomes are most relevant?	Investment Outcome	Investment measures
Investigate appropriate mixed species crops that maximise carbon input to the soil	Research	Develop soil health long term indicators Improved more efficient soil health toolkit Add value to existing soil health long term sites Investigate intercropping. Which species is compatible with sugarcane and provides soil health benefits?	3 demonstration sites 4 temporal sites Trial data presented at shed meetings. Fact sheets Workshops	Research, breeding and solution development	Increase carbon input. Develop simple smart technology tools that measure soil health indicators. Measure Improved organic carbon levels.	3 demonstration sites 4 temporal sites Trial data presented at shed meetings. Fact sheets Workshops
Develop a commercial machine to apply ash products at low rates sub surface in one pass. Set up on ground trials.	Product	Set up trial around sub surface mill mud / ash application at a distant field away from the mill. Measure the response and evaluate cost.		Improved solution packaging		
Education on strategic tillage and herbicide group rotation.	Education and knowledge transfer	Locally SRA & BPS conducting meetings with growers and resellers about weed resistance.		Increased solution uptake	Speak with GRDC about funding training in the district	

9.4 Pest & 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
- YCS

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

Targeted Practices	How will we do it? <i>Measurement of the issue; Education and knowledge transfer; Planning, Industry engagement, New practices; Product; or Service</i>	What is the activity?	What outputs will be produced?	Which MEE outcomes are most relevant?	Investment Outcome	Investment measures
Engage with Wilmar about setting up LAMP test at one of the mills. Discuss privacy issues	Product	Historical mapping overtime, analysing the mill data.		Increased solution uptake	Map areas from the mill testing and investigate data. Target known means of spread (e.g. Planting contractors, harvesting contractors)	Disease free planting material Tissue culture sales Clean seed sales
	Education and knowledge transfer	Regional RSD workshops Continual education, shed meetings High level Demonstration site infecting plots. These demonstration sites will verify yield reductions.		Increased solution uptake		
	Product	Automated harvester sterilisation		Research, breeding and solution development		

Targeted Practices	How will we do it? <i>Measurement of the issue; Education and knowledge transfer; Planning, Industry engagement, New practices; Product; or Service</i>	What is the activity?	What outputs will be produced?	Which MEE outcomes are most relevant?	Investment Outcome	Investment measures
Continue research and development.	Research	Collaborate with pesticide manufacturing companies and review alternative long-term strategies.	Alternatives to imidacloprid and some insecticides in fallow crops.	Research, breeding and solution development	Trap cropping using other plant species in fallow crops. Reduction in imidacloprid use Reduced pesticide usage across the district	
	Education and knowledge transfer	Advisor training and grower workshops with a competency outcome.	Grower adoption	Increased solution uptake		
Support JCU Autoweed project.	Research	Conduct trials comparing spot spray system and blanket application.		Research, breeding and solution development		
Install insect traps around the region	Starch test and YCS monitoring		Improved growth, stress resilience		Reduction in YCS, increase tonnage	

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

These objectives will be achieved in collaboration with growers, harvesting operators, Wilmar and DAF by June 2023.

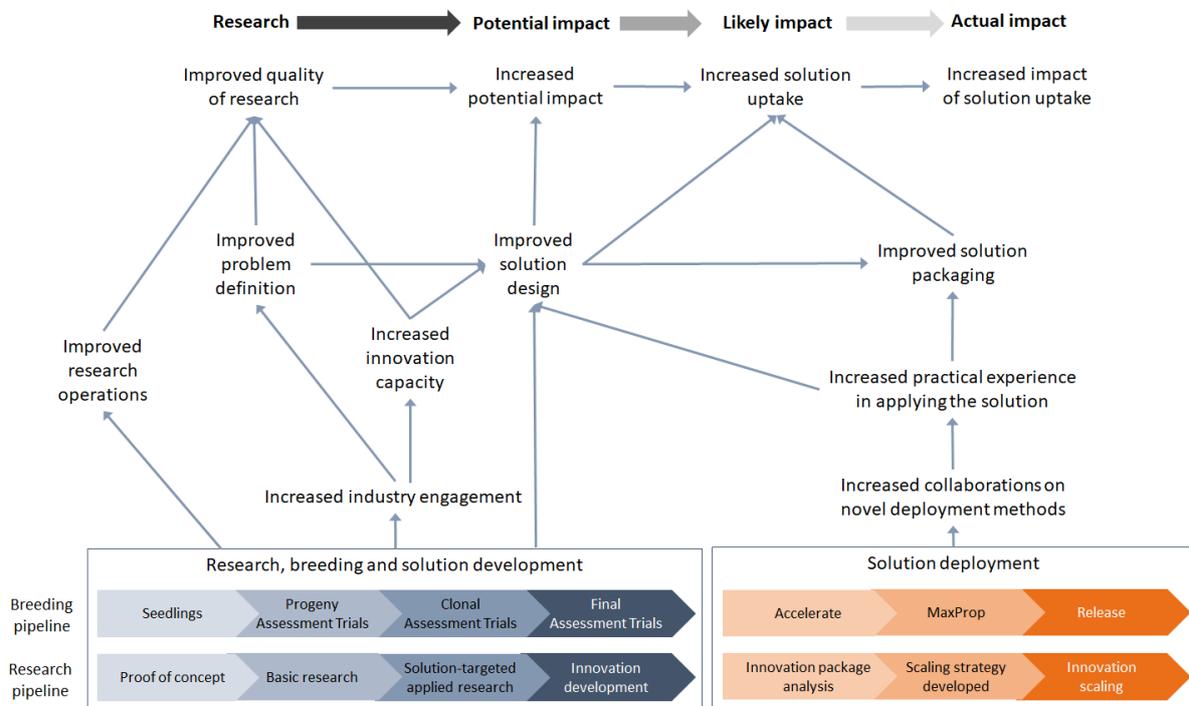
Targeted Practices	How will we do it? <i>Measurement of the issue; Education and knowledge transfer; Planning, Industry engagement, New practices; Product; or Service</i>	What is the activity?	What outputs will be produced?	Which MEE outcomes are most relevant?	Investment Outcome	Investment measures
Introduce cane loss monitors to harvesters	Education and knowledge transfer	Demonstration of cane loss monitors to grower and harvesting sector.	SRA agriculture machinery specialists to develop workshops for growers and harvesting contractors.	Increased solution uptake	Improve tonnage by better ratooning and less harvest losses Adoption of cane loss monitors to harvesters	Adoption of cane loss monitors to harvesters
Education of economic benefits to industry	Education and knowledge transfer	Coordinate small groups of harvesting contractors and growers			More profitable industry across harvesting, millers & growers. Payment on quality parameters as well as tonnage. Introduce harvester operators to the Harvester Predictive tool	Uptake of HDP tool Increase tonnage through the mills. Better quality of cane samples
Coordinate the development of a system that allows control of billet quality parameters from a mobile platform.	Education and knowledge transfer	Engage with major harvester companies about the concept			Remove the human error factor. Investigate current grain harvester technology and multiple row concept.	Adoption and adaptation of new technology to harvesters

10 Monitoring, evaluation and economics (MEE)

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

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

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



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



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